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Environmental, Social, and Governance (ESG) Risk towards Stock Market Reaction in Indonesia

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ABSTRACT

Investors want to ensure that their investments will be sustainable by investing in a business that considers ESG aspects. This research aims to examine the effect of ESG risk on stock market reaction in Indonesia. Research samples include 300 observations that listed on the index of Indonesian Stock Exchange ESG Leaders. ESG risk is measured by ESG risk score. Stock market reaction is measured by abnormal return. Hypothesis test uses fixed-effect regression analysis. Based on data analysis, ESG risk has an effect on stock market reaction. The effect of ESG risk on stock market reaction occurs more in lower information asymmetry. It indicates that lower ESG risk captures effective ESG implementation and lower companies' risks and attracts investors to buy the stock. This research provides new evidence of ESG risk on investors' reactions on the Indonesian Stock Exchange.

Keywords: ESG Risk, Stock Market Reaction, Index of ESG Leader
JEL Classification: D53, G41, O16, Q51

1 Introduction

Companies consider social and environmental aspects in business activities and integrated them with a good governance system. It happens since there is a demand for business sustainability where business needs to be run in the long-term without harming environmental and social aspects (Cohen, 2023). Environmental, social, and governance (hereafter ESG) activities facilitate the efforts to achieve business sustainability. ESG plays an important role in the implementation of environmental and social responsibilities to achieve long-term revenues and profits and integrate companies' vision with a combination of economics, environmental, and social (Cohen, 2023).

At the same time, investors also consider ESG aspects when they make an investment decision. ESG investment refers to the condition where the investment involves ESG aspects. In the context of companies, ESG investment can be implemented by doing business that considers environmental aspects (such as carbon emission reduction, energy efficiency, natural resources efficiency, recycling, the use of water, renewable energy, etc.) or social aspects (such as diversity in working place, employee policy, slavery avoidance, etc.) (Baier et al., 2020; Broadstock et al., 2020). In the context of investors, sustainable investment can be achieved when investors invest in companies that do ESG investments (Cohen, 2023).

Investors want to ensure that their investments will be sustainable by investing in a business that considers ESG aspects. Rahman (2022) reports that, based on a survey by Katadata Insight Center, there are 66.1% of Indonesian investors tend to invest in companies with ESG implementations. PricewaterhouseCoopers (2023) also reports that most investments with ESG interact more with investors than none in the ASEAN stock market. The Indonesian Stock Exchange supports ESG consideration in stock investment by providing some indexes for green stocks such as indexes of SRI-Kehati and ESG leaders. PricewaterhouseCoopers (2023) reports that there is an improvement in stock performance that is listed on the indexes of SRI-Kehati and IDX ESG Leaders from 2021 until 2023.

Investors' interest to invest in the companies that implement ESG leads to the explanation of why investors give a positive response to the ESG implementation in the stock market. First, ESG implementation contributes to stock value since there is an improvement in companies' performance. By implementing ESG, companies can generate a new market segment of green products for green customers (Baier et al., 2020; Broadstock et al., 2020), expenditure saving from energy efficiency (Baier et al., 2020; Broadstock et al., 2020; Zhang et al., 2020), and reduction of cost of conflict between companies and regulators (Baier et al., 2020; Redondo Alamillos & de Mariz, 2022). Second, ESG implementation contributes to future stock value since ESG brings the aspect of sustainability. Investment sustainability is important for investors to get future returns (Jain et al., 2019; Serafeim & Yoon, 2022). Sustainable investment comes from sustainable businesses by the companies. Sustainable businesses help companies to provide more cash flow and earnings in the future (Lys et al., 2015). Third, ESG can bring more potential for dividends. Since ESG implementation helps companies get better performance, including generating more earnings (Yoon & Chung, 2018), there is potential for bigger dividends for investors (Dahiya et al., 2023; Seth & Mahenthiran, 2022). Some studies find that ESG leads to positive stock market reactions e.g. (Leite & Uysal, 2023; Nyakurukwa & Seetharam, 2023; Serafeim & Yoon, 2022; Yin et al., 2023). In Indonesia, some studies find a positive relationship between ESG disclosure and investors' reactions in the stock market e.g. (Cheng & Christiawan, 2011; Khomsiyah

& Martha, 2023).

However, some studies find inconsistent relationships between ESG and stock market reactions. For example, Almeyda and Darmansya (2019), Ningwati et al. (2022), and Trisnowati et al. (2022) do not find a significant relationship between ESG and stock market reaction. Furthermore, Wang et al. (2023), and Murata and Hamori (2021) find that ESG gives a negative impact on the market reaction. The inconsistency of previous findings may come from the issue of greenwashing (de Jong et al., 2019). Greenwashing refers to the information on ESG implementation where ESG information is only used to increase positive perception from the public and avoid regulation violations without generating improvement of sustainable business (Becker-Olsen & Potucek, 2013; de Freitas Netto et al., 2020). Some studies such as Du (2014) and Li et al. (2022) find that greenwashing misleads investors to evaluate the stock value.

To avoid the greenwashing effect, investors need to evaluate how far ESG contributes to the companies' performance. PricewaterhouseCoopers (2023) suggests ESG implementation can contribute to positive stock value if ESG performance is evaluated first, for example, into ESG rank or rating. The Indonesian Stock Exchange with Sustainalytics provides evaluation for ESG implementation. The result of the evaluation is called ESG risk. ESG risk indicates the ESG contribution to reducing companies' risks (Münchhausenet al., 2021). Lower ESG risk shows lower companies' risks because of ESG contribution.

