Influence of ESG Rating on Stock Price Behavior: Evidence from Malaysian Public-Listed Companies

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Abstract: Research Question: Does Environmental, Social, and Governance (ESG) ratings influence the stock price behavior of Malaysian Public Listed companies (PLCs) and which component of ESG has a more significant impact? **Motivation:** The relationship between ESG and stock performance is intricate and can vary based on factors such as geographical location, firm size, and specific ESG components considered. It is necessary to fully comprehend this relationship and its implications for investors and firms. There is a need to specifically examine the effect of ESG ratings on stock price behaviour of Malaysian PLCs. **Idea:** This study examines the relationship between ESG disclosures and stock price behaviours. **Data:** ESG disclosures of 33 Malaysian public-listed companies in the Bloomberg database from 2017 to 2022. **Method/Tools:** Various static panel estimators, specifically Pooled Ordinary Least Squares (POLS), Fixed Effects (FE), and Random Effects (RE). These models allow us to examine how changes in ESG disclosure affect stock price behavior measured by stock price synchronicity. **Findings:** Our results reveal that ESG disclosure and its environmental component are negatively associated with stock price synchronicity. Higher levels of ESG and environmental disclosures lead to greater incorporation of firm-specific information into stock prices, resulting in stock prices moving less in tandem with the broader market. Firms with strong ESG and environmental practices thus provide more transparency and specific information to investors, enhancing the informational efficiency of their stock prices. Conversely, social and governance disclosures do not significantly influence stock price synchronicity. As a robustness test, we also find that governance disclosure shows a significant negative relationship with idiosyncratic volatility, suggesting lower firm-specific risk and more stable stock prices. **Contributions:** This study contributes to new evidence on which components of ESG have a more significant impact on stock price behaviours. These findings underscore the importance of ESG practices in enhancing Malaysian public-listed firms' information environment and financial stability.

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Overall, the results reinforce the value of integrating ESG considerations into investment strategies.

Keywords: ESG rating; stock performance; stock price synchronicity; public-listed companies; Malaysia.
JEL Classification: G11, G18, G32, G38, H21

1. Introduction

ESG investing focuses on choosing investments that align with responsible corporate behaviours, steering portfolios clear of companies involved in hazardous or unethical operations. Effective ESG strategies can significantly enhance environmental outcomes, emphasizing the need to mitigate negative impacts and support sustainability. The environmental aspect looks at how a company works to safeguard the environment; the social aspect examines how it handles its interactions with employees, suppliers, customers, and the communities it operates; while the governance aspect delves into a company's leadership, executive pay, auditing practices, internal controls, and the rights of shareholders development (Li *et al.*, 2021; Gabric, 2023).

Investors are increasingly incorporating ESG factors into core benchmarks and passive investments. Lagoarde-Segot, in 2011, pointed out that the significance of ESG investments surged notably after the introduction of the United Nations Principles for Responsible Investment at the New York Stock Exchange in April 2006. According to Morningstar, Kerber (2024) reported contrasting behaviors between European and American investors regarding sustainable funds in the first quarter, with Europe maintaining steady interest and the United States experiencing a record net withdrawal of $8.8 billion from these products. Factors such as high interest rates, mediocre returns in 2023, greenwashing concerns, and the ongoing politicization of ESG-focused investing contributed to these outflows in the US.

The FTSE Russell indices offer a comprehensive suite of global index solutions, providing insightful data analysis for investors (FTSE Russell, n.d.). ESG indices play a crucial role in embedding ENV, SOC, and GOV factors into investment choices, fostering sustainable and ethical investing approaches. Bursa Malaysia's FTSE4Good Index evaluates firms' ESG performances, highlighting Malaysian firms committed to ethical practices. As of the latest review in December 2023, Bursa Malaysia expanded its FTSE4Good indices, incorporating 11 new constituents to enhance the diversity of ESG-compliant firms (The Malaysian Reserve, 2023).

ESG investing offers numerous benefits, including risk management, improved long-term returns, and fostering sustainable business practices. Manulife outlines five core advantages, emphasizing the growing importance of integrating ESG factors into investment strategies (Manulife Investment Management, 2020). Similarly, PwC's report on ESG deals and impact investing in Malaysia underscores the potential for creating significant positive social and environmental impacts while achieving financial returns (Sabri and Chang, 2023). This trend signifies a shift toward more ethical and sustainable investment practices in the Malaysian market. These insights collectively underscore the increasing relevance of ESG criteria in shaping investment landscapes, illustrating how global and regional indices and investor awareness drive the transition toward sustainability. Table 1 below shows the industry breakdown in the F4GBM Index.

Table 1: Industry breakdown in F4GBM Index

ICB Code	ICB Industry	No. of Firms	Market Cap (MYR mil)	Weighted %
10	Technology	11	27,519	4.15
15	Telecommunications	5	57,539	8.67
20	Health Care	5	14,028	2.11
30	Financials	15	239,377	36.06
35	Real Estate	11	14,986	2.26
40	Consumer Discretionary	13	31,340	4.72
45	Consumer Staples	10	46,608	7.02
50	Industrials	19	70,393	10.6
55	Basic Materials	6	52,694	7.94
60	Energy	9	26,339	3.97
65	Utilities	4	83,035	12.51
Totals		108	663,857	100

Source: FTSE4Good Bursa Malaysia Index Factsheet. FTSE Russell (May 31, 2024).

