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THE IMPACT OF PUBLIC ATTENTION ON ENVIRONMENTAL ISSUES TO THE PERFORMANCE OF CONVENTIONAL AND ESG STOCK INDICES IN INDONESIA

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Abstract

Environmental, social, and governance (ESG) factors are becoming increasingly important for investors in evaluating the financial performance of companies, especially in Indonesia where there is a growing awareness of sustainability and social responsibility. In this study, the researcher investigates the impact of public attention on environmental controversies to the return performance of Conventional and ESG stock indices in Indonesia represented by LQ45 and SRI Kehati. The data period is ranging from January 2013 – March 2023 using a panel model approach. The findings of the study suggest that Environmental Issues news articles have a statistically significant effect on the return of SRI Kehati and LQ45 Index. However, the studydid not find a significant impact of the Google Search Volume Index (GSVI) on the return.

Keywords: Public Attention, Environmental issues, Stock Index Return in Indonesia.

Introduction

In recent years, environmental issues have become a hot topic in various countries, especially with the signing of the Paris Agreement regarding the commitment of various countries to prevent climate change. Some of the manifestations of the commitments from the Paris Agreement and COP26 are the commitment from countries to greater accountability and transparency by reducing emissions and spurring investment in renewable energy, the more countries make commitments to achieve net-zero by 2050, the more market incentives to achieve decarbonization targets by implementing carbon taxes and supporting environmentalrecovery performance, and more quickly climate finance by introducing laws requiring sustainable finance regulations for banks, capital markets, and non-bank financial institutions to report activities related to change climate (Gazzo et al., 2021).

According to the United Nations Environment Program, the green economy is an alternative to the current conventional economic models which pose widespread

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environmental and health risks, encourage wasteful consumption and production, and encourage ecological and resource scarcity (Heshmati, 2017).

There has been a lot of attention given to the impact of integrating environmental, social, and governance (ESG) factors into investment decisions on investment performance. This is a topic of interest for both academic researchers and investors,as sustainable investing has become more common. The academic research on this topic has focused mainly on equity investments, as data is more readily available for these types of investments. The research has primarily looked at how ESG factors affect a company's economic performance, its cost of capital, and the performance ofits traded shares (A. C. Ng & Rezaee, 2015).

According to the results of a 2019 survey by Morgan Stanley quoted from thePictet Financial Times, around 85% of investors are interested in sustainable investments where there is an increase of 71% compared to 2015 (Walter, 2020). This is also supported by a report from Morningstar that the money kept in sustainable funds andESG-focused ETFs grew 53% globally in 2021 to $2.7 trillion with a net profit of $596 billion. The increase takes into account revisions in Europe, where regulators are imposing stricter rules to determine what can be labeled a sustainable fund. This results in 73% of the ESG indices having outperformed their equivalent non-ESG indices since inception.

Attention is a critical factor in stock selection as investors tend to purchase stocks that draw their attention. This attention leads to higher returns and trading volumes. The media can worsen investor bias, and credible evidence of misconduct can lead to negative reactions from investors. The momentum effects based on overreaction are supported by the collective findings of this study, and these methodsare important for investors and market players to obtain information before making informed investment decisions. Even though investor interest in the ESG index is growing where the positive performance relatively occurred under normal conditionsand did not produce significant results when the financial crisis occurred (Castro et al., 2021). This is also supported by Oberndorfer (2013) where the results of his study show that it has a strong negative impact. But there is no significant cumulative average abnormal returnto include the DJSI STOXX. This suggests that inclusion in a more well-known sustainability stock index can have a greater negativeimpact. Shackleton (2022) argues that research shows that stock returns precede and have a negative impact on environmental and social (ES) performance. ESG performance improvement is based on performance improvement and product and range expansion which is related to thevolatility of ESG controversial stocks.

Literature Review

Capital Asset Pricing Model (CAPM) (Sharpe, 1964) 4 factor Carhart (1997) analysis is crucial in this research in order to explain stock returns over time before examining impact of Public Attention factors, such as news articles and Google Search VolumeIndex (GSVI), related to environmental issues on stock returns (Hidayat, 2019). This analysis can help in comprehending the risk and return implications of these factors, as well as the potential for generating abnormal returns beyond the traditional factors of market, size,

value, and momentum. Additionally, the Carhart analysis considers the impact of transaction costs and provides a more robust estimation of the alpha coefficient, which can better capture the true performance of the investment strategy. Prior researches such as Li (2022), Ng & Zheng (2018), El Ouadghiri et al. (2021) and Borghesi et al. (2022) were also utilized Carhart's four-factor model.