In this case, this research aims to examine the effect of ESG risk on investors' reactions. Investors will give a positive reaction to lower ESG risk since ESG implementation contributes to reducing companies' risks. There are arguments why investors give positive responses to lower ESG risk. First, lower ESG risk indicates higher ESG performance. Higher ESG performance can give benefits better companies' performance (Baier et al., 2020; Broadstock et al., 2020; Yoon & Chung, 2018; Zhang et al., 2020) and business sustainability (Jain et al., 2019; Serafeim & Yoon, 2022) that leads to higher stock value, and provide higher companies' earnings (Yoon & Chung, 2018) that leads to higher potential of dividends (Dahiya et al., 2023; Seth & Mahenthiran, 2022). Second, lower ESG risk indicates that companies have lower risks. Lower companies' risks become good news for investors since companies' stocks also contain lower risks (Andreou et al., 2021; Zulfitra et al., 2022). Based on signaling theory, ESG risk gives a signal of information about companies that have good ESG performances and low risks. Xiong (2021) finds that lower ESG risk leads to higher stock returns.

There are some contributions from this research. First, this research fills previous findings gap about the relationship between ESG and investors' reaction (Almeyda & Darmansya, 2019; Cheng & Christiawan, 2011; Khomsiyah & Martha, 2023; Leite & Uysal, 2023; Murata & Hamori, 2021; Ningwati et al., 2022; Nyakurukwa & Seetharam, 2023; Serafeim & Yoon, 2022; Trisnowati et al., 2022; Wang et al., 2023; Yin et al., 2023). For example, different with Xiong (2021) who examines the effect of ESG risk on stock price in crisis period of COVID-19, this research runs in period of COVID-19 and post-pandemic and also does the examination in alternative scenario of information asymmetry condition as robustness test. Second, this research provides new evidence of ESG risk on investors' reactions on the Indonesian Stock Exchange. Since there is a positive trend of ESG-based investment in Indonesia (PricewaterhouseCoopers, 2023; Rahman, 2022), it is important to provide how investors in the Indonesian Stock Exchange react to the ESG risk. Compared to

30% of global CEOs, 38% of Indonesian CEOs consider ESG implementation in business, however, compared to 40% of global CEOs, only 22% of Indonesian CEOs consider ESG in risk management (PricewaterhouseCoopers, 2021).

2 Literature Review

2.1 Signaling Theory

Signaling theory explains that there is specific information published to give a specific signal to external parties about companies' quality (Lee et al., 2022; Spence, 1973). The main objective of information signaling is to reduce information asymmetry between companies and external parties. As one of the external parties, investors need to know the companies' quality to make an investment decision (Su et al., 2014). On the other hand, companies need to give a signal to investors because companies have a quality that has to be informed to investors (Connelly et al., 2010).

Connelly et al. (2010) explain the steps of information signaling. First, there is a company that has specific qualities as a signaler. Second, the signaler sends the signal. Third, there are information users as signal receivers. Receivers will observe and interpret the signal. Fourth, receivers will give their reaction and send feedback to the signaler. In the context of ESG risk, companies give a signal to investors that investors need to invest in the companies' stock since companies have benefits of ESG implementation that are successful to reduce risks. The concept of signaling theory in the ESG implementation can be seen in figure 1.

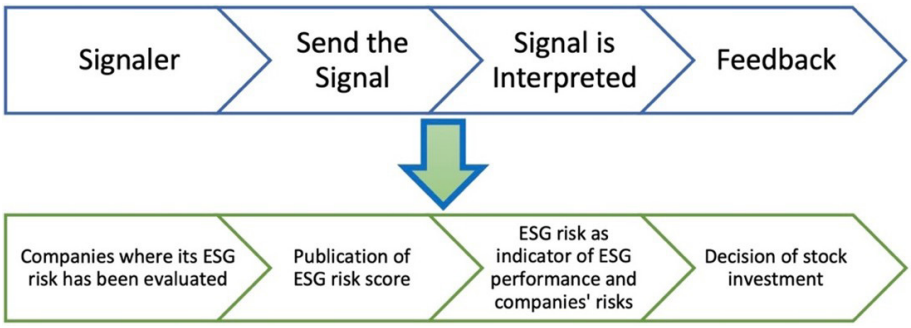

Figure 1. Signaling Theory in the Context of ESG Risk

Source: signaling theory explanation by Connelly et al. (2010) that has been adjusted to the context of this research

Based on Figure 1, the signalers are the companies where ESG risk has been evaluated. In the context of the Indonesian Stock Exchange, the signalers include companies that are listed on the index of ESG leaders and have been evaluated by Sustainalytics. Signalers give a signal by the publication of the ESG risk score. In the context of the Indonesian Stock Exchange, the ESG risk score is published by Sustainalytics, whereas almost at the same time, the Indonesian Stock Exchange publishes the evaluation result for companies that are listed on the index of ESG leaders. As a signal, the ESG risk score is interpreted by investors. Investors evaluate ESG risk scores as the indicators of ESG performance and companies' risks. Investors will give feedback by making an investment decision. Investors decide to sell, buy, or hold the companies' stocks when the ESG risk score is published. In this case, investors' decisions will be reflected by stock price and return.

2.2 Environmental, Social, and Governance (ESG)

2.2.1 ESG Implementation

ESG happens since there is an issue of business sustainability where companies have to run businesses that consider economic, social, and environmental aspects (Shakil, 2021). Baier et al. (2020) also suggest ESG as a foundation of corporate social responsibility and business sustainability implementation. In general, ESG is defined as companies' activities to fulfill environmental, social, and ethical responsibilities based on good governance (Kim & Li, 2021).