The relationship between ESG and stock performance is intricate. It varies based on factors such as geographical location, firm size, and specific ESG components considered. Further research is necessary to fully comprehend this relationship and its implications for investors and firms. Several challenges complicate this analysis: (1) Lack of Global Standards: The absence of uniform ESG criteria makes it challenging to assess firm performance consistently. (2) Availability and Quality of ESG Data: Since ESG data disclosure is often voluntary, the availability and quality of such data can be lacking. (3) Lack of Clear Link: A clear connection between sustainability initiatives and financial strategy can help investors understand a firm's financial performance (Gelb *et al.*, 2023).

Malaysian Public Listed Companies (PLCs) are notable for their strong ESG performance relative to their ASEAN peers (Adilla, 2022). The F4GBM Index evaluates the ESG performance of around 260 firms listed on the Bursa Malaysia Main Markets (Tan, 2022). Despite this, there is a need for more comprehensive studies that specifically examine the effect of ESG ratings on the stock performance of Malaysian PLCs. This research will conduct a case study on Malaysian PLCs to determine how ESG ratings influence their stock performance. It provides significant perspectives for investors, legislators, and the firms themselves. Hence, this study examines the relationship between ESG ratings and stock price behavior in the Malaysian market, especially the impact of Environmental, Social, and Governance factors on stock behaviours, such as synchronicity and idiosyncratic volatility.

This study contributes to the existing body of knowledge and has the potential to influence practical decision-making processes among various stakeholders. From an academic perspective, it addresses a gap in the literature by focusing on the impact of ESG ratings on the stock performance of Malaysian PLCs. The detailed case study approach used in this research could serve as a model for future studies in similar contexts. Furthermore, the findings could enhance ESG investing, CSR, and financial performance theories, particularly in emerging markets like Malaysia.

This paper is organized as follows. Section two reviews the literature and develops the hypothesis. Section three describes the data and methodology. Section four discusses the empirical results. The last section concludes the study.

2. Literature Review

ESG ratings have become crucial indicators of a business's commitment to sustainable and ethical operations. These ratings influence investment decisions and significantly shape a firm's overall performance. ESG has also become a focal point in the financial world, influencing portfolio construction and trading decisions. The impact of these ratings on

stock price behaviour has been extensively researched. Serafeim and Yoon (2023) investigated whether ESG ratings predict future ESG news and associated market reactions. They found that while the consensus rating predicts future news, its predictive ability needs to improve for firms with considerable disagreement between raters. In such cases, the relationship between news and market reactions weakens, although the rating with the most predictive power can still predict future stock returns. Similarly, Feng *et al.* (2022) explored the impact of ESG ratings on stock price reactions in Chinese firms, finding that high ESG ratings are associated with positive stock price reactions, particularly in firms with greater transparency and disclosure practices.

It is highlighted that firms with strong ESG ratings typically exhibit better profitability, lower risk, and higher valuations due to reduced capital costs. Improvements in ESG ratings predict future stock performance positively by identifying systematic and stock-specific risks (MSCI Sustainability Institute, 2023). Furthermore, Tan (2020) demonstrated that firms with higher ESG ratings outperformed those with lower ratings during the market volatility in 2020, showing greater resilience during downturns and less volatility. Additionally, Friede *et al.* (2015) examined over 2,000 empirical studies and found a positive correlation between ESG ratings and stock price reactions. They concluded that ESG factors are consistently priced by the market, indicating that investors increasingly consider ESG information when making investment decisions. This finding aligns with other research, reinforcing that ESG ratings significantly influence stock price reactions across different markets and periods.

Further reinforcing this, Fatemi *et al.* (2018) demonstrated that firms with superior ESG ratings tend to have higher Tobin's Q values, suggesting enhanced firm valuation through perceived lower risk and improved reputation. Atan *et al.* (2018) examined Malaysian firms. They found a significant positive relationship between higher ESG disclosure and Tobin's Q, indicating that the market values these firms more favorably due to their sustainable practices. Additionally, Lee *et al.* (2023) confirmed this positive relationship in Malaysian PLCs. These studies suggest that investors view high ESG-rated firms as better managed and more likely to deliver sustainable growth, leading to higher market valuations. In another study on Malaysian PLCs, Yip and Lau (2024) suggest that firms must increase their market capitalisation, reduce total liabilities, and improve their free cash flow to benefit from ESG practices.

Wang *et al.* (2022) highlight that strong ESG performance curtails managers' opportunistic behavior, which in turn reduces information asymmetry and enhances investor sentiment. This correlation suggests that firms with robust ESG practices are perceived as more transparent and reliable, increasing investor confidence and stock price stability. Contrarily, ESG rating disagreements can significantly elevate the risk of stock price crashes. Bi and Qu (2023) found that inconsistencies in ESG ratings undermine corporate information transparency and amplify investor sentiment volatility. When ESG ratings are not aligned, it creates confusion and uncertainty among investors regarding the actual ESG performance of a firm, which can lead to panic selling and increased crash risk.

Interestingly, another study presents a different perspective on the impact of ESG rating disagreements. Dong *et al.* (2025) discovered that such disagreements could reduce stock price crash risk, primarily driven by discrepancies in environmental ratings. Their mechanism analysis suggests that ESG rating disagreements attract media attention, enhancing public scrutiny and corporate transparency. This increased visibility can reassure investors and stabilize stock prices by ensuring that potential issues are promptly addressed and disclosed. While ESG performance generally reduces the risk of stock price crashes, disagreements in ESG ratings can have varying impacts on stock price crash risk. These

findings highlight the importance of ESG performance and the need for consensus in ESG ratings in mitigating stock price crash risk.

