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Are ESG Ratings Noisy for Stock Returns? Evidence from Thailand's Stock Market

Introduction

Currently, the ESG (Environmental, Social, and Governance) trend has garnered significant attention among investors and top executives in Thailand's business sector. This is reflected in the number of funds related to governance or environmental concerns, which have increased from 2 to 120 over the past 10 years, with nearly THB80 billion in assets under management.

Additionally, the government has continuously promoted this trend. At the end of last year, the Thai ESG Fund was established to create incentives and awareness regarding ESG. As an incentive, investors can invest up to 30% of their annual taxable income, with a maximum of THB100,000, excluding the THB500,000 limit from retirement savings funds such as Super Saving Fund (SSF), Retirement Mutual Fund (RMF), and Provident Fund (PVD). Another highlight of the Thai ESG Fund is that there is no minimum purchase requirement, nor is it necessary to invest every year, provided that holdings are maintained for 8 years from the purchase date.

As of December 28, 2023, the total value of assets invested in the Thai ESG Fund from 16 asset management companies, spanning 30 funds, amounted to approximately THB5.266 billion. Although this figure falls short of the government's target of THB10 billion, it still reflects significant investor interest, given the potentially short sales period. It is anticipated that in 2024, the Thai ESG Fund will attract even more investor interest.

Despite the growing global interest in ESG, including in Thailand, which reflects the theory that high ESG scores positively impact stock prices, the importance of ESG in investment varies, and there is no definitive empirical evidence.[1] For example, Friede et al. (2015) found a positive correlation between ESG and company performance, particularly in North America and emerging markets. Conversely, La Torre et al. (2020) concluded that the efforts of Eurostoxx50 companies in terms of ESG commitments did not appear to affect their performance in the European market. Garcia et al. (2017) discovered that profitability of firm assets was only correlated with environmental performance among ESG performance proxies, and companies with superior ESG performance were generally less profitable in BRICS (Brazil, Russia, India, China, and South Africa) markets. Additionally, sector-specific research by Cayón and Gutierrez (2021) revealed a positive correlation between sin companies[2] and ESG performance, while non-sin companies in the top 25% and worst 25% of ESG performers exhibited a negative correlation with ESG performance in the subsequent year. Overall, the relationship between ESG ratings and stock performance remains uncertain.

The current empirical studies are inconclusive, leading to ongoing debates on the importance of ESG metrics in portfolio allocation, and there is no consensus on the application of ESG in investment management. According to Berg, Kölbel, and Rigobon (2022), one reason for the lack of standard criteria for applying ESG scores is the varying evaluation criteria among providers and the differing processes for creating models to calculate certain metrics for each aspect of ESG.

In a study by Berg et al. (2022), eight sources of ESG ratings were identified: MSCI's IVA Industry Weighted score, Sustainalytics' ESG Risk Ratings, Refinitiv's TRESG score, RepRisk's Reputation Risk Index (RRI), Truvalue Labs' (TVL) Insight Score, Moody's Global score, S&P Global's ESG score, and Institutional Shareholder Services (ISS) Numeric ESG Overall Rating. When the ESG scores from each provider were subjected to pairwise correlation, the correlations for stock markets were either negative or only slightly positive. The average correlation was just 0.2 for the U.S. stock market, with correlations ranging from -0.45 to 0.7. This result indicates issues arising from the unique evaluation methods of each provider, suggesting that a company rated highly in ESG by one pro-

vider may receive a low rating at the same time when evaluated by another provider.

Berg et al. (2022) interpret the divergence in ESG ratings as a measurement error that diminishes the true effect of ESG performance on stock returns in standard regressions. They propose two noise-correction procedures, where ESG ratings are instrumented with ratings from other ESG rating agencies, similar to the classical errors-in-variables problem. The corrected estimates reveal that the effect of ESG performance on stock returns is stronger than previously estimated.

To address this issue for Thai stocks, a method for correcting noise in ESG ratings is utilized as well. The approach introduced ratings from multiple ESG rating agencies as instrumental variables, inspired by the classical errors-in-variables problem discussed by Berg et al. (2022). The main objective of this procedure is to address the inherent noise and inconsistencies in ESG ratings. By incorporating ratings from other agencies as instruments, the proposed method aims to reduce measurement errors and enhance the accuracy of ESG assessments.