ESG has components that are connected one to another. Baier et al. (2020) explain each component of ESG. The first component is the governance aspect. The governance aspect includes corporate governance mechanism, audit and control, board structure, management compensation, investors' rights, transparency, business ethics, fraud and corruption, political consequences, whistle-blowing, sustainability report, stakeholder, and regulation. The second component is the environmental aspect. An environmental aspect includes ecosystem, land, biodiversity, water, climate change, energy and renewable energy, carbon emission, environmental management and standard, pollution, product responsibility, waste, recycling, and green supply chain. The third component is the social aspect. Social aspect includes public health, medicine access, HIV and AIDS, nutrition, product safety, charity, education, human rights, public relation, freedom of expression, and labour.

In the context of investors and capital markets, some studies already examine ESG. Figure 2 shows the pattern of ESG studies in the context of ESG implementation.

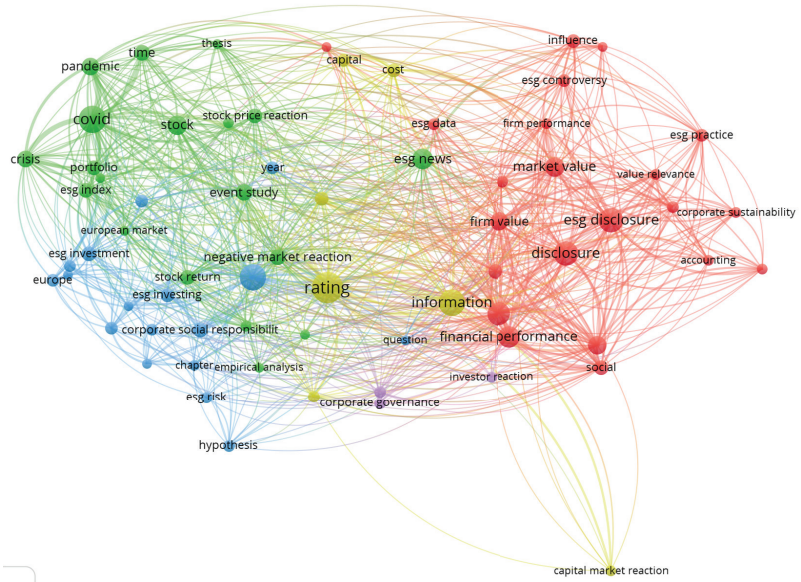

Figure 2. ESG Studies

Source: proceed data by VosViewer

Figure 2 is a result of a bibliometric analysis based on the keywords of "ESG" and "stock market reaction". Based on Figure 2, there are examinations of ESG implementation that relate to the capital market. The studies include event study, ESG index, ESG rating, ESG investment, ESG risk, companies' performance, pandemic and covid, sustainability, market reaction, stock return, and stock price.

In Indonesia, ESG implementation is included in the regulation of POJK no. 51/POJK.03/2017. Companies that are listed on the Indonesian Stock Exchange have to do sustainable finance and investment by doing ESG in the business. Regulation of POJK no. 51/POJK.03/2017 regulates the implementation of social and environmental responsibilities that have to be run based on good corporate governance. Furthermore, the Indonesian Stock Exchange provides a stock index to attract green investors who are interested in ESG-based investment such as the index of ESG leaders.

There are some findings of ESG implementation in emerging market in Asia including Indonesia. Feng et al. (2015) find that ESG implementation in Asia increase risk investment since there is costs increasing to implement environmental responsibility. Manchiraju and Rajgopal (2017) also find that ESG implementation reduce stock price. However, in Indonesia, there are conflicting results. On one hand, Kurnia et al. (2020) find the positive relationship between ESG and stock value. On the other hand, Mahmudah et al. (2023) find the negative relationship between ESG and stock value while Ramadhan et al. (2023) do not find sigficant relationship between ESG and stock value.

2.2.2 ESG Risk and Index of IDX ESG Leader

Index of IDX ESG Leader is a stock index in the Indonesian Stock Exchange. The index is launched on 14th December 2020. The index of IDX ESG Leader is a thematic index where the index lists companies based on the theme of ESG. Companies on the index of IDX ESG Leader are companies with good ESG performance, no significant controversy, liquid stock transactions, and good finances (Indonesian Stock Exchange, 2020). The ESG evaluation is run by the external party which is Sustainalytics.

The result of ESG evaluation by Sustainalytics is ESG risk. ESG risk refers to the degree of companies' risks that have been reduced by implementing ESG (Münchhausenet al., 2021). The lower the ESG risk, the higher the ESG performance to reduce and manage companies' risks. The ability of ESG to reduce companies' risks can be seen in Figure 3.

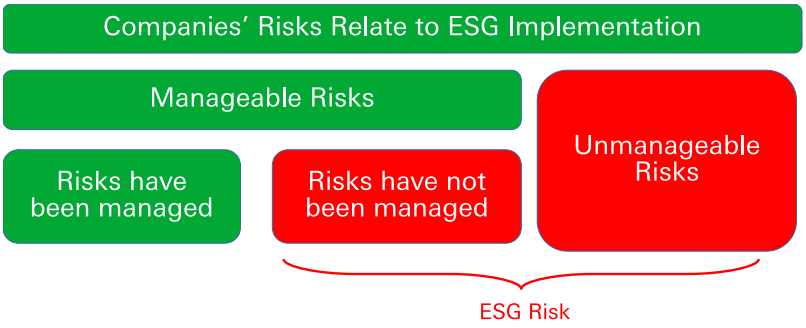

Figure 3. ESG Risk

Source: Sustainalytics (2021)

Figure 3 shows the evaluation steps of ESG risk. First, there is an identification of companies' risks, especially risks that relate to ESG implementation. Second, companies' risks are split into manageable and unmanageable risks. Third, there is an identification of whether manageable risks have been managed. Manageable risks include risks that have been managed and have not been managed. Risks that have been managed indicate the ESG performance where ESG implementation gives benefits for companies to manage and reduce risks. On the other hand, risks that have not been managed show that ESG

implementation gives no contribution to risk reduction. Fourth, risks that have not been managed and unmanageable risks are determined as ESG risks. Higher ESG risk shows lower ESG effectiveness to reduce companies' risks (Münchhausenet al., 2021).