Among the many measures of stock price behavior, stock price synchronicity is a critical concept in finance. It reflects the degree to which individual stock prices move in tandem with the overall market. It measures the relationship between the fluctuations of a single stock price and the average price fluctuations in the market (Sun *et al.*, 2021). Essentially, stock price synchronicity indicates how much stock prices move together and has significant implications for asset pricing models, investment decisions, and risk management practices (Qiu *et al.*, 2019).

Several studies have explored the factors influencing stock price synchronicity. Dai *et al.* (2018) reported a significant positive correlation between CSR disclosure and stock price synchronicity. Their findings indicated that CSR information disclosure increases the synchronicity of stock prices with the market or sector index, suggesting that such disclosures result in stock prices moving more closely with broader market trends. This potentially implies a reduction in firm-specific information reflected in stock prices. Zhang and Zhou (2020) investigated the impact of leverage structure, breaking it down into operating and financing leverage. Their empirical results showed that both types of leverage negatively affect stock price synchronicity, suggesting that higher leverage reduces the extent to which stock prices move with the market.

Pedersen *et al.* (2021) also highlighted that ESG factors increasingly influence investment decisions and can affect a firm's intrinsic performance and perceived market value. Investors considering ESG information may adjust their views on a firm's risk and expected return, leading to better-informed investment decisions and potentially improved long-term firm performance. However, ESG disclosure could lead to varied stock returns based on multiple factors, illustrating the complex influence of ESG factors on stock prices and returns. New evidence also suggests that ESG-related investment enhanced the performance of Malaysian pension funds by providing higher returns and lower risk relative to non-ESG-related portfolios (Rahman and Lau, 2023).

Conversely, other studies underscore the complexity of the relationship between ESG factors and stock performance. Bae *et al.* (2021) found no significant relationship between CSR performance and stock performance during the COVID-19 crisis, suggesting that ESG factors do not inherently enhance resilience during periods of high market uncertainty. Their research indicates that ESG practices only sometimes protect shareholder value during crises, cautioning against definitive conclusions about the positive impact of CSR in such contexts. Similarly, Demers *et al.* (2020) concluded that CSR activities did not improve stock performance during the COVID-19 pandemic. Their analysis showed that ESG disclosure did not positively explain stock returns during the initial market downturn in early 2020 and was negatively associated with returns during the recovery period in the second quarter of 2020, even when accounting for industry affiliation and various risk measures.

Overall, stock price synchronicity is a multifaceted concept influenced by various factors. It plays a crucial role in reflecting the level of firm-specific information in stock prices, thereby contributing to market informativeness. Understanding this concept can provide valuable insights into market dynamics and firm behavior. However, further research is needed to comprehend the mechanisms and implications of stock price synchronicity fully. Despite the expanding body of research on the impact of ESG ratings on stock performance, several significant gaps still need to be addressed, which this study aims to address, especially on stock price synchronicity. Furthermore, existing research has concentrated mainly on developed markets, with emerging markets such as Malaysia receiving less attention. This underscores the need for studies that specifically investigate

the influence of ESG ratings on the stock price synchronicity of publicly listed firms in Malaysia, as the dynamics in emerging markets can differ considerably from those in developed markets.

On top of that, while some studies have examined the overall impact of ESG ratings on stock price synchronicity, few have explored the individual effects of the specific ESG components, namely ENV, SOC, and GOV. Understanding these individual components can provide a more detailed perspective on how each aspect of ESG contributes to stock price synchronicity. In conclusion, this research aims to fill these gaps by focusing on the role of ESG ratings in influencing stock price synchronicity, particularly in Malaysia, and by analyzing the impacts of the individual ESG components.

Based on the above discussion, the following hypotheses are proposed:

H1: ESG disclosure is negatively associated with stock price synchronicity.
H2: Environmental disclosure is negatively associated with stock price synchronicity.
H3: Social disclosure is negatively associated with stock price synchronicity.
H4: Governance disclosure is negatively associated with stock price synchronicity.

3. Methodology

3.1 Sample Period

This study examines the performance of Malaysian PLCs that are part of the F4GBM Index, covering the years from 2017 to 2022. This period includes distinct phases such as pre-pandemic, pandemic, and post-pandemic times, providing a comprehensive view of how various economic conditions influence ESG performance and stock market valuations. A balanced panel dataset is employed to ensure the integrity and consistency of the analysis despite some data gaps. Consequently, the study focuses on a subset of 33 Malaysian PLCs, guaranteeing robust and reliable empirical results throughout the entire study period.

The variables employed in the study are categorized into dependent, independent, and control variables. Table 2 summarizes all variables used in the research, offering a comprehensive overview of their functions and measurement methods within the analysis framework.

Table 2: List of variables

Variables	Coding	Metric Method
Dependent Variable		
Stock price synchronicity	SYNCH^	$\ln(R^2/1-R^2)$
Independent Variable		
Environmental, Social and Governance disclosure	ESG	Environmental–social–governance score as reported by the Bloomberg database
Environment disclosure	ENV	Environmental score as reported by the Bloomberg database
Social disclosure	SOC	Social score as reported by the Bloomberg database
Government disclosure	GOV	Governance score as reported by the Bloomberg database
Control Variable		
Market Capitalisation	MC	Product of share price and outstanding shares in the market
Price to Book Ratio	PBV	Ratio of the market price of a stock to its book value
Standard deviation	STD	Standard deviation of the rate of return
Skewness	SKEW	Skewness of the rate of return
Kurtosis	KUR	Kurtosis of the rate of return
Gross Domestic Product	GDP	GDP annual growth rate of Malaysia as reported by The World Bank

Notes: The metric method is based on methodologies established by Morck *et al.* (2000), Durnev *et al.* (2004), Dai *et al.* (2018), and Potharla *et al.* (2023).

