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A STUDY ON THE IMPACT OF SUSTAINABLE MANAGEMENT ON EARNINGS PERSISTENCE AND MARKET PRICING: EVIDENCE FROM KOREA

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Abstract. This study examines the implications of sustainable management for the persistence of earnings and earnings components. This study also analyzes whether sustainable management influences investors' assessments of earnings persistence. According to previous studies, sustainable management activities ultimately have a positive effect on corporate financial performance and corporate value by satisfying the desires of not only shareholders, but also various actors concerned with social contributions and reduced information asymmetry. In addition, the transparency of financial reporting increases as earnings management decreases due to ethical management. So this study predicts that excellent sustainable management activities will improve earnings persistence and investors use as a signal to correctly price the persistence of earnings. This research uses the ESG ratings as a proxy for sustainable management and sample size is 3,247 in Korea securities market. The empirical results show that there is a significant positive relationship between higher ESG grades and earnings and earnings components. And by the method of Mishkin (1983), investors correctly price the persistence of earnings and earnings components based upon sustainable management activities. The results in this study helps to improve our understanding of the impact of sustainable management for earnings quality and investors' evaluation of earnings quality.

Keywords: sustainable management, ESG, earnings persistence, earnings quality, market pricing, investment decision.

JEL Classification: M14, M40.

Introduction

This study investigate the implication of sustainable management on the persistence of current earnings and earnings components (cash flow and accruals) for next-period earnings. Applying the Mishkin (1983) methodology, this study also examines whether sustainable management activities influences investors' assessments of earnings persistence.

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Sustainable management emphasizes management transparency and ethical management in addition to the traditional management value of creating profit through product quality or marketing strategy. In addition, sustainable management considers the contribution to the public interest in social development and environment protection. Sustainable management means that firms can survive and grow only when they search for cooperation and coexistence with various firms and people (Yu & Jung, 2016). Sustainable management is recognized as an essential management way for a firm to survive as a going concern (Kim & Kim, 2018).

South Korean firms (such as KT, SKT, Samsung SDI, and POSCO) also accept sustainable management as a survival strategy and publish annual reports on sustainable development, social responsibility or environmental management (Oh & Kang, 2016). The Korea Corporate Governance Service (KCGS) assesses the level of sustainable management of companies listed in Korean Securities Market (KSE) every year through environmental, social, and governance (ESG) assessments since 2011. The rating of the KCGS reports four areas of ESG integration, environmental management, social responsibility, and governance in seven grades (S, A+, A, B+, B, C, D) (Korea Corporate Governance Service [KCGS], 2018).

Consistent with the opinions of the business worlds, previous studies report that sustainable management activities ultimately have a positive effect on corporate financial performance and corporate value by satisfying the desires of not only shareholders, but also various actors concerned with social contributions and reduced information asymmetry (Waddock & Graves, 1997). In addition, the transparency of financial reporting increases as earnings management decreases due to ethical management, which conforms to laws and ethics strictly (Ban & Park, 2012). Accordingly, firms with excellent sustainable management activities should have lower risks and improve earnings quality due to transparent accounting.

This study analyzes the relationship between sustainable management activities and the earnings persistence of earnings quality. Prior studies offer various definitions of earnings quality, such as liquidity, accounting transparency, conservatism, and earnings persistence. However, Jonas and Blanchet (2000) suggested earnings persistence as an element to measure the predicted earnings values from the perspective of information users, and contended that under high earnings persistence, information was reliable and earnings quality was high. Since sustainable management practices should implement environmental and social responsibility to remain as a going concern and perform activities for both short- and long-term performance to maintain sustained growth by improving governance, such firms should have higher earnings persistence. Capital market investors who use accounting information should evaluate such outcomes rationally.