CAPM Carhart's four-factor model consists of Excess Return, High Minus Low (HML), Small Minus Big (SMB), and Momentum (WML). Excess Return is the result of HML represents the Value Factor to compare the performance between growth stock and value stock of companies listed in the index. SMB represents SizeFactor associated with small capitalization stocks and large capitalization stocks. Thelast factor is Momentum (WML) which represent excess return of stocks that have exhibited positive momentum (i.e., their prices have been increasing over a specific time period) over those that have exhibited negative momentum (i.e., their prices have been decreasing over the same period). The inclusion of a cross-sectional momentum factor in the Carhart 4-Factor Model significantly enhances the ability ofthe multifactor model to provide explanations. Traditional asset pricing models, based on the efficient market hypothesis, focus on the link between investor attention and stock prices. However, two well-known theories in the literature are the Investor Recognition Hypothesis (Merton, 1990) which explain the investor preferences based on the accessible information and the

Selective Attention Theory which show that people tend to filter out information based on physical characteristics (Broadbent, 1958). Due to the difficulties in keepingtrack of the overwhelming amount of information in the market, investors often relyon stock price changes to inform their investment decisions. As stated by Cajueiro (2009), investors pay close attention to market prices to seek information that canhelp their investment decisions. According to Hillert et al. (2014), media coverage can worsen investor bias, and Carberry et al. (2018) argue that investors are more likely to react negatively when the media presents clear and credible information about misconduct and finds supporting evidence. The collective findings of this study lend credibility to the explanation of momentum effects based on overreaction. Therefore, understanding how public attention affects stock prices is crucial in making informed investment decisions.

To measure public attention, researchers can use several methods. Some researchersuse news coverage (El Ouadghiri et al., 2021; Kim et al., 2022), some use social media like Twitter (Butler & Hansen, 1991), while others use company advertising expenses (Grullon & Michaely, 2004). Some also use Google search intensity, which proposes a new and direct measure for investor attention by using the accumulated search frequency on Google, called the Google Search Volume Index (GSVI) (Ekinci & Bulut, 2021; El Ouadghiri et al., 2021; Nguyen et al., 2019), as a proxy for investigating investor attention.

There are several previous studies related to the relationship between public concern for environmental issues and stock performance. One of these researches is conducted by El Ouadghiri et al. (2021) titled *Public Attention to Environmental Issues and Stock Market Returns* discusses the effect of media coverage of environmental issues on stock market returns. This study uses data from news articlesand GSVI as a proxy for

public attention to environmental issues, and compares returns on conventional and ESG indices using panel regression and CAPM 4-factor Carhart method. The results show that public attention to environmental issues has asignificant positive effect on the increase in the US sustainable stock index and a negative effect on the conventional stock index.

In addition, research related to investor attention using GSVI was also conducted bySwamy (2019) titled *Investor attention and Google Search Volume Index: Evidence from an emerging market using quantile regression analysis*. This study examines investor attention measured by the Google Search Volume Index (GSVI) in predicting stock price increases. The results show that higher GSVI predicts positive and significant stock price increases in the first and second weeks. The research model with GSVI acts as a better predictor for the direction and magnitudeof stock price increases than the model without GSVI.

Study related to GSVI and stock return on emerging market is also conducted by Nguyen et al. (2019) with the title *Google Search and Stock Returns in Emerging Markets* that argues the effectiveness of CAPM Fama French alone in capturing stock's trend and suggest the GSVI integration as alternative augmented factor in explaining stocks returns. The findings shows that GSVI have negative significanceimpact on Philippines, Thailand, and Vietnam market which mean investors more sensitive to bad news than good news in their investment decision.