Stock price synchronicity (SYNCH) refers to how individual stock returns align with overall market returns. This measure can fluctuate based on various factors, including market transparency and the characteristics of the investor base. SYNCH is calculated using the metric, following the methodologies established by Morck *et al.* (2000), Durnev *et al.* (2004), Dai *et al.* (2018), and Potharla *et al.* (2023).

$$R_{it} - R_{ft} = \alpha_0 + \beta_1\left(R_{mt} - R_{ft}\right) + \varepsilon_{it} \quad (1)$$

$$SYNCH_{it} = \ln\left(\frac{R_i^2}{1 - R_i^2}\right) \quad (2)$$

where R_{it} represents the stock returns while R_{ft} denotes the risk-free rate of return, and R_{mt} signifies the market return, typically represented by FTSE Bursa Malaysia KLCI. The expression $R_{mt} - R_{ft}$ calculates the spread between the market return and risk-free return. The R^2 value, which indicates the proportion of variance in stock returns explained by the market returns, is derived from Equation (1). To address the limitation that R^2 is confined to a range between 0 and 1, a logarithm transformation is applied in Equation (2).

The independent variables include overall ESG disclosure and the individual components of ENV, SOC, and GOV disclosure. ESG disclosure encompasses a firm's comprehensive reporting on its practices related to environmental, social, and governance factors. Conversely, the individual component disclosures focus on a firm's practices in each area. These disclosures are typically measured using ESG ratings from recognized ESG rating agencies. For this research, the ESG data are sourced from Bloomberg ESG.

The control variables are incorporated to account for other factors that might influence the relationship between ESG disclosure and stock price synchronicity, ensuring the robustness and reliability of the empirical analysis.

Market capitalisation (MC) measures a firm's size, calculated by multiplying the market price of its shares by the total number of outstanding shares annually. It provides a year-end snapshot of the firm's size for each year under study (Fernando, 2024). The firm's MC data is extracted from Bloomberg.

The price-to-book value (PBV) ratio is a financial metric used to compare a firm's MC to its book value. It is a tool for investors to assess whether a stock is overpriced or underpriced. A low PBV ratio may indicate an undervalued stock, while a high PBV ratio may suggest an overvalued stock. The PBV ratio data is extracted from Bloomberg. It is calculated annually using the end-of-year share price, assets, and liabilities (McClure, 2024) as shown in the following formula:

$$PBV = \frac{Stock\ Price}{Total\ Assets - Total\ Liabilities} \quad (3)$$

The standard deviation (STD), often called volatility, is an economic metric that indicates how much returns for a specific security or market index vary. It shows how much a stock's returns deviate from its average return, providing insight into the risk associated with the stock. A higher STD signifies greater volatility and, therefore, higher risk. The monthly stock returns data of the sample firms is extracted from Yahoo Finance. The STD is calculated monthly by taking the standard deviation of returns within a specified month and then annualizing it using the square root of 252, representing the typical number of trading days in a year as shown in the following formula:

$$STD = \sqrt{12\ months} \times \sqrt{Monthly\ Volatility} \quad (4)$$

Understanding skewness (SKEW) is crucial for risk management, as most stock returns exhibit skewness. More significant negative SKEW indicates increased risk, suggesting a higher probability of substantial and adverse outcomes. SKEW is a statistical metric that quantifies the lack of symmetry in a distribution. In the context of stock returns, it provides insights into the volatility and risk associated with a particular stock (Taylor, 2024). The formula for SKEW is as follows:

$$SKEW = \frac{\sum_{i=1}^{N}(X_i - \bar{X})}{(N-1)\sigma} \tag{5}$$

where X_i represents the stock return of the i^{th} month, $\bar{X}$ is the mean of the data, N is the number of monthly stock returns in a year, and σ is the standard deviation for the stock returns. In this study, skewness is computed based on the distribution of monthly stock returns for each firm over a year. The SKEW is determined through an Excel function to ensure uniformity and precision, utilizing monthly stock returns data from Yahoo Finance.

Kurtosis (KUR) measures the "tailedness" of a distribution. A high KUR indicates a distribution with heavy tails and a sharp peak, while a low KUR indicates a distribution with light tails and a flat peak (Miran, 2023). The formula for KUR is as follows:

$$KUR = \frac{Fourth\ Moment\ Value}{Square\ of\ Second\ Moment\ Value} \tag{6}$$

The Fourth Moment value is calculated as the fourth power of each deviation from the mean, summed, and then divided by the total number of observations. Conversely, the Second Moment value is the variance, the square of the standard deviation. Like SKEW, KUR is computed based on the distribution of monthly stock returns for each firm over a year. The KUR is calculated using the Excel function to ensure uniformity and precision, with monthly stock returns data extracted from Yahoo Finance.

Gross domestic product (GDP) is a measure that quantifies a nation's economic activity by considering the overall value in money of all goods and services generated within the country's borders within a specific period. The annual GDP growth rate, expressed as a percentage (%), indicates how fast a country's economy is growing or shrinking. This metric is crucial for comparing economic performance across countries and is a key indicator for policymakers and economists to assess an economy's health (World Bank, 2024). Our annual GDP growth rate for Malaysia is extracted from the World Bank.