The Model and Methodology

To investigate the effect of ESG performance on stock returns, we employ the method of regression analysis proposed in Berg et al. (2022). A panel data on n firms over T periods are collected.
The true regression model is

$$r_{i,t+1} = \alpha + \beta x^*_{i,t} + controls_{i,t} + u_{\{i,t\}}$$
$$i = 1, \dots, n;\ t = 1, \dots, T \qquad (1)$$

where $r_{i,t+1}$ is the stock return of firm i between time t and $t + 1$ and x^* is the true measure of the ESG of firm i at time t. There are some control variables in the regression equation. The error-component term $u_{i,t}$ of firm i at time t can contain the firm-specific effects and/or time-specific effects. To illustrate the methodology in this section, we simplify the model by omitting the control variables and assuming that $u_{i,t}$ is uncorrelated to the true ESG measure x^* and all control variables. All subscripts will be dropped to simplify the notation as well.

Attenuation Bias (Measurement Error)

Because the true ESG measure x^* is unobservable, in our regression analysis we use an ESG rating x from a rating agency, which is observable. However, the ESG rating is full of noise, i.e., it contains measurement errors:

$$x = x^* + \varepsilon \qquad (2)$$

where ε is the measurement error uncorrelated with x^* and u. Thus, the regression model is

$$r = \alpha + \beta\, x + v \qquad (3)$$

where $v = u - \beta\varepsilon$. It is easy to see that

$$cov(x, v) = cov(x^* + \varepsilon, u - \beta\varepsilon) = -\beta\ var(\varepsilon) \neq 0 \qquad (4)$$

Therefore, this regression model has an endogeneity problem. Thus, the OLS (Ordinary Least Squares) estimator will estimate

$$\beta_{\{OLS\}} = \left(\frac{var(x^*)}{(var(x^*) + var(\varepsilon)}\right)\beta \qquad (5)$$

Since the term in the parenthesis is positive and less than 1, the OLS estimate will be downwardly biased towards zero. This is called an *attenuation bias*.

The endogeneity problem from a measurement error can be fixed easily by using an instrumental variable (IV). An IV z satisfies three properties which are (i) exogeneity: $cov\,(z,u) = 0$, (ii) relevance: $cov\,(z,x) \neq 0$, and (iii) positive and finite variance: $0 < var\,(z) < \infty$. An obvious choice of IV for the ESG rating variable is another ESG rating z_1 from another rater. Therefore,

$$z_1 = x^* + \eta_1, \qquad (6)$$

where η_1 is the measurement error uncorrelated with x^* and u. If the raters construct their ESG ratings independently, we may assume that η_1 is uncorrelated with ε as well. Hence the IV estimator will estimate

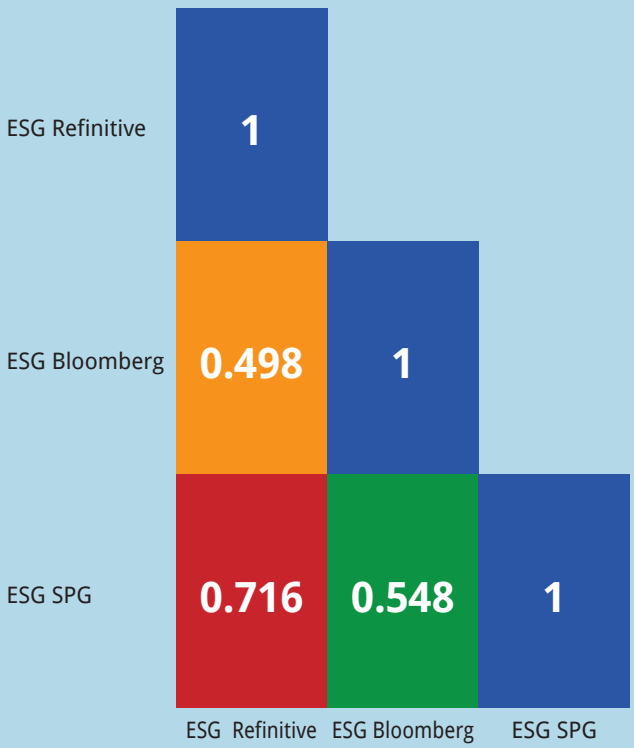
$$\beta_{\{IV\}} = \beta + \frac{cov(z_1, v)}{cov(z_1, x)} = \beta + \frac{0}{var(x^*)} = \beta \qquad (7)$$

that is, the IV estimator will estimate the true β. Therefore, the ratio of the OLS estimator and the IV estimator can estimate the attenuation bias.