Another study focused on the Indian stock market was conducted by Anita et al. (2023) titled *When do ESG controversies reduce firm value in India?* which discussesthe impact of ESG controversies on firm value. The results of this study show the same as the previous two researchers, where media coverage of ESG controversies only reduces firm value when media reach is high because high reach has a greater distribution capacity and cognitive magnitude. On the other hand, media coverage can increase firm value when severity is high, as higher severity results in an intensification of sense making that reduces crisis severity.

Other study related on ESG Controversies observed by DasGupta (2022) who revealsa significant positive correlation between a company's financial underperformance and its ESG performance. However, when a company faces a high number of ESG controversies, it becomes less inclined to adopt better ESG practices, despite the positive effect of such controversies on the link between financial underperformance and ESG performance.

Hypotheses are derived from theory, which is based on the logical beliefs of the researcher and previous scientific research. The hypotheses that can be observed in this study are as follows:

H_0: Public attention to environmental controversies does not affect the performance of conventional indices (LQ45) or ESG indices (Sri Kehati).

H_1: Public attention (news articles) to environmental controversies affects the performance of both conventional indices (LQ45) and ESG indices (Sri Kehati).

H_2: Public attention (GSVI) to environmental controversies affects the performance of both conventional indices (LQ45) and ESG indices (Sri Kehati).

Research Method

The data will be taken from closing prices index in Indonesia using monthly basis data from January 2013 – March 2023 of LQ45 Index and SRI Kehati Index. The public attention data can be obtained from the numbers of News articles and InterestOvertime on Google (GSVI) with keyword related to environmental issues. The search interest data, also known as the Google Search Value Index (GSVI), for the keyword is sourced from the Google search engine and obtained through Google Trends. The value assigned to measure the search volume of the keyword ranges from0-100. A value of 100 indicates the highest level of popularity for the keyword, whilea value of 50 means the keyword is fairly popular. A score of 0 means that there is not enough data available for the keyword search. The keywords used for this research derived from major environment issues of Indonesia based on Economic and Social Commission for Asia and the Pacific Committee on Environment and Development Fifth Session (2021), which areEcosystem Degradation, The Greenhouse Effect, Pollution, Weather Changes, Drought, Extinction, Global Warming, Deforestation, Waste, Overfishing and Flood.

Table 1
Combined Linear Panel Model

Data	Total Data	Sources
Closing Price LQ45 Index (monthly)	123	Refinitiv Eikon
Closing Price SRI Kehati Index (monthly)	123	Refinitiv Eikon
Closing Price JKSE Index (monthly)	123	Refinitiv Eikon
Google Search Volume Index (News Search)	5,052	Google Trends
News Articles	25,805	Detik.com
SML, HML, & WML LQ45	366	TICMI IDX
SML, HML, & WML SRI Kehati	366	TICMI IDX

For the first step, a combined linear panel model was used to investigate how globalclimate-related natural weather disasters impact the monthly returns of LQ45 and SRIKehati Index.

The formula for Panel Regression formula is described below:Model 1:

$$R_i = \alpha_0 + \beta_1 SRI_t + \beta_2 \ln(1 + MA_t) + \beta_3 JKSE_t + \beta_4 SMB_t + \beta_5 HML_t + \beta_6 WML_t + \beta_7 LQ_t + \beta_9 'Months_t + \varepsilon_{it}$$

In the first model, R_i is the dependent variable in the form of monthly stock index returns. The independent variables are the 4-factor Carhart model represented by variables $JKSE_t$, which is the market return, SMB_t representing the size factor, 〖 HML_t representing the value factor, and WML_t representing the momentum factor.

MA_t is a control variable in the form of the number of news articles written with thecontrolled keyword each month. SRI_t and LQ_t are dummy variables originating from the SRI Sustainable Index return and the LQ45 Index return, respectively, as fixed entity

effects. $'Months_t$ is a dummy variable as a proxy for time in panel data analysis because it is usually treated as a fixed effect, which means assuming that thetime effect is the same for all units in the sample. ε_{it} is the error term.