We employed panel data analysis, which combines time series and cross-sectional data. This approach captures variations within firms over time and differences across firms at specific points in time. Multi-regression models are the primary tool for analyzing the relationship between ESG disclosures and stock price synchronicity. These models allow us to examine how changes in ESG disclosure affect stock price synchronicity across a sample of companies. The model is formulated as follows:

$$\begin{aligned} SYNCH_{it} = {} & \beta_0 + \beta_1 LNESG_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} \\ & + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \end{aligned} \tag{7}$$

In Equation (7), SYNCH represents stock price synchronicity, while ESG signifies the composite environmental, social, and governance disclosure. Other variables include MC, PBV ratio, STD, SKEW, and KUR. GDP variables are included to account for common economic shocks, with LN representing the natural logarithm. Importantly, all independent variables, except GDP, enter the model as lagged-one-year values to mitigate concerns

regarding reverse causality. To enhance the analysis of stock performance through ESG factors, the model has been refined by categorizing ESG disclosures into specific segments:

$$SYNCH_{it} = \beta_0 + \beta_1 LNENV_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \quad (8)$$

$$SYNCH_{it} = \beta_0 + \beta_1 LNSOC_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \quad (9)$$

$$SYNCH_{it} = \beta_0 + \beta_1 LNGOV_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \quad (10)$$

This study employs various static panel estimators, specifically Pooled Ordinary Least Squares (POLS), Fixed Effects (FE), and Random Effects (RE), based on Yan *et al*. (2024). The POLS model, a basic estimation technique, combines time series and cross-sectional data without accounting for unobservable entity-specific effects. In contrast, using the Least Squares Dummy Variable technique, the FE model accounts for individual differences through varying intercepts, capturing unique factors such as work culture and management styles. The RE model, however, considers that error terms can be correlated across time and entities, accommodating differences through error terms for each entity using Generalized Least Squares or maximum likelihood techniques. This model addresses heteroscedasticity and provides a more efficient estimation than the FE model.

Before estimation, diagnostic tests such as the Likelihood Ratio (Poolability) test, the Breusch-Pagan Lagrange Multiplier (BP-LM) test, and the Hausman test (HT) test are conducted to determine the most appropriate model. Model selection is based on the significance level, with p-value thresholds of 1%, 5%, or 10%. The null hypothesis is rejected if the p-value falls below the given threshold. If the Poolability test indicates that POLS is preferred over FE, the BP-LM test is then required to determine whether the RE model is better than the POLS model. This ensures that even if individual effects are not significant enough for FE, they could still be random and significant for RE. In contrast, if the Hausman test suggests that the RE model is better, the BP-LM test is performed to ascertain whether the RE model is better than the POLS model. This confirms the presence of random effects and their significance. By conducting these tests, the study ensures the selection of the most appropriate and robust estimation method for analyzing the panel data, considering individual-specific effects and their correlation with other explanatory variables.

4. Empirical Analysis and Discussion

4.1 Descriptive Statistics and Correlation

Table 3 shows the descriptive analysis of the dataset, consisting of 198 observations, which reveals significant variability across various vital metrics. The SYNCH values display a wide range with a mean of -0.7648, indicating a general trend of negative synchronization. The ESG disclosure is moderate overall, with a mean of 1.1047. Environmental (LNENV), social (LNSOC), and governance (LNGOV) disclosures indicate diverse performance levels, with governance disclosure being relatively higher (mean of 1.6055). MC demonstrates substantial differences in entity sizes, ranging from 0.9100 to 105.5279, reflecting significant variability. The PBV ratio exhibits a skewed distribution, with some entities having very high ratios (ranging from 0.1869 to 21.4168). STD values indicate varying levels of volatility among the entities, with a mean of 1.5449 and a wide range from 0.0677 to 11.5338. SKEW values range from -2.1027 to 2.2704, with a mean of -0.0344, suggesting a relatively symmetrical distribution despite outliers and extreme values. KUR values, with a mean of -0.0030, indicate a relatively normal distribution, although some

entities exhibit extreme kurtosis values ranging from -2.0420 to 6.0878. The GDP values show significant variability, with a mean of 3.5934 and a range from -5.4568 to 8.6503. This variability highlights the different economic conditions faced by the entities during the observed period.

This comprehensive analysis underscores the entities' diverse characteristics and performance levels, providing a robust foundation for further empirical investigation and hypothesis testing.

Table 3: Descriptive statistics

	Mean	Median	Maximum	Minimum	Observations
SYNCH	-0.7648	-0.5456	0.9969	-5.0445	198
LNESG	1.1047	1.1053	1.9095	-0.1054	198
LNENV	0.5276	0.7275	1.9865	-2.5257	198
LNSOC	1.0268	0.9746	1.9615	-0.9416	198
LNGOV	1.6055	1.6302	1.9169	0.9203	198
MC	25.2544	19.4034	105.5279	0.9100	198
PBV	3.0424	1.7459	21.4168	0.1869	198
STD	1.5449	0.8833	11.5338	0.0677	198
SKEW	-0.0344	-0.0239	2.2704	-2.1027	198
KUR	-0.0030	-0.3483	6.0878	-2.0420	198
GDP	3.5934	4.6281	8.6503	-5.4568	198