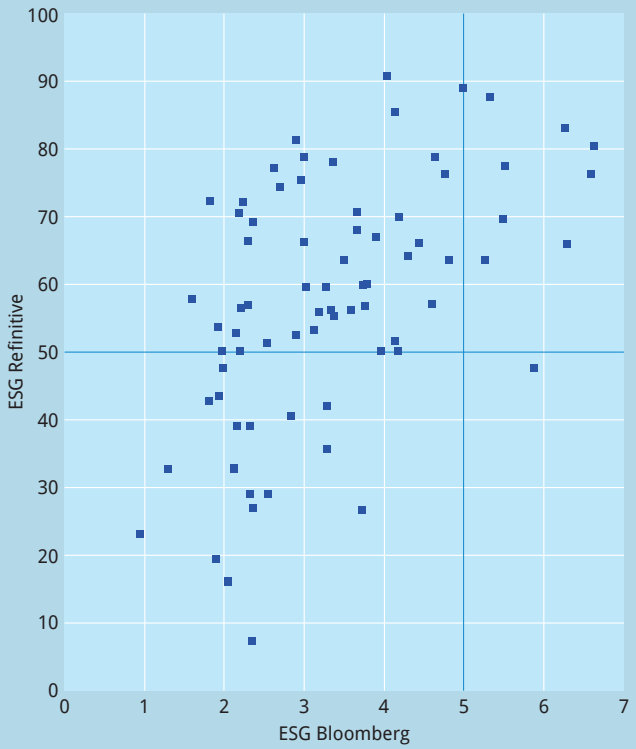
ESG Ratings in Thailand

ESG rating agencies are known to provide diverging ESG scores because they use different data sources and models for their assessments. These data sources vary widely; for example, if a company's carbon emissions data is missing, a standard carbon emissions model is used to estimate the expected emissions for that firm. Additionally, different ESG rating agencies assign different weights to various ESG components. As a result, the ESG ratings can be inconsistent and noisy, as illustrated by Figure 1. Figure 1(a) displays the correlation matrix for three different agencies, highlighting that Bloomberg scores diverge from the others. The pairwise correlation between ESG Refinitiv and ESG Bloomberg is just 0.498, and it rises slightly to 0.548 when compared with ESG S&P Global. Given this discrepancy, it is likely that some firms may receive high scores from one agency but low scores from another. This crucial point is illustrated by Figures 1(b), 1(c), and 1(d), which show scatter plots comparing the ESG scores of two rating agencies in 2022. In these plots, several firms are located in the upper left corner, indicating significant discrepancies between the scores assigned by the two agencies.

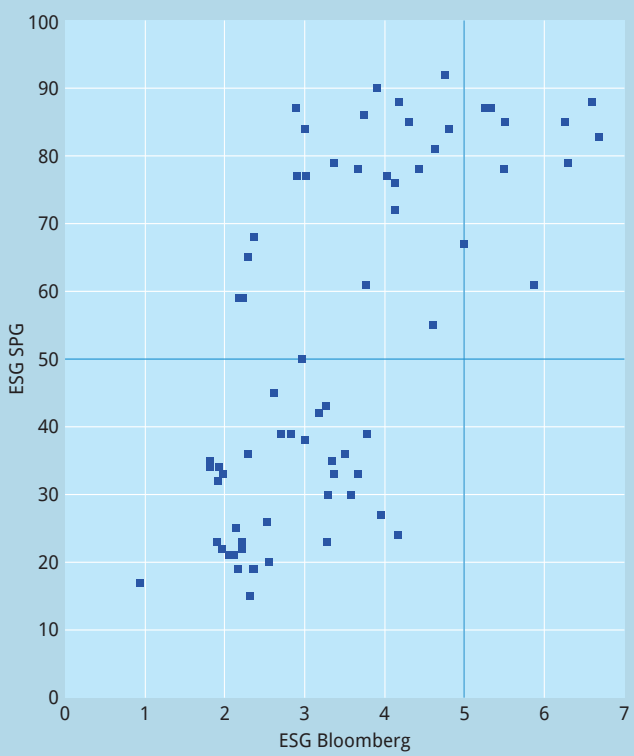
Figure 1: Correlation Matrix of ESG Scores Provided by Three ESG Rating Agencies and Scatter Plots between Two Agencies' Ratings in 2022