In the second model, the author analyzes the impact of investor attention through Google search intensity using GSVI, represented by the variable $GSVI_t$. The dependent, independent, and dummy variables in model 2 are similar with model 1.
Model 2:

$$R_i = \alpha_0 + \beta_1 SRI_t + \beta_2 \ln(1 + GSVI_t) + \beta_3 JKSE_t + \beta_4 SMB_t + \beta_5 HML_t + \beta_6 WML_t + \beta_7 LQ_t + \beta_9 'Months_t + \varepsilon_{it}$$

β_i represents the beta of the investment. In this analysis, $\ln(1 + MA_t)$ & $\ln(1 + GSVI_t)$ represent the natural logarithm of one plus the value of MA_t and $GSVI_t$, respectively, as used in previous studies (El Ouadghiri et al., 2021).
The investment return value for the issuer is obtained using the formula:

$R_i = ln\frac{P_i}{}, Pi{-}1$

where R_i is the return of stock index i, P_i is the closing price of stock index i in periodt, and P_{i-1} is the closing price of issuer i in period t-1. The purpose of using Logarithmic returns is to get symmetric result.

Result and Analysis

Table 2
Google Search Interest result

Keyword	Google Search Interest
Ecosystem Degradation	476
Climate Change	651
Drought	994
Extinction	465
Global Warming	1041
Greenhouse Gas	40
Waste	195
Flood	1093
Pollution	59
Deforestation	38

The Google Search Interest result shows that the most popular search keyword about environment issues that pique public attention is related to flood andglobal warming issues. The news articles coverage also shows the highest number onthe flood issues. However, the topic about pollution is covered more on the news. This result is in

accordance with data from BNPB that shows there are 8,073 flood cases happened in Indonesia during 2014 – 2023.

Table 3
Descriptive Analysis

Keyword	Numbers of Articles
Flood	9.770
Degradation Ecosystem	76
Greenhouse Gas	720
Drought	599
Extinction	997
Global Warming	1.289
Waste	1.331
Deforestation	552
Climate Change	2.482
Pollution	6.892

The descriptive analysis shows that the average monthly return of the SRI Kehati index is higher than both the conventional index, LQ45 and the market return. The volatility of the SRI Kehati index and the LQ45 index are almost similar. This is shown by the standard deviation values respectively are 0.0484 and 0.0478, which are higher compared to the market volatility of only 0.0386. The LQ45 index providesthe highest monthly return value of 11% compare to SRI Kehati index with only 10.4% and the market return of only 9%. Despite offering highest return, LQ45 Indexalso shows the lowest return as shown in minimum with the value of -24.1%. This islower compared to the market's lowest monthly return of around -18.3% and the SRI Kehati index of -21.9%. There are no negative values found in the news article variable and the GSVI due to the characteristic of the data.

Table 4
Panel Regression

	SRI Kehati	*LQ45*	*JKSE (Rm)*	*SMB LQ45*	*HML LQ45*	*WML LQ45*	*SMB SRI*	*HML SRI*	*WML SRI*	*Ln(1+MA)*	*ln (1+GSVI)*
Mean	0,00457231	0,0017691	0,0035498	0,00567464	-0,000924	0,00353078	0,0036627	5,7152E-06	0,00424173	4,847037223	3,44161643
Standard Error	0,00440269	0,00434937	0,00350969	0,00040312	0,00074245	0,00037216	0,00038803	0,00066516	0,00037236	0,07503438	0,0687783
Median	0,01072466	0,00831867	0,00785832	0,00565003	-0,0032051	0,00349618	0,00307478	-0,0024409	0,00489135	4,58496748	3,4657359
Standard Deviation	0,04842964	0,04784309	0,03860662	0,00443436	0,0081669	0,00409373	0,00426834	0,00731674	0,00409593	0,825378140	0,75656135
Minimum	-0,2190611	-0,2410667	-0,1834203	-0,0011535	-0,0152238	-0,0034371	-0,0030532	-0,0095508	-0,0031435	3,871201011	1,38629436
Maximum	0,10483675	0,11072483	0,09022151	0,01464444	0,02056571	0,01754877	0,01237184	0,02092839	0,01791975	7,487173695	5,23644196
Count	121	121	121	121	121	121	121	121	121	121	121
Confidence Level (95,0%)	0,00871703	0,00861145	0,00694895	0,00079816	0,00146999	0,00073685	0,00076827	0,00131697	0,00073724	0,148562840	0,13617626

The panel regression anlysis shows that in Model 1, the F-statistic significance level is 345.28 in the Panel OLS analysis, indicating that the model is statistically significant as a whole. The R-squared value of 0.8802 shows that approximately 88%of the variation in the dependent variable is explained by the independent variables in the model. Based on the T-stat and P-value in Model 1, Market Return (JKSE) andnews articles (MA) have a positive impact, while the Value factor has a negative impact on the returns of the SRI Kehati and LQ45 indices, as the T-Stat values are greater than 1.96 and P-Values are lower than 0.05. The T-stat value for Market Return is 41.3 and for news articles it is 2.5.