Table 4 presents a correlation matrix for ESG scores, including ENV, SOC, and GOV disclosures as independent variables. The correlation analysis reveals that ESG and its components have varying impacts on the financial metrics of Malaysian PLCs. The analysis shows that overall ESG disclosure (LNESG) has strong positive correlations with LNENV and LNSOC and a moderate positive correlation with LNGOV. This indicates that improvements in these areas enhance overall ESG performance. MC shows a moderate positive correlation with GOV disclosure but weak negative correlations with overall ESG, ENV, and SOC disclosures. This suggests that larger firms may only sometimes excel in these ESG dimensions. The PBV ratio is moderately negatively correlated with social disclosure and positively correlated with STD, indicating that firms with higher social performance might have lower PBV ratios and higher volatility. SKEW and KUR exhibit weak correlations with other variables, suggesting minimal influence on distribution asymmetry and outliers. GDP weakly correlates with all other variables, indicating a limited direct impact on firm-specific performance metrics. Overall, ESG, ENV, and SOC disclosures show correlations between 0.68 to 0.70. The remaining pairs exhibit correlations below 0.6, indicating no significant multicollinearity concerns. This ensures that most variables in the study are sufficiently independent, allowing for reliable regression analysis without the risk of inflated variance.

Table 4: Correlation matrix

	LNESG	LNENV	LNSOC	LNGOV	MC	PBV	STD	SKEW	KUR	GDP
LNESG	1									
LNENV	0.6782	1								
LNSOC	0.7010	0.2003	1							
LNGOV	0.3256	0.0672	0.2134	1						
MC	-0.0995	-0.1458	-0.1642	0.2399	1					
PBV	-0.0074	0.1289	-0.2638	0.0678	-0.1179	1				
STD	0.0850	0.1363	-0.1134	-0.1273	-0.0511	0.2502	1			
SKEW	-0.0400	-0.0538	-0.0036	0.0903	-0.0818	0.0054	0.0529	1		
KUR	0.0575	0.1008	0.0549	-0.0617	-0.0008	-0.0023	-0.0222	-0.1140	1	
GDP	0.0141	0.0289	0.0314	-0.0288	-0.0007	-0.0262	-0.1484	-0.1953	-0.0340	1

4.2 Results for the Baseline Models

This section presents the empirical analysis conducted to examine the baseline models on the influence of ESG ratings on the stock performance of Malaysian PLCs. The study aims to understand the relationship between ESG disclosures and financial performance. The analysis is divided into two main models: the ESG regression model, which assesses the overall impact of ESG ratings, and the disaggregated individual ENV, SOC, and GOV disclosure model, which examines the specific contributions of environmental, social, and governance disclosures to stock performance. Through these models, the study seeks to provide comprehensive insights into how different aspects of ESG practices influence stock performance.

Table 5 reports the impact of ESG disclosure variables on SYNCH using a FE model. The results reveal several important insights. Notably, the LNESG shows a significant negative relationship with SYNCH, with a coefficient of -1.0381. This indicates that higher levels of ESG disclosure are associated with lower SYNCH, supporting research hypothesis H1. In practical terms, this finding suggests that firms with better ESG performance have stock prices that are less likely to move in tandem with the broader market, likely reflecting the incorporation of more firm-specific information into their stock prices.

Additionally, MC demonstrates a significant positive relationship with SYNCH, with a coefficient of 0.0622. This implies that larger firms tend to exhibit higher synchronicity. One possible explanation is that larger firms are more integrated with the market and attract more attention from investors, causing their stock prices to align more closely with overall market trends. Conversely, other variables examined in the model, including PBV, STD, SKE, KUR, and GDP, do not show significant impacts on the DV. The absence of significant relationships for these variables suggests that they do not significantly influence SYNCH for the firms in the dataset.

Table 5: Regression results for the effect of overall ESG

Variable	Equation (7)
Constant	-1.0905*
	(0.6522)
LNESG	-1.0381**
	(0.4600)
MC	0.0622***
	(0.0188)
PBV	-0.0720
	(0.0590)
STD	0.0013
	(0.0785)
SKEW	-0.1520
	(0.1115)
KUR	-0.0704
	(0.0578)
GDP	0.0093
	(0.0163)
Model Selection Test	
Poolability (p-value)	0.0175**
BP-LM	0.5133
Hausman (p-value)	-
R-squared	0.2914
Adjusted R-squared	0.0703
F-statistic	1.3181

Notes: The figures in the parentheses are standard errors. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level.

The model explains approximately 29.14% of the variability in the DV, as indicated by the R-squared value. While the model captures a substantial portion of the factors influencing SYNCH, a significant amount of variability still needs to be explained, potentially due to other unobserved factors. The analysis highlights the importance of ESG performance and firm size in determining the degree of synchronicity in stock prices, suggesting that investors and policymakers should consider these aspects when assessing market behavior and firm valuation. The findings underscore that higher ESG disclosures correlate with lower SYNCH, reflecting that firm-specific information is integrated into stock prices. Conversely, larger firms tend to have higher synchronicity due to greater market integration and visibility.