Some studies specifically examine ESG risk. Zioło et al. (2023) observe the literature review that relates to ESG risk. Zioło et al. (2023) find that ESG risk includes business and sustainability risks. In the US, G. Cohen (2023) examines the effect of ESG risk on companies' value and finds that there is no significant relationship between ESG risk and companies' valuation. G. Cohen (2023) also examines the effect of ESG risk on companies' survival and finds that higher ESG risk reduces financial stability and increases default risk. Xiong (2021) examines the effect of ESG risk on stock in the US and finds that lower ESG risk increases stock returns. There are also studies of ESG risk in Indonesia. Purwitasari et al. (2023) examine the effect of ESG risk on companies' performance and find that there is no significant relationship between ESG risk and companies' performance. Yudhanto and Simamora (2023) examine the mediating role of companies' risk between ESG risk and companies' performance and find that lower ESG risk improves companies' performance by reducing companies' risks.

2.3 ESG Risk and Stock Market Reaction

Pástor et al. (2022) find that 17% of stock return variance is explained by green factors. Ramelli et al. (2021) also find that environmental events such as climate change and emission change how investors behave. In Indonesia, 66.1% of investors tend to choose green investments based on ESG (Rahman, 2022). In this case, ESG implementation affects how investors make a decision. In general, investors tend to invest in green investment, including ESG-based investment, to ensure their investment values are sustainable and do not violate any ethical norms (Baier et al., 2020; Broadstock et al., 2020; G. Cohen, 2023; Gil Cohen, 2023).

One of the indicators to evaluate ESG implementation is ESG risk. ESG risk is important information for investors to evaluate companies. First, ESG risk defines ESG performance. Lower ESG risk indicates that ESG is successful to reduce companies' risks. The ability of ESG implementation to reduce companies' risks shows the effectiveness of ESG. When ESG implementation is effective, it means that ESG implementation can give benefits to investors. Effective ESG implementation generates more companies' performance such as a new market segment of green products for green customers (Baier et al., 2020; Broadstock et al., 2020), expenditure saving from energy efficiency (Baier et al., 2020; Broadstock et al., 2020; Zhang et al., 2020), and reduction of cost of conflict between companies and regulators (Baier et al., 2020; Redondo Alamillos & de Mariz, 2022). If companies have better performance, companies' stock values are also increased. Effective ESG implementation also generates business sustainability. When business sustainability occurs, companies' stock values are also increased in the future (Jain et al., 2019; Serafeim & Yoon, 2022). The guarantee of future stock value comes from the ability of business sustainability to assure future cash flow and earnings (Lys et al., 2015). Furthermore, if ESG implementation can generate more current and future earnings (Lys et al., 2015; Yoon & Chung, 2018), investors have more possibility to get more dividends (Dahiya et al., 2023; Seth & Mahenthiran, 2022).

Second, ESG risk is also an indicator of companies' risks. Lower ESG risk indicates that companies also have lower risks. For example, G. Cohen (2023) finds that lower ESG

risk leads to lower default risk. When companies have lower risks, investors tend to buy companies' stocks since investors will bear lower risks as well (Andreou et al., 2021; Zulfitra et al., 2022). When investors tend to buy lower-risk stocks, the stock price will increase.

Indicators of ESG performance and companies' risks in the ESG risk will affect investors' reactions in the stock market. Lower ESG risk will be good news for the market since it shows higher ESG performance and lower companies' risks. On the other hand, higher ESG risk will be bad news for the market since it shows lower ESG performance and higher companies' risks. Based on signaling theory, ESG risk is a signal of companies' qualities to implement effective ESG and reduce risks. ESG risk information is needed by investors because investors cannot evaluate directly how companies implement ESG in their daily business activities.

Some studies already examine the ESG implementation and companies' risks on stock market reaction. Leite and Uysal (2023), Nyakurukwa and Seetharam (2023), Serafeim and Yoon (2022), and Yin et al. (2023) find that ESG implementation has an effect on market reaction. Andreou et al. (2021) and Zulfitra et al. (2022) find that companies' risks have an effect on stock market reaction. Furthermore, Xiong (2021) finds that lower ESG risk leads to higher stock returns.

Ha: ESG risk has an effect on stock market reaction.

3 Data and Method

3.1 Sample and Data

Research samples include companies that are listed on the Indonesian Stock Exchange ESG Leader 2021-2023. ESG risk score is only available for companies that are listed on the Indonesian Stock Exchange ESG Leader. Research data include ESG risk score, publication date of ESG leader evaluation, stock price, and stock index of ESG Leader. Minor evaluation of the ESG Leader index is once in six months while major evaluation is also once in six months. In this case, there are 10 research periods in 2021-2023. If available, this research also eliminates the companies that issue corporate action on the publication date of evaluation to mitigate other news that can affect abnormal return. The data can be accessed at www.idx.co.id. The total samples are 300 observations as in Table 1.