This paper analyzes companies listed on the KSE from 2011 to 2016 when the KCGS began its ESG assessments. This paper uses the ESG grades of the KCGS as a proxy for sustainable management among Korean companies, apply the method of Sloan's (1996) model to test the persistence of earnings and earnings components and Mishkin's (1983) methodology to test investor's assessments of earnings persistence. The main findings of the empirical analysis are as follows. First, there is a significant positive relationship between the higher ESG grades and the persistence of earnings and earnings components (cash flow and accruals). This means that excellent sustainable management is likely to have the more persistent earnings,

cash flow and accruals. Second, As a result of using the Mishikin (1983) test, investors in the capital market correctly price the persistence of earnings and earnings component based upon sustainable management activities. This means that investors use sustainable management as a signal to assess the persistence of earnings and earnings components.

This research makes the following contributions compared with prior studies related to sustainable management. First, this study demonstrates the influence of firm's sustainable management activities on the quality of reported earnings. Previous studies report that sustainable management activities improve financial performance or firm value, but this study presents empirical results on whether sustainable management activities increase the persistence of earnings and earnings components. The results of these studies imply that sustainable management activities are a factor that can improve a firm's value by improving earnings quality. Second, this study analyzes the implication of sustainable management activities on investors' expectations on the persistence of earnings and its components by extending the studies of Sloan (1996) and Xie (2001), who investigate investors' responses to earnings persistence. That is, many firms perform sustainable management activities to survive, and our study presents empirical results on whether investors in the capital market rationally reflect such activities in stock prices. This results are consistent with the findings of previous studies reporting that sustainable management activities may have a negative influence on firm value by incurring costs in the short term, but the activities will improve firm value in the long term.

The rest of this paper proceeds as follows: the first section establishes the research hypotheses after reviewing previous studies. The second section describes the research model, sample, and preliminary data analysis and the third section presents the results of the empirical analysis. The last section provides the conclusions and contributions of the study.

1. Literature review and hypotheses

1.1. Review of the literature on sustainable management

Previous studies on sustainable management can be largely classified into studies related to financial performance or firm value and studies related to earnings management (Lee, 2011). First, studies related to financial performance show that sustainable management has a positive influence on financial performance and firm value in various ways. Waddock and Graves (1997) confirmed that firms' social contribution activities are positively related to financial performance and have the positive effects of improving long-term financial performance. Lev et al. (2010) reported that firms that are active in socially responsible activities had better sales and financial performance because consumers who were interested in social issues prefer the products and services of firms that made social contributions. Dalal and Thaker (2019) and Bhaskaran et al. (2020) found that corporate with good ESG scores improve performance evaluated through accounting as well as market-based measure. Carnevale and Mazzuca (2014) analyzed that sustainable management reports were additional and supplemental disclosures and had a positive relationship with stock prices because they resolved information asymmetry and helped investors made efficient decisions. Jung (2014) stated that sustainable management activities such as appropriate income-generation, social

benefit-sharing, and win-win growth activities for partner companies positively influenced the financial performance of the firm and had a positive correlation with corporate value. Kim (2009) contended that CSR was a cost factor in the short term, but it had the positive effect of lowering costs in the long-term because it increased the firm's reputation, resulting in higher sales. The author reported that the value of firms carrying out social responsibility activities was higher than it was for firms that did not because they had lower earnings downside risk and less potential for being involved in negative events that can damage the firm's value. Kim and Kim (2018) are found that companies with exemplary social responsibility activities have a higher sustainability of management performance than those that do not. Kim and Ma (2020) stated that sustainable management includes environmental protection, social contribution activities, and ethical management. These non-financial performances were reported as continuously improving the firm value. Choi (2021) argued that sustainable management enhances corporate value and is related to corporate innovation. These research findings reflect the opinions of stakeholders who believe that sustainable management ultimately has a positive influence on financial performance and shareholder value by satisfying the needs of not only shareholders but also various stakeholders (Waddock & Graves, 1997).