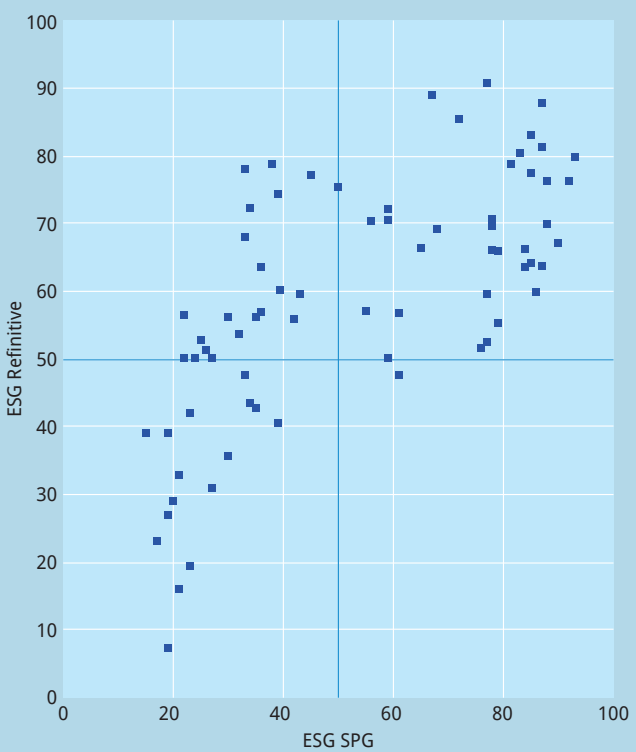
1(a)



1(b)



1(c)



1(d)

Source: Created by the author based on data from Refinitiv ESG, S&P Global ESG, and Bloomberg ESG

Empirical Results

In this section, we address the problem of noise in ESG ratings that may arise from using different scores from different agencies. To determine the validity of the scores from different agencies, we use data from three ESG rating providers: Refinitiv, S&P Global, and Bloomberg. Figure 2 presents the average ESG scores for each agency from 2015 to 2022. It is evident that the average scores across the three agencies remained quite steady but contain noise. Table 1 presents the descriptive statistics for the ESG variables as well as the financial variables. For Refinitiv and S&P Global, the ratings are on a scale from 0 to 100, whereas the scores for Bloomberg ESG scores range from 0 to 10. A high value of a rating signifies good performance and a low rating signifies poor performance. The sample consists of 70 firms in Thailand's stock market.