Table 1. Data Sample

Period of ESG Leader Evaluation	Publication Date of Evaluation	Companies
17-Mar-21 to 15-Jun-21	09-Mar-21	30
16-Jun-21 to 14-Sep-21	09-Jun-21	30
15-Sep-21 to 14-Dec-21	08-Sep-21	30
15-Dec-21 to 15-Mar-22	08-Dec-21	30
16-Mar-22 to 14-Jun-22	09-Mar-22	30
15-Jun-22 to 20-Sep-22	08-Jun-22	30
21-Sep-22 to 20-Dec-22	14-Sep-22	30
21-Dec-22 to 14-Mar-23	14-Dec-22	30
15-Mar-23 to 20-Jun-23	08-Mar-23	30
21-Jun-23 to 19-Sep-23	14-Jun-23	30
Total Sample		300

Source: www.idx.co.id

3.2 Research Variables

Independent variable is ESG risk. ESG risk is measured by the ESG score published by the Indonesian Stock Exchange. The dependent variable is the stock market reaction. Stock market reaction is measured by abnormal return on the publication date of ESG leader evaluation. Abnormal return can be calculated as in Equation 1 (Leite & Uysal, 2023).

$$Abnormal\ return = Realized\ return - Expected\ Return \quad (1)$$

Realised return is calculated by the closing price on the publication date minus the closing price one day before the publication date divided by the closing price one day before the publication date. The expected return is based on the price index of the ESG leader. This research considers the price index of ESG leaders as relevant as the return that is expected by investors since the price index pictures the trading behaviour of investors that are interested specifically in companies with ESG implementation. The expected return is calculated by the closing price index of ESG Leader on the publication date minus the closing price index of ESG Leader one day before the publication date divided by the closing price index of ESG Leader one day before the publication date.

For robustness test, this research also examines ESG risk on cumulative abnormal return in windows event of 3 days (1 day before to 1 day after publication date of ESG Leader evaluation), 5 days (2 days before to 2 days after publication date of ESG Leader evaluation), 7 days (3 days before to 3 days after publication date of ESG Leader evaluation), 9 days (4 days before to 4 days after publication date of ESG Leader evaluation), and 11 days (5 days before to 5 days after publication date of ESG Leader evaluation) to investigate how long ESG risk information is considered by investors to make decisions. This research also examines ESG risk on daily stock return to investigate returns had by investors (Nyakurukwa & Seetharam, 2023). Daily stock return is calculated as a realized return.

This research also uses control variables to control that market reaction is not only affected by ESG risk. Control variables include beta, free float ratio, and companies' size. This research uses beta, free float ratio, and companies' size as control variables since beta, free float ratio, and companies' size also affect the stock market reaction. First, beta aims to control stock risk. This research considers beta as a stock risk since ESG risk also contains companies' risks in the stock valuation. A higher beta leads to higher stock risk and affects negative responses by investors (Hirshleifer et al., 2020). In Indonesia, stock beta is already calculated by Pefindo. Pefindo calculates beta by using a regression of the market return on stock return. Second, the free float ratio aims to control the stock that is available to be traded in the market. Investors' reaction is reflected by trading behavior and the only available stock in the market that can be only traded. A higher free-float ratio indicates that the stock is liquid and easily traded (Ding et al., 2016). Higher stock liquidity leads to positive responses from investors (Bali et al., 2014). The free float ratio is calculated by stocks available to be traded divided by total outstanding stocks (Bali et al., 2014). Information on the free float ratio has been provided together with the ESG risk score in the ESG Leader evaluation result. Third, companies' size aims to control companies' stability and resources to determine stock value. Bigger companies tend to have more stability and resources that lead to higher stock value and attract investors (Sari Permata & Alkaf, 2020). Companies' size is measured by the logarithm natural of market capitalisation (Sari Permata & Alkaf, 2020).

3.3 Data Analysis

The hypothesis is examined by fixed-effect regression analysis. Fixed-effect refers to companies' fixed-effect that aim to control each company having a different strategy of ESG implementation. The regression model can be seen in Equation 2.

$$REACT = a + b_1 ESG + b_2 BETA + b_3 FLOAT + b_4 SIZE + \sum companies + e \quad (2)$$

REACT is a stock market reaction. ESG is ESG risk. BETA is stock beta. FLOAT is a free float ratio. SIZE is companies' size. ∑companies are companies fixed-effect. The hypothesis is accepted if the coefficient of b_1 is negative and significant.

4 Results and Discussion

4.1 Descriptive Statistics

Table 2. Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
REACT	-0.060	0.035	-0.001	0.016
ESG	0.118	0.297	0.230	0.048
BETA	0.492	2.096	1.437	0.388
FLOAT	0.074	0.694	0.381	0.121
SIZE	27.810	34.333	31.064	1.588

Source: proceed data

Based on Table 2, market reaction (REACT) has the lowest value of -0.060 and the highest value of 0.035. On average, the market reaction has a value of -0.001 with a deviation of 0.016. ESG risk (ESG) has the lowest value of 0.118 and the highest value of 0.297. On average, ESG risk has a value of 0.230 with a deviation of 0.048. Stock beta (Beta) has the lowest value of 0.492 and the highest value of 2.096. On average, the stock beta has a value of 1.437 with a deviation of 0.388. The free float ratio (FLOAT) has the lowest value of 0.074 and the highest value of 0.694. On average, the free float ratio has a value of 0.381 with a deviation of 0.121. Companies' size (SIZE) has the lowest value of 27.810 and the highest value of 34.333. On average, the companies' size has a value of 31.064 with a deviation of 1.588.