Research on the level of earnings management and sustainable management contend that managers of firms conducting CSR engage in responsible management decision-making from an ethical perspective and secure the transparency of financial reporting (Ban & Park, 2012). Moon (2007) used the introduction of ethical management as a proxy for sustainable management and finds that the level of discretionary accounting choices was low for firms that introduce ethical management. In addition, the author reported lower discretionary accruals after the introduction of ethical management than it was prior. Kim et al. (2010) used the Korea Economic Justice Institute (KEJI) index as a proxy for sustainable management and found a negative correlation between social indicators and discretionary accruals, meaning that ethical firms that performed their social responsibilities to the fullest refrain from earnings management, which was an unethical behavior. Rezaee and Tao (2019) found that the quantity and quality of sustainable disclosure had been shown to be positive to the innate earnings quality and negative to the discretionary earnings quality. This presented that sustainability disclosure quantity and quality was modified and mitigated opportunistic financial reporting. Kim and Lee (2015) analyzed the relationship with CSR activities by measuring the quality of profits as volatility of profits. As a result, it was found that the volatility of EPS and the volatility of current accruals decreased as the corporate social contribution activities increased. In other words, the fidelity of corporate CSR was interpreted as having the result of enhancing the quality of profits and increasing corporate value.

Previous studies report that firms performing sustainable management activities improve their reputation by satisfying the needs of stakeholders via social contributions and resolving information asymmetry. And sustainable management activities decrease the possibility of the firm's involvement in negative events that can damage the firm's value, which positively influences financial performance and shareholder value. In addition, firms performing sustainable management activities have improved accounting transparency due to the low possibility of discretionary accounting thanks to ethical management.

Accordingly, firms performing sustainable management activities may reduce risks and improve earnings quality due to transparent accounting. However, most prior studies investigate sustainable management activities, financial performance, firm value, and earnings management, and studies on the relationship with earnings persistence, which can influence the quality of accounting earnings, are lacking. Accordingly, this study analyzes the relationship between sustainable management activities and earnings persistence.

1.2. Hypotheses

Accounting information is indispensable for information users to make financial decisions such as investments in firms or loans. In particular, earnings is the summary of a firm's performance is the most frequently used accounting information (Choi & Kim, 1999). The quality of financial reporting influences information users' dependence on accounting information (Lee, 2010). The definition of earnings quality varies depending on the user's purpose. However, from an investor's perspective, high quality earnings should reflect current firm's performance well, predict future firm's performance well and provide a useful summary measure of a firm value (Dechow et al., 2010).

Jonas and Blanchet (2000) suggested earnings persistence as an element to measure the predicted value of earnings from the perspective of information users. Companies that prepared financial statements and users of accounting information judge that information as reliable only when earnings is sustained, and they do not believe the information is reliable just because the firm creates a temporary high profit. Earnings persistence can be used as an indicator to estimate future earnings, and if earnings has sustainable properties, then it is considered high quality information. Otherwise the quality of earnings is considered low (Penman & Zhang, 2002). As such, earnings persistence is a qualitative characteristic of earnings, and it is an important concern for investors.

Sustainable management is a business strategy to maintain sustained growth by increasing the firm's competitiveness through activities to improve the environment, social responsibility, and governance to remain as a going concern. The sustainable management method should implement activities for both short- and long-term financial performance. Accordingly, this study expects that firms with excellent sustainable management activities will have more persistent earnings. In addition, the impact of earnings components on future earnings will still increase if this study divides the earnings into cash flows and accruals. This study therefore establishes Hypothesis 1. The reason why components of earnings are divided into cash flows and accruals is because the persistence on future earnings differs for cash flows and accruals, since accruals contain many management judgments and assumptions (Sloan, 1996; Xie, 2001). If excellent sustainable management activities will lead to a decrease in accounting discretion and increase the quality of accruals, the accruals will affect future earnings, similar to cash flows. This is a matter of empirical analysis.

H1. *Sustainable management is positively associated with the persistence of earnings and earnings components.*

If the effect of sustainable management activities on the persistence of earnings and earnings components in Hypothesis 1 is significant, then investors in the capital market may use

sustainable management activities as a signal of earnings persistence. Previous studies, such as those by Sloan (1996) and Xie (2001), present evidence that investors reflect their rational expectations of future earnings persistence in stock prices. Tsoutsoura (2004) found the positive influence of sustainable management performance on profitability measures such as return on assets, and Carnevale and Mazzuca (2014) reported a positive relationship between sustainable management activities and stock prices. Dalal and Thaker (2019) and Bhaskaran et al. (2020) also suggested that ESG scores enhance market-based performance such as Tobin's Q. Accordingly, this study establishes Hypothesis 2 to test if investors rationally reflect earnings persistence due to sustainable management in stock prices.