In Model 2, the F-statistic significance level is 333.13 in the OLS Panel analysis, indicating that the model is statistically significant as a whole. The R-squared value of 0.8764 shows that approximately 87% of the variation in the dependent variable is explained by the independent variables in the model. Based on the T-stat and P- value in Model 2, only Market Return (JKSE) has a positive impact on the returns ofthe SRI Kehati and LQ45 indices, with a T-stat value of 40.6 and a P-value of 0.000.

Model 1

Out[9]:

PanelOLS Estimation Summary

Dep. Variable:	Return	R-squared:	0.8802
Estimator:	PanelOLS	R-squared (Between):	-50.071
No. Observations:	242	R-squared (Within):	0.8802
Date:	Wed, May 03 2023	R-squared (Overall):	0.6148
Time:	16:53:25	Log-likelihood	648.52
Cov. Estimator:	Unadjusted		
		F-statistic:	345.28
Entities:	2	P-value	0.0000
Avg Obs:	121.00	Distribution:	F(5,235)
Min Obs:	121.00		
Max Obs:	121.00	F-statistic (robust):	345.28
		P-value	0.0000
Time periods:	121	Distribution:	F(5,235)
Avg Obs:	2.0000		
Min Obs:	2.0000		
Max Obs:	2.0000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
HML	-0.4588	0.1934	-2.3725	0.0185	-0.8398	-0.0778
JKSE	1.1923	0.0288	41.375	0.0000	1.1355	1.2490
MA	0.0055	0.0022	2.5314	0.0120	0.0012	0.0097
SMB	-0.3361	0.2584	-1.3004	0.1947	-0.8452	0.1731
WML	-0.2610	0.2940	-0.8877	0.3756	-0.8402	0.3182

Model 2

Out[6]:

PanelOLS Estimation Summary

Dep. Variable:	Return	R-squared:	0.8764
Estimator:	PanelOLS	R-squared (Between):	-6.8598
No. Observations:	242	R-squared (Within):	0.8764
Date:	Wed, May 03 2023	R-squared (Overall):	0.8319
Time:	16:57:31	Log-likelihood	643.66
Cov. Estimator:	Unadjusted		
		F-statistic:	333.13
Entities:	2	P-value	0.0000
Avg Obs:	121.00	Distribution:	F(5,235)
Min Obs:	121.00		
Max Obs:	121.00	F-statistic (robust):	333.13
		P-value	0.0000
Time periods:	121	Distribution:	F(5,235)
Avg Obs:	2.0000		
Min Obs:	2.0000		
Max Obs:	2.0000		

Parameter Estimates

	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
GSVI	0.0029	0.0015	1.8831	0.0609	-0.0001	0.0059
HML	-0.2724	0.1747	-1.5591	0.1203	-0.6166	0.0718
JKSE	1.1955	0.0294	40.627	0.0000	1.1375	1.2534
SMB	-0.1525	0.2441	-0.6249	0.5326	-0.6334	0.3284
WML	0.0172	0.2811	0.0611	0.9513	-0.5366	0.5709

Conclusion

This study investigates how public attention about environmental issues, presented in News articles and Google Searches as measurement, impacts the returns of Indonesia's stock indices such as LQ45 and SRI Kehati between January 2013 - March 2023. The analysis does not solely rely on the common event study approach and Sharpe's

CAPM, which mostly focuseson the short-term effect of unexpected events and new information, such as environmental issues, on stock returns. This study finds that news articles (H_1) have positive significant impact on the return which mean that investors' decision in Indonesia impacted by the mediacoverage intensity of the environment issues, especially issue related to flood and pollution. Both models show that market return is the factor that significantly impact the return from SRI Kehati and LQ45 returns. However, the GSVI has no significant impact on the return thusthe H_2 is rejected.

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