4.2 Preliminary Test

Table 3. Preliminary Test

Test	Result	Notes
Kolmogorov Smirnov	Significance > 0.05	Data are distributed normally
Glejser	Significance > 0.05	No heteroscedasticity problem
Run	Significance > 0.05	No autocorrelation problem
VIF	VIF < 10, tolerance > 0.1	No multicollinearity problem

Source: proceed data

The preliminary test aims to examine whether the regression model is valid. A valid regression model occurs when there are no normality, heteroscedasticity, autocorrelation, and multicollinearity problems. Table 3 shows that the significance value of Kolmogorov

Smirnov is above 0.05. The result indicates that data are distributed normally. The significance value of Glejser is above 0.05. The result indicates that there is no heteroscedasticity problem. The significance value of Run is above 0.05. The result indicates that there is no autocorrelation problem. The value of VIF is below 10 and the value of tolerance is above 0.1. The result indicates that there is no multicollinearity problem.

4.3 Main Analysis

Table 4. Main Analysis

Independent Variable	Coefficient	*t*-statistics	Coefficient	*t*-statistics
ESG	-0.069	-3.551*	-0.069	-3.275*
BETA	-0.006	-2.638*	-0.006	-2.465**
FLOAT	0.023	3.174*	0.026	3.403*
SIZE	-0.001	-1.468	-0.001	-1.013
Constant	0.043		0.019	
Dependent variable	Abnormal Return		Stock Return	
F-statistics	8.776*		7.699*	
Adjusted-R^2	0.094		0.082	
Observations	300			

*Significant in 0.01, **Significant in 0.05

Source: proceed data

Table 4 shows the analysis result of ESG risk on stock market reaction (abnormal return and stock return. ESG risk (ESG) on abnormal return has a coefficient value of -0.069 with a *t*-statistic of -3.551 (significant in 0.01). ESG risk (ESG) on stock return has a coefficient value of -0.069 with a *t*-statistic of -3.275 (significant in 0.01). It shows that lower ESG risk leads to higher returns. The result indicates that Ha is accepted where ESG risk has an effect on stock market reaction.

4.4 Robustness Test

The robustness test aims to examine alternative analysis. Furthermore, alternative analysis is compared to the main analysis whether the result is consistent. If the result is consistent, then the main result is robust if it is analysed in other alternative conditions. If the result is not consistent, then the main result cannot be applied to other alternative conditions. There are two alternative analyses in this research. First, this research examines the abnormal return for some alternative event window periods. Second, this research involves information asymmetry in the analysis of ESG risk on stock market reaction.

4.4.1 The alternative of Event Windows Periods for Abnormal Return

As an alternative analysis, this research also examines the effect of ESG risk on stock market reaction in different event window periods. Since the main analysis only examines abnormal returns only at the publication date, the alternative analysis aims to examine whether the main result also occurs in longer days after the ESG Leader evaluation publication date. This research investigates whether ESG risk information still has content used by investors' consideration after 1 to 5 days ESG Leader evaluation publication date. Abnormal return before the ESG Leader evaluation publication date is also considered to capture whether there is a leakage of information before the publication date (Hartono,

2015). In this case, this research uses cumulative abnormal return in windows event of 3 days (1 day before to 1 day after publication date of ESG Leader evaluation), 5 days (2 days before to 2 days after publication date of ESG Leader evaluation), 7 days (3 days before to 3 days after publication date of ESG Leader evaluation), 9 days (4 days before to 4 days after publication date of ESG Leader evaluation), and 11 days (5 days before to 5 days after publication date of ESG Leader evaluation). Cumulative abnormal return can be calculated as in Equation 3 (Hartono, 2015). The alternative analysis of the event windows period can be seen in Table 5.

$$Cumulative\ abnormal\ return_{day\ 1\ to\ day\ 5} = \sum_{day\ 1\ to\ day\ 5}^{day\ -1\ to\ day\ -5} Realized\ return - Expected\ return \quad (3)$$

Table 5. Alternative Analysis of Event Windows Period

Variable	Coefficient (t-statistics)				
	(1)	(2)	(3)	(4)	(5)
ESG	0.014	-0.197	-0.172	-0.099	-0.169
	(0.087)	(-1.216)	(-1.045)	(-0.595)	(-0.967)
BETA	0.031	0.033	0.045	0.046	0.029
	(1.577)	(1.689***)	(2.279**)	(2.294**)	(1.393)
FLOAT	-0.085	-0.116	-0.128	-0.166	-0.184
	(-1.398)	(-1.961***)	(-2.118**)	(-2.704*)	(-2.872*)
SIZE	-0.022	-0.024	-0.027	-0.027	-0.028
	(-4.282*)	(-4.703*)	(-5.256*)	(-5.060*)	(-5.069*)
Constant	0.658	0.772	0.868	0.844	0.931
F-statistics	7.764*	11.532*	14.431*	13.460*	12.849*
Adjusted-R^2	0.083	0.123	0.152	0.143	0.137

*Significant in 0.01, **Significant in 0.05, ***Significant in 0.10, (1) Cumulative abnormal return of 3 days (1 day before to 1 day after the publication date of ESG Leader evaluation), (2) Cumulative abnormal return of 5 days (2 days before to 2 days after the publication date of ESG Leader evaluation), (3) Cumulative abnormal return of 7 days (3 days before to 3 days after the publication date of ESG Leader evaluation), (4) Cumulative abnormal return of 9 days (4 days before to 4 days after the publication date of ESG Leader evaluation), (5) Cumulative abnormal return of 11 days (5 days before to 5 days after the publication date of ESG Leader evaluation)