H2. *Investors in the capital market rationally price the persistence of earnings and earnings components based upon sustainable management activities. 2. Research model, sample composition, and descriptive statistics*

2. Research model, sample composition, and descriptive statistics

2.1. Research model

This study examines the influence of sustainable management activities on current-period earnings, cash flow and accruals for future earnings after one period. This study also analyzes whether sustainable management activities affect investors' assessments of earnings persistence.

Earnings persistence is generally measured by the correlation of earnings between the current period and one-period after, using the first-order autocorrelation coefficient (Sloan, 1996). This study uses the following basic model to estimate earnings persistence:

$$NI_{i,t+1} = \beta_0 + \beta_1 NI_{i,t} + \varepsilon_{i,t+1}, \tag{1}$$

where $NI_{i,t}$ is the net profit in year t, $NI_{i,t+1}$ is the net profit in year $t + 1$, and all variables except for the dummy variable are normalized to average total assets. This study uses Eq. (2) to test Hypothesis 1 by introducing ESG, which represents the excellence of sustainable management activities, in Eq. (1).

$$NI_{i,t+1} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 NI_{i,t} + \beta_3 ESG \times NI_{i,t} + \varepsilon_{i,t+1}. \tag{2}$$

ESG represents the excellence of sustainable management activities, and it is a dummy variable equal to 1 if the KCGS rates the firm's sustainable management activities as S, A+, A, or B+, and 0 otherwise. If better sustainable management activities lead to higher the earnings persistence, then β_3 will have a statistically significant positive value.

The findings of previous studies show that cash flows, an earnings component, have a greater effect on earnings persistence than accruals due to the discretion of the accrual calculation process. However as this study expects that firms conducting sustainable management activities will decrease accounting discretion and have high quality of accruals, this study establishes Eq. (4) by modifying Eq. (3) to determine if accruals differ for firms conducting sustainable management activities.

$$NI_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 ACC_{i,t} + \varepsilon_{i,t+1}; \tag{3}$$

$$NI_{i,t+1} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 OCF_{i,t} + \beta_3 ACC_{i,t} + \beta_4 ESG \times OCF_{i,t} + \beta_5 ESG \times ACC_{i,t} + \varepsilon_{i,t+1}. \quad (4)$$

Equation (3) divides the current net income of Eq. (1) into cash flow (OCF) and accruals (ACC), where this study calculates accruals as the current net income – cash flows from operating activities. In Eq. (4), β_2 signifies the persistence of cash flow and β_4 signifies the incremental effect, which is the influence of sustainable management activities on cash flow persistence. β_3 represents the persistence of accruals and β_5 represents the incremental effect, which is the influence of sustainable management activities on the persistence of accruals. If the persistence of accruals and cash flows as earnings components is high for firms with superior sustainable management activities, then β_4 and β_5 will have statistically significant positive values. Previous studies (Sloan, 1996; Hanlon, 2005) report that the persistence of accruals is lower than the persistence of cash flows. However, prior studies on sustainable management activities (Moon, 2007; Kim et al., 2010) report lower discretionary accruals because sustainable management activities decrease accounting discretion. Accordingly, because the sustainable management has incremental effects on the persistence of cash flows and accruals, this study consider that whether the persistence of accruals is lower than that of the cash flows as a matter of empirical evidence.