Table 6: Regression results for the effect of individual components of ESG

Variable	Equation (8)	Equation (9)	Equation (10)
Constant	-1.8304***	-1.9770***	-0.2358
	(0.4492)	(0.4859)	(1.5300)
LNENV	-0.5301***		
	(0.1772)		
LNSOC		-0.2591	
		(0.2467)	
LNGOV			-1.2334
			(0.9304)
MC	0.0599***	0.0645***	0.0605***
	(0.0185)	(0.0192)	(0.0191)
PBV	-0.0917	-0.0621	-0.0463
	(0.0589)	(0.0597)	(0.0605)
STD	-0.0006	-0.0312	-0.0033
	(0.0768)	(0.0786)	(0.0807)
SKEW	-0.1729	-0.1463	-0.1462
	(0.1102)	(0.1133)	(0.1130)
KUR	-0.0674	-0.0718	-0.0816
	(0.0570)	(0.0591)	(0.0584)
GDP	0.0102	0.0056	0.0021
	(0.0160)	(0.0165)	(0.0163)
Model Selection Test			
Poolability (p-value)	0.0055***	0.0345**	0.0288**
BP-LM	0.5930	0.4265	0.4346
Hausman (p-value)	0.0001***	0.0013***	0.0009***
R-squared	0.3118	0.2690	0.2728
Adjusted R-squared	0.0971	0.0409	0.0459
F-statistic	1.4521*	1.1794	1.2021

Notes: The figures in the parentheses are standard errors. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level.

The regression analysis in Table 6 reports the influence of individual ESG disclosure variables (ENV, SOC, and GOV) on SYNCH using an FE model. In FE (8), the coefficient for LNENV is -0.5301, with a p-value indicating significance at the 0.001 level, supporting research hypothesis H2. This significant negative relationship suggests that higher ENV disclosure is associated with lower SYNCH, meaning that better environmental practices lead to stock prices that move less in sync with the broader market. This supports the notion that environmental information contributes to firm-specific knowledge, making stock movements more independent of market trends. In Equation (9), the coefficient for LNSOC is -0.2591 but is not statistically significant. Hence, hypothesis H3 is not supported. This indicates that SOC disclosure does not significantly impact SYNCH in this model. The lack of significance suggests that social factors may not provide substantial firm-specific information that influences stock price movements independently of the market. Similarly, GOV disclosure does not significantly impact the DV, meaning H4 is not supported either.

This implies that GOV disclosure, as disclosed, may not substantially affect the degree to which a firm's stock price moves independently of the market.

Across all models, MC consistently shows a significant positive relationship with SYNCH (coefficients: 0.0599, 0.0645, 0.0605, all significant at the 1% level). The results indicate that larger firms have higher synchronicity, possibly due to greater market integration and higher visibility, leading to stock prices that move more closely with market trends. Other variables examined in the model, including PBV, STD, SKEW, KUR, and GDP, do not show significant impacts on SYNCH across all models. The absence of significant relationships for these variables suggests that they do not significantly influence the DV for the firms in the dataset. This is an important consideration, as it indicates that while firm size and ESG performance are crucial, other financial metrics and macroeconomic indicators may be less influential. The R-squared values across the models indicate that the models explain approximately between 27.28% to 31.18% of the variability in SYNCH. This means that while the models capture some factors influencing DV, a significant portion of variability still needs to be explained, potentially due to other unobserved factors.

In short, higher ESG disclosures, particularly ENV disclosures, are significantly associated with lower SYNCH, indicating that these firms integrate more firm-specific information into their stock prices. Larger firms tend to exhibit higher synchronicity due to greater market integration. Other financial and macroeconomic variables examined do not significantly impact DV in this context.

4.3 Robust Check: Alternative Measures of Stock Price Behaviour

Idiosyncratic risk, or specific or unsystematic risk, refers to the risk inherent to a particular asset or a specific group of assets. This type of risk arises from factors unique to the asset, such as firm-specific events, management decisions, industry-specific conditions, or regulatory changes (Chen, 2022). Unlike systematic risk, which affects the entire market, idiosyncratic risk is not correlated with broader market risk (Ang *et al.*, 2006).

Idiosyncratic volatility refers to the variability in the returns of a specific asset due to its unique risk factors. It captures the risk of price changes caused by circumstances specific to a particular security or sector, distinguishing it from market-wide volatility (Nordqvist, 2024). Essentially, it is the component of a security's total volatility that is not explained by overall market movements, reflecting risks unique to that security (Irvine and Pontiff, 2005).

Studies have demonstrated a significant relationship between ESG ratings and idiosyncratic risk. A study by Cheng and Fang (2022) found that idiosyncratic volatility has dual effects on stock pricing: it influences both investors' expected returns and the efficiency of stock prices in reflecting their actual value. Another study by Horn (2023) highlighted those stocks of companies with ESG ratings exhibit lower idiosyncratic risk, with the effect being more substantial for higher ESG ratings. Even companies with lower ESG ratings showed significantly lower idiosyncratic risk than those without ESG ratings. According to Engelhardt *et al.* (2021), higher ESG scores are linked to decreased firm-specific risk, improving stock price stability and reducing volatility.

Equations (1) and (2) estimate the idiosyncratic volatility of stock prices, providing residuals that indicate the difference between market-expected returns and actual returns. These residuals represent the idiosyncratic behavior of stock prices. The STD of these residuals is computed for each year from the sample and is used as a proxy for the idiosyncratic volatility of stock prices (Hasan and Habib, 2017). In this context, the study examines the relationship between ESG disclosures and their components with the idiosyncratic volatility of stock prices. The following multiple regression models are employed to analyse this relationship:

$$IDIO_{it} = \beta_0 + \beta_1 LNESG_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \quad (11)$$

$$IDIO_{it} = \beta_0 + \beta_1 LNENV_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \quad (12)$$

$$IDIO_{it} = \beta_0 + \beta_1 LNSOC_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \quad (13)$$

$$IDIO_{it} = \beta_0 + \beta_1 LNGOV_{it-1} + \beta_2 MC_{it-1} + \beta_3 PBV_{it-1} + \beta_4 STD_{it-1} + \beta_5 SKEW_{it-1} + \beta_6 KUR_{it-1} + \beta_7 GDP_{it} + v_i + \varepsilon_{it} \quad (14)$$

In these equations, IDIO represents the measure of idiosyncratic volatility. The variables on the right-hand side of Equations (11) to (14) are consistent with those mentioned in Equations (7) to (10). The study uses these models to explore how overall ESG scores and individual components (ENV, SOC, and GOV) relate to idiosyncratic volatility in stock prices.