Source: proceed data

Table 5 shows that ESG risk (ESG) on cumulative abnormal return of 3 days has a coefficient of 0.014 with a *t*-statistic of 0.087 (insignificant). ESG risk (ESG) on cumulative abnormal return of 5 days has a coefficient of -0.197 with a *t*-statistic of -1.216 (insignificant). ESG risk (ESG) on cumulative abnormal return of 7 days has a coefficient of -0.172 with a *t*-statistic of -1.045 (insignificant). ESG risk (ESG) on cumulative abnormal return of 9 days has a coefficient of -0.099 with a *t*-statistic of -0.595 (insignificant). ESG risk (ESG) on cumulative abnormal return of 11 days has a coefficient of -0.169 with a *t*-statistic of -0.967 (insignificant). The alternative result shows that there is no effect of ESG risk on stock market reaction after the ESG Leader publication date. It is not consistent with the main result in Table 4. In general, the result shows that ESG risk information is valuable for investors only at the publication date. This result shows that investors can understand the information content of ESG risk at the first day of publication date. This research does not examine the intraday return because of data limitation. This research also does not examine the separate indicator of environmental risk, social risk, and governance risk individually

since there is a data limitation.

4.4.2 The Role of Information Asymmetry

As an alternative analysis, this research also examines the effect of ESG risk on the stock market reaction by involving information asymmetry. The main concern of signaling theory is information asymmetry reduction. (Connelly et al., 2010; Lee et al., 2022; Spence, 1973; Su et al., 2014). If information asymmetry exists, then information signaling cannot be done well and the stock market will give negative responses to the published information. OuYang et al. (2017) suggest that information asymmetry can reduce the stock market reaction. Furthermore, Zarafat et al. (2022) and Siew et al. (2016) explain that information asymmetry will bring higher stock risk, especially in ESG publications. This research argues that positive response by investors in the stock market for lower ESG risk occurs more when there is lower information asymmetry. In this case, information asymmetry plays the moderating role between ESG risk and stock market reaction. Information asymmetry is measured by bid-ask spread as in Equation 4 (Siew et al., 2016). The moderating model can be seen in Equation 5.

$$Bid\text{-}Ask\ Spread = \frac{Lowest\ ask\ price_d - Highest\ bid\ price_d}{\left(Lowest\ ask\ price_d + Highest\ bid\ price_d\right)/2} \tag{4}$$

$$REACT = a + b_1 ESG + b_2 ESG \times IA + b_3 IA + b_4 BETA + b_5 FLOAT + b_6 SIZE + \sum companies + e \tag{5}$$

REACT is a stock market reaction. ESG is ESG risk. IA is information asymmetry. ESG x IA is moderating the effect of information asymmetry between ESG risk and stock market reaction. BETA is stock beta. FLOAT is a free float ratio. SIZE is companies' size. Companies are companies fixed-effect. The alternative analysis of information asymmetry can be seen in Table 6.

Table 6 shows that the interaction between ESG risk and information asymmetry (ESG x IA) on abnormal return at publication date has a coefficient of 34.008 with a *t*-statistic of 3.944 (significant in 0.01). The interaction between ESG risk and information asymmetry (ESG x IA) on abnormal return cumulative abnormal return of 3 days has a coefficient of 326.353 with a *t*-statistic of 4.492 (significant in 0.01). The interaction between ESG risk and information asymmetry (ESG x IA) on abnormal return cumulative abnormal return of 5 days has a coefficient of 229.927 with a *t*-statistic of 3.202 (significant in 0.01). The interaction between ESG risk and information asymmetry (ESG x IA) on abnormal return cumulative abnormal return of 7 days has a coefficient of 237.150 with a *t*-statistic of 3.246 (significant in 0.01). The interaction between ESG risk and information asymmetry (ESG x IA) on abnormal return cumulative abnormal return of 9 days has a coefficient of 316.609 with a *t*-statistic of 4.036 (significant in 0.01). The interaction between ESG risk and information asymmetry (ESG x IA) on abnormal return cumulative abnormal return of 11 days has a coefficient of 235.633 with a *t*-statistic of 3.023 (significant in 0.01). The alternative result shows that there is a positive effect of the interaction between ESG risk and information asymmetry on stock market reaction. It can be concluded that a negative relationship between ESG risk and stock market reaction occurs more when there is lower information asymmetry. It also indicates that the main result in Table 4 occurs more in the condition where information asymmetry is lower.

Table 6. Alternative Analysis of Information Asymmetry

Variable	Coefficient (t-statistics)					
	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.232	-1.553	-1.296	-1.304	-1.620	-1.299
	(-5.075*)	(-4.025*)	(-3.398*)	(-3.361*)	(-4.151*)	(-3.139*)
ESG x IA	34.008	326.353	229.972	237.150	316.609	235.633
	(3.944*)	(4.492*)	(3.202*)	(3.246*)	(4.306*)	(3.023*)
IA	-6.283	-62.546	-40.633	-40.651	-60.898	-44.272
	(-3.375*)	(-3.987*)	(-2.620*)	(-2.577**)	(-3.837*)	(-2631*)
BETA	-0.007	0.019	0.024	0.036	0.034	0.021
	(-3.216*)	(1.008)	(0.203)	(1.873***)	(1.759***)	(0.991)
FLOAT	0.030	-0.020	-0.070	-0.081	-0.103	-0.137
	(4.110*)	(-0.038)	(-1.177)	(-1.325)	(-1.686***)	(-2.111**)
SIZE	0.000	-0.015	-0.016	-0.018	-0.019	-0.021
	(0.137)	(-2.401**)	(-2.616*)	(-2.914*)	(-3.141*)	(-3.309*)
Constant	0.042	0.718	0.710	0.766	0.909	0.947
F-statistics	9.237*	9.201*	10.260*	12.591*	12.878*	10.544
Adjusted-R^2	0.142	0.141	0.157	0.189	0.192	0.161