Next, for Hypothesis 2 on whether investors rationally assess the persistence of earnings and earnings components based upon firm's sustainable management activities, this study applies Mishkin's (1983) test, as in previous studies (Sloan, 1996; Xie, 2001; Hanlon, 2005; McGure et al., 2013). This paper examines market efficiency by estimating Eqs (2) and (5) simultaneously. This study constructs Eqs (4) and (6) by separating the earnings components and constructing models. SAR is the size-adjusted returns in period t+1, which this study measures subtracting the group's yield-to-average classified according to the firm's scale from the holding period return of an individual firm.

$$NI_{i,t+1} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 NI_{i,t} + \beta_3 ESG \times NI_{i,t} + \varepsilon_{i,t+1}; \quad (2)$$

$$SAR_{i,t+1} = \alpha_0 + \gamma_1 (NI_{i,t+1} - \beta_0^* - \beta_1^* ESG_{i,t} - \beta_2^* NI_{i,t} - \beta_3^* ESG \times NI_{i,t}) + \upsilon_{i,t+1}; \quad (5)$$

$$NI_{i,t+1} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 OCF_{i,t} + \beta_3 ACC_{i,t} + \beta_4 ESG \times OCF_{i,t} + \beta_5 ESG \times ACC_{i,t} + \varepsilon_{i,t+1}; \quad (4)$$

$$SAR_{i,t+1} = \alpha_0 + \gamma_1 (NI_{i,t+1} - \beta_0^* - \beta_1^* ESG_{i,t} - \beta_2^* OCF_{i,t} - \beta_3^* ACC_{i,t} - \beta_4^* ESG \times OCF_{i,t} + \beta_5^* ESG \times ACC_{i,t}) + \upsilon_{i,t+1}. \quad (6)$$

Mishkin's (1983) method compares the actual observed earnings persistence to the earnings persistence reflected in stock prices. Eqs (2) and (4) measure the actual earnings persistence by matching earnings and earnings components in period t+1 and t. Eqs (5) and (6) measure and assess the earnings and earnings components recognized based upon the market evaluations of each, respectively. Consequently, if investors in the capital market rationally assesses the persistence of earnings and earnings components according to the firm's sustainable management activities, then this study expects $\beta_2 + \beta_3 = \beta_2^* + \beta_3^*$ in Eqs (2) and (5), and $\beta_2 + \beta_4 = \beta_2^* + \beta_4^*$ and $\beta_3 + \beta_5 = \beta_3^* + \beta_5^*$ in Eqs (4) and (6). In Eqs (2) and (5),

however, if $\beta_2 + \beta_3 > \beta_2^* + \beta_3^*$, then the capital market underestimates the influence of current earnings on future earnings compared to the cross-sectional relationship between current earnings based upon sustainable management activities and future earnings; if $\beta_2 + \beta_3 < \beta_2^* + \beta_3^*$, then the capital market overestimates the influence of current earnings on future earnings. This study interprets the persistence of cash flows and accruals in Eqs (4) and (6) similarly.

This study estimates the equations above on market rationality simultaneously using a nonlinear regression analysis (iterative weighted nonlinear least squares). To test the constraints of $\beta_2 + \beta_3 = \beta_2^* + \beta_3^*$ in Eqs (2) and (5), and $\beta_2 + \beta_4 = \beta_2^* + \beta_4^*$ and $\beta_3 + \beta_5 = \beta_3^* + \beta_5^*$ in Eqs (4) and (6), this study uses the likelihood ratio statistics proposed by Mishkin (1983).

$$2N \log\left(\frac{SSR^c}{SSR^u}\right) \sim \chi^2(q).$$

Here, N is the number of samples, SSR^c is the residual sum of squares with a constraint, SSR^u is the residual sum of squares without a constraint, and q is the number of constraints related to market efficiency. If χ^2 is significant, then the regression coefficients between the equations are not identical and market efficiency is rejected (Ko & Yoon, 2006).

2.2. Sample composition

This study analyzes firms listed on the Korea Stock Exchange for the sample period from 2011 to 2016, the period in which ESG evaluations were conducted. Data up to 2017 were used for analysis. The ESG rating did not change much after that. From 2020, the effect of covid19 could cause convenience by industry, so it was excluded from the study. This study identifies ESG grades using public data published on the homepage of the KCGS. Table 1 summarizes the sample selection process. The initial sample was 4,591 firms listed on the stock market in each year. After eliminating financial businesses, firms balancing accounts in months besides December, firms without financial or stock price data available in the FnGuide Database, firms lacking the comprehensive ESG evaluation data were not available, and outliers, the final sample consists of 3,247 firm-year observations.