Table 7: Regression results for idiosyncratic volatility as the alternative measure of stock price behavior

Variable	Equation (9)	Equation (10)	Equation (11)	Equation (12)
Constant	0.6296***	0.3997***	0.3687	2.0595***
	(0.2153)	(0.1175)	(0.2971)	(0.4783)
LNESG	-0.2418			
	(0.1743)			
LNENV		-0.0314		
		(0.0640)		
LNSOC			0.0795	
			(0.1509)	
LNGOV				-1.1037***
				(0.3025)
MC	-0.0031	-0.0030	0.0087	-0.0006
	(0.0024)	(0.0026)	(0.0117)	(0.0024)
PBV	0.0148	0.0172	-0.0027	0.0215
	(0.0150)	(0.0156)	(0.0365)	(0.0144)
STD	0.2371***	0.2219***	0.0075	0.2365***
	(0.0345)	(0.0353)	(0.0481)	(0.0335)
SKEW	-0.0393	-0.0363	0.0097	-0.0120
	(0.0623)	(0.0630)	(0.0693)	(0.0620)
KUR	-0.0155	-0.0187	-0.0416	-0.0211
	(0.0336)	(0.0339)	(0.0361)	(0.0334)
GDP	-0.0282***	-0.0288***	-0.0232**	-0.0298***
	(0.0099)	(0.0099)	(0.0101)	(0.0099)
Model Selection Test				
Poolability (p-value)	0.0000***	0.0000***	0.0000***	0.000***
BP-LM (p-value)	0.0275**	0.0078***	0.0394**	0.0658*
Hausman (p-value)	1.0000	1.0000	0.0000***	1.0000
R-squared	0.2471	0.2239	0.6457	0.3085
Adjusted R-squared	0.2135	0.1893	0.5351	0.2777
F-statistic	7.3601***	6.4709***	5.8402***	10.0068***

Notes: The figures in the parentheses are standard errors. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level.

The regression analysis examines the factors influencing the IDIO using both FE and RE models. Table 7 reveals several vital insights. The constant term is significant in most models, indicating a consistent baseline level of IDIO across the data. The overall LNESG, LNENV, and LNSOC disclosures do not significantly impact IDIO, suggesting that these general ESG disclosures may not substantially influence firm-specific risk. However, LNGOV disclosure significantly negatively impacts IDIO, indicating that robust GOV

practices are associated with lower firm-specific risk. This relationship underscores the importance of governance in enhancing firm stability and investor confidence by mitigating risks associated with managerial opportunism and improving resource allocation and risk management.

MC and PBV ratios also do not significantly affect IDIO, implying that firm size and valuation metrics are not significant determinants of firm-specific risk. SKEW and KUR show no significant impacts, indicating that the shape of the return distribution does not heavily influence IDIO. Conversely, the STD is consistently significant, indicating that higher stock return volatility is associated with higher IDIO. The GDP significantly negatively affects all models, suggesting that higher economic growth helps reduce firm-specific risk.

The models explain 22% and 65% of the variability in IDIO, with adjusted R-squared values slightly lower, indicating a moderate fit. In summary, GOV practices and stock return volatility are significant predictors of IDIO, while economic growth plays a stabilizing role. Other factors, such as overall ESG scores, MC, and valuation metrics, do not show significant impacts, highlighting the crucial role of governance in managing firm-specific risk.

5. Conclusion

Our results provide valuable insights into the impact of ESG disclosures on the degree of stock price synchronicity and idiosyncratic volatility. Firstly, the study reveals that overall ESG and ENV disclosures are negatively associated with SYNCH. This indicates that higher levels of ESG and ENV disclosures lead to greater incorporation of firm-specific information into stock prices, resulting in stock prices that move less in tandem with the broader market. Firms with strong ESG and ENV practices thus provide more transparency and specific information to investors, enhancing the informational efficiency of their stock prices. Secondly, the research identifies a significant negative relationship between GOV disclosure and IDIO. This suggests that robust GOV practices contribute to a reduction in firm-specific risk. Effective governance mechanisms, which include higher transparency, better decision-making processes, and more robust compliance with regulations, reduce uncertainties and firm-specific risks, leading to more stable and predictable stock performance.

The relationship between these two results underscores the comprehensive impact of ESG practices on market behavior. While ESG and ENV disclosures enhance the informational efficiency of stock prices by reducing synchronicity, GOV disclosures strengthen firm stability by lowering IDIO. This dual effect highlights the multifaceted benefits of ESG practices, contributing to firms' transparency and stability. The negative correlation between ESG and ENV disclosures with SYNCH and the substantial influence of GOV disclosures in decreasing IDIO underscores the significance of thorough ESG practices. These findings suggest that firms that invest in robust ESG practices enhance their market transparency and stabilize their stock performance, ultimately contributing to a more efficient and resilient market. These insights are valuable for investors, policymakers, and corporate managers aiming to understand and leverage the benefits of ESG practices in the financial markets.

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