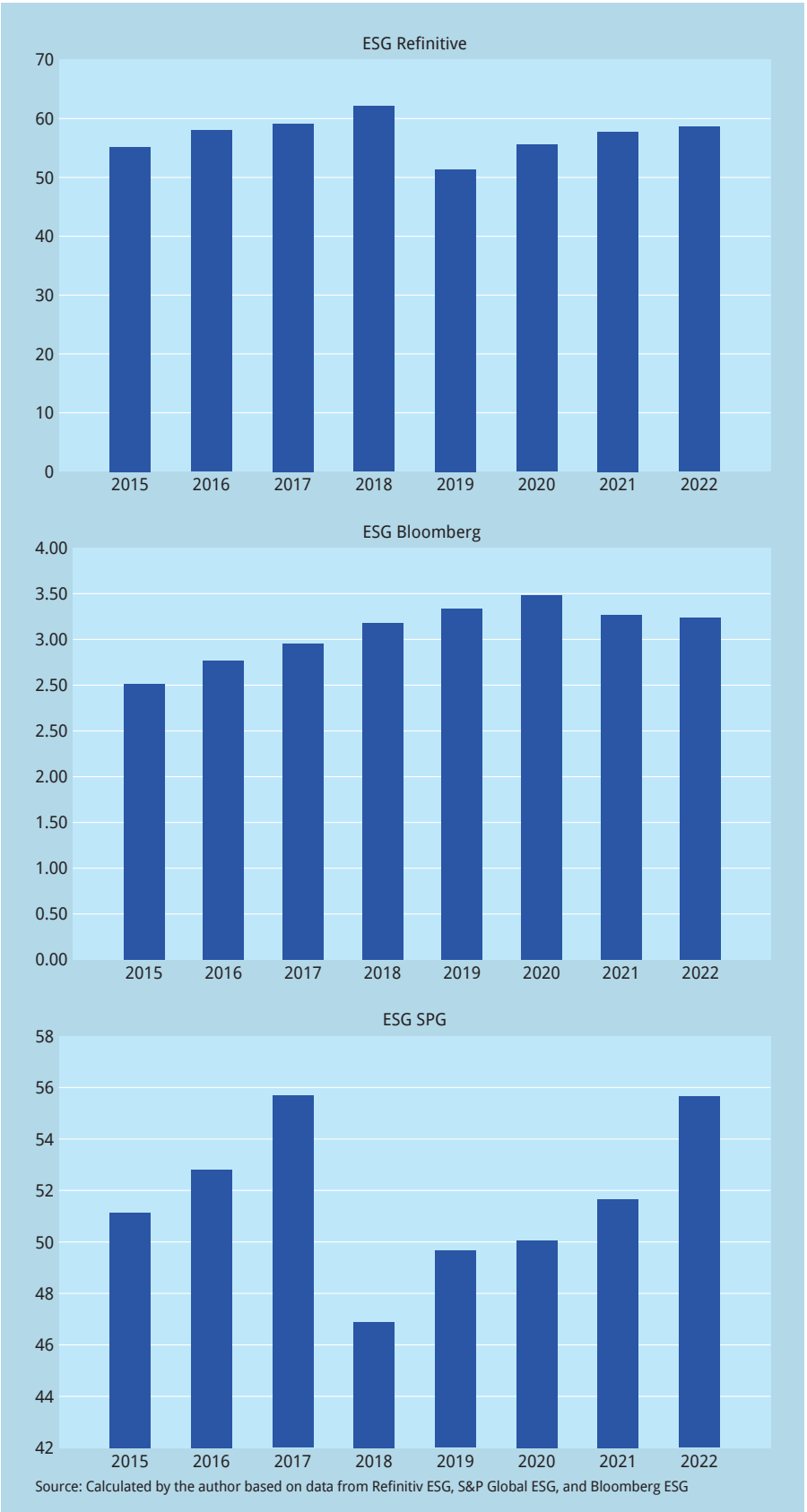
To quantify the problem of noise, we estimate the OLS regressions of stock returns on ESG ratings and compare them to the standard asset pricing model, which can be written as follows:

$$r_{k,t+1} = \alpha + \beta Y^*_{i,t} + controls_{i,t} + u_{\{i,t\}}$$
$$i = 1, \dots, n;\ t = 1, \dots, T \qquad (8)$$

Where $Y^*_{i,t}$ denotes the ESG rating of firm k, by rater i, in year t. All returns are monthly. Using the same model specification in the work of Lewellen (2015), we include stock-level controls consisting of Dividends, Market Value, Market-to-Book, Asset Growth, ROA (Return on Assets), Momentum, and Volatility. All models are estimated with industry and month fixed effects.

We estimate the OLS regressions of stock returns on ESG ratings and contrast them with Two-Stage Least Squares regressions (2SLS), which use scores from other rating agencies as instruments. Table 2 reports the main empirical results based on three different scores and two different models. All of the OLS coefficients on ESG ratings are negative, indicating that higher ESG scores lead to lower returns for Thai stocks on average. However, two of the three OLS coefficients, those for Refinitiv and S&P Global scores, are not significant.

Figure 2: Average ESG Scores on Thai Stocks for 2015-22 from Three ESG Rating Providers



Source: Calculated by the author based on data from Refinitiv ESG, S&P Global ESG, and Bloomberg ESG

When we use the 2SLS method, utilizing scores from other rating agencies as instruments, we find, as expected, that the OLS estimators suffer from attenuation bias (measurement error). After controlling with the IV, the 2SLS coefficients for Refinitiv and S&P Global scores become significant at the 1 percent level, and their magnitudes increase as expected.