*Significant in 0.01, **Significant in 0.05, ***Significant in 0.10, (1) Abnormal return at publication date of ESG Leader evaluation (2) Cumulative abnormal return of 3 days (1 day before to 1 day after publication date of ESG Leader evaluation), (3) Cumulative abnormal return of 5 days (2 days before to 2 days after publication date of ESG Leader evaluation), (4) Cumulative abnormal return of 7 days (3 days before to 3 days after publication date of ESG Leader evaluation), (5) Cumulative abnormal return of 9 days (4 days before to 4 days after publication date of ESG Leader evaluation), (6) Cumulative abnormal return of 11 days (5 days before to 5 days after publication date of ESG Leader evaluation)

Source: proceed data

Table 6 also shows that the strongest explanatory power of the regression model is the model of cumulative abnormal return of 9 days (4 days before to 4 days after the publication date of ESG Leader evaluation) with an adjusted-R^2 of 0.192. It indicates that, in the condition where lower information asymmetry occurs, investors need 4 days to fully interpret the information of ESG risk and get optimal returns. Different from Table 5 which shows no effect of ESG risk on stock market reaction after the publication date of ESG Leader evaluation, after the role of information asymmetry, there is an effect of ESG risk on stock market reaction after the publication date of ESG Leader evaluation. This research does not use financial statement quality to reflect the information asymmetry since the information asymmetry in this research refers to the information gap between investors and not the information gap between investor and companies.

4.5 Discussion

This research aims to examine the effect of ESG risk on stock market reaction in Indonesia. This research contributes to filling the previous findings gap between ESG implementation and investors' reactions by measuring the effectiveness of ESG implementation through ESG risk to avoid greenwashing motivation. This research also provides new evidence of ESG risk on investors' reactions on the Indonesian Stock Exchange.

Based on data analysis, ESG risk has an effect on stock market reaction. The result indicates that Ha is accepted where ESG risk has an effect on stock market reaction. Investors need to invest in ESG-based stock to ensure investment sustainability. ESG risk information helps investors to make a decision. Investors react positively to stocks with

lower ESG risk. Lower ESG risk captures effective ESG implementation. Effective ESG implementation brings better current and future performances for companies and leads to higher current and future stock values. Better current and future performances also bring companies to generate more earnings and lead to higher potential dividends for investors. Lower ESG risk also captures lower companies' risks. Lower companies' risks help investors to bear lower stock risks. Effective ESG implementation and lower companies' risks become good news for investors and lead to positive reactions from the stock market. This result is consistent with Leite and Uysal (2023), Nyakurukwa and Seetharam (2023), Serafeim and Yoon (2022), Yin et al. (2023), and Xiong (2021) who find that ESG implementation has an effect on stock market reaction. The result is also consistent with Andreou et al. (2021) and Zulfitra et al. (2022) who find that companies' risks have an effect on stock market reaction.

The result also finds that ESG risk information only affects stock market reaction at the publication date of ESG Leader evaluation. Furthermore, this research also finds that ESG risk information can affect stock market reaction after the publication date of ESG Leader evaluation if lower information asymmetry occurs. When lower information asymmetry occurs, information on ESG risk gives optimal returns 4 days after the publication date of ESG Leader evaluation. This research confirms the concept of signaling theory where ESG risk is a signal of effective ESG implementation.

The result implies companies have better ESG implementation to reduce companies' risks and increase stock value. The result also implies investors to evaluate ESG performance by assessing ESG risk to make an investment decision. The result also implies Indonesian Stock Exchange formulate regulations about ESG risk evaluation for all companies, not only for companies that are listed on the index of ESG Leader, so investors have more options to invest in ESG-based stock. The result only applies to companies that are listed on the index of ESG Leader and cannot be generalised for all listed companies on the Indonesian Stock Exchange.

5 Conclusion

This research aims to examine the effect of ESG risk on stock market reaction in Indonesia. Based on data analysis, ESG risk has an effect on stock market reaction. The effect of ESG risk on stock market reaction occurs more in lower information asymmetry. It indicates that lower ESG risk captures effective ESG implementation and lower companies' risks and attracts investors to buy the stock.

The result implies companies have better ESG implementation. Companies can make effective strategies to implement ESG and reduce business risks and ensure business sustainability. When companies implement effective ESG, their stock value will be increased. The increase in stock value helps companies to make optimal funding from the stock market.

The result also implies investors to evaluate ESG performance by assessing ESG risk to make an investment decision. To avoid greenwashing motivation, investors not only accept positive information about ESG implementation but also evaluate how far ESG performance contributes to the companies' performance. By evaluating ESG risk, investors know that ESG implementation is performed effectively to reduce companies' risks.

This research has a limitation of result generalisation. The result only applies to companies that are listed on the index of ESG Leader and cannot be generalised for all listed companies on the Indonesian Stock Exchange. It happens since, so far, ESG risk score

is only available for companies that are listed on the index of ESG Leader. Future research is expected to examine all listed companies on the Indonesian Stock Exchange so the result can be generalised.

6 Policy Recommendation

The result implies Indonesian Stock Exchange formulate regulations about ESG risk evaluation for all listed companies on the Indonesian Stock Exchange, not only for companies that are listed on the index of ESG Leader, so investors have more options to invest in ESG-based stock. In detail, the Indonesian Stock Exchange can make an agreement with Sustainalytics to evaluate all listed companies on the Indonesian Stock Exchange. The Indonesian Stock Exchange can also make its standard evaluation that can be used by all investors. Regulation of POJK no. 51/POJK.03/2017 only provides the standard at the strategic level. Further, Indonesian Stock Exchange can make a derivative regulation that provides detailed standards both for companies and investors in ESG implementation.

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