Key Takeaway

It is evident that there are noise issues in ESG data. This creates the problem of attenuation bias which affects statistical inferences obtained from standard regression models. In particular, the problem exists in the case of ESG data for Thai stocks which this article examines. The problem of downward bias is resolved here by applying the concepts of Berg et al. (2022) and using 2SLS, with scores from other rating agencies as instruments. This method resulted in ESG coefficients that are more than twice the size of those obtained from OLS models and that became statistically significant.

Table 1: Descriptive Statistics for All Variables

	Mean	StDev	Min	Max
ESG Scores				
Refinitiv	56.73	18.66	2.42	91.82
S&P Global	51.93	25.08	7.00	93.00
Bloomberg	3.21	1.38	0.56	6.62
Financial Variables				
Return	0.49	2.94	-10.99	16.78
Dividend Yield	2.96	2.35	0.00	19.72
Market-to-Book	3.32	2.82	0.27	21.88
Asset Growth	16.38	60.47	-84.90	1325.66
ROA	7.55	7.07	-16.09	64.09
Momentum	0.47	2.87	-7.29	23.19
Volatility	0.09	0.05	0.02	0.30

Note: Return is the average of monthly returns in percent from month +1 to +12; Dividend Yield is per share over the prior 12 months divided by price at the end of the prior month; Market-to-Book is the logarithm of market value of equity minus the logarithm of book value of equity at the end of the prior month; Asset Growth is the logarithm of growth in total assets in the prior fiscal year; ROA is income before extraordinary items divided by average total assets in the prior fiscal year; Momentum is return from month -12 to month -2; and Volatility is the monthly standard deviation, estimated from returns from months -12 to -1.
Source: Calculation by the author

Table 2: Estimation Results for Stock Returns and ESG Ratings

	OLS		IV		OLS		IV		OLS		IV	
	Coeffs	StdErr	Coeffs	StdErr	Coeffs	StdErr	Coeffs	StdErr	Coeffs	StdErr	Coeffs	StdErr
Refinitiv	-0.019	0.014	-0.058***	0.026								
S&P Global					-0.011	0.010	-0.077***	0.026				
Bloomberg									-0.721***	0.182	-0.557	0.35
Return(-1)	-0.405***	0.055	-0.40***	0.062	-0.362***	0.048	-0.342***	0.069	-0.365***	0.054	-0.373***	0.064
ROA	0.158***	0.035	0.179***	0.045	0.155***	0.033	0.153***	0.045	0.177***	0.038	0.174***	0.043
Momentum	0.503***	0.052	0.492***	0.062	0.496***	0.054	0.416***	0.072	0.510***	0.054	0.515***	0.063
Asset Growth	0.004	0.005	0.006	0.006	0.005	0.005	0.006	0.006	0.008	0.005	0.004	0.006
Market-to-Book	-0.265**	0.117	-0.387***	0.137	-0.420***	0.114	-0.438***	0.141	-0.424**	0.123	-0.512***	0.145
Dividend Yield	-0.086	0.088	-0.129	0.097	-0.062	0.08	-0.159	0.105	-0.124	0.078	-0.045	0.096
Volatility	1.83	2.636	5.725*	3.179	0.846	2.807	1.282	3.391	5.150*	2.89	4.596	3.084
Constant	1.398	1.051	3.793**	1.817	1.3	0.821	5.507***	1.884	2.864***	0.85	2.535	1.573
R^2	0.47		0.43		0.39		0.28		0.45		0.432	

Note: ***, ** and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.
Source: Calculation by the author

This analysis suggests that investors or practitioners should reference several different ESG ratings in evaluating the investment prospects for a company. Given how ESG ratings tend to diverge across rating agencies, it is highly recommended to use as an instrument a second ESG rating from a different agency, if available, to obtain stronger empirical results and more reliable information on the effect of ESG performance on stock returns. The 2SLS method is superior to the traditional OLS approach.

Notes

1 See more detailed information in the meta-study by Atz, Bruno, Liu, and Van Holt (2022), which compiled 1,141 empirical studies from 2015 to 2020 to examine the relationship between ESG scores and company financial performance.

2 Sin companies are publicly traded companies associated with activities that are considered unethical or immoral.

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