Table 1. Sample selection

Category	Obs.
Firm-years listed on the stock market from 2011 to 2016	4,591
Exclusions:	
Financial businesses or firm-year balancing accounts in months besides December	(355)
Firm-years with unavailable financial or stock price data	(195)
Firm-years with unavailable ESG evaluation data	(581)
Outliers (the highest and lowest 1% of the major variables)	(213)
Total Samples	3,247

Table 2 presents the distribution of the 3,247 observations for each year. The number of observations was the smallest in 2011 (419, 12.9%), the year of the first ESG evaluations, and increased to the maximum of 586 (18.0%) in 2016. The sample is evenly distributed in each year.

Table 2. Sample distribution

Year	2011	2012	2013	2014	2015	2016	Total
Obs.	419	517	567	580	578	586	3,247
Proportion	12.9%	15.9%	17.5%	17.9%	17.8%	18.0%	100.0%

Note: Proportion measured by dividing the number of observations by the total sample.

2.3. Descriptive statistics

Table 3 provides the descriptive statistics of the variables used in the analysis. Both the average earnings for the next year (NI_{t+1}) and the earnings for the current year (NI) were 0.021, which was 2.1% of the total assets. When this study divides earnings (NI) into cash flow (OCF) and accruals (ACC), the OCF average was 0.047 (4.7% of total assets), and the ACC average was –0.026 (2.6% of total assets). The average size-adjusted return (SAR) was –0.152. Of the sample, 16.7% of firms have ESG grades of S, A+, A, and B+ for sustainable management activities from the KCGS.

Table 3. Summary statistics

Variable	Mean	Min	25%	Median	75%	Max	Std
NI_{t+1}	0.021	–0.763	0.003	0.025	0.052	2.914	0.103
NI	0.021	–0.355	0.003	0.025	0.053	0.256	0.064
OCF	0.047	–0.166	0.010	0.043	0.082	0.285	0.064
ACC	–0.026	–0.353	–0.055	–0.021	0.007	0.223	0.063
SAR	–0.152	–18.822	–0.257	–0.075	0.155	2.272	1.698
ESG	0.167	0.000	0.000	0.000	0.000	1.000	0.373

Note: NI – Net Income/average total assets; OCF – cash flows from operating activities/average total assets; ACC – (NI-OCF)/average total assets; SAR – holding period return of individual firm – yield to average of the group classified by business scale; ESG – a dummy variable to which "1" was assigned if comprehensive evaluation grade by the KCGS was S, A+, A, or B+, and "0" was assigned to the rest.

Table 4 presents the correlation coefficients among the variables. This study finds a highly significant positive correlation (r = 0.434) between future earnings (NI_{t+1}) and current earnings (NI) and a highly significant positive correlation between future earnings and cash flow (OCF; r = 0.334) and accruals (ACC; r = 0.097). The correlation coefficient between OCF and ACC was –0.502, which is a highly significant negative correlation, similar to Hanlon (2005).

This study finds a significant positive correlation coefficient (r = 0.044) between sustainable management activities (ESG) and future earnings (NI_{t+1}), and a significant positive correlation coefficient (r = 0.041) between ESG and size-adjusted returns (SAR).

In Table 5, this study compares the firms with high and low ESG assessments of the level of sustainable management activities. The results show that excellent firms have better financial

performance than do their counterparts for all variables. In particular, cash flows from operating activities were higher for excellent firms than for non-excellent firms, and accruals were lower.

Table 4. Correlation statistics

Variables	NI_{t+1}	NI	OCF	ACC	SAR
NI	0.434				
	(<0.0001)				
OCF	0.334	0.516			
	(<0.0001)	(<0.0001)			
ACC	0.097	0.482	–0.502		
	(<0.0001)	(<0.0001)	(<0.0001)		
SAR	0.042	0.038	0.032	0.005	
	(0.016)	(0.031)	(0.064)	(0.780)	
ESG	0.044	0.049	0.102	–0.055	0.041
	(0.013)	(0.006)	(<0.0001)	(0.002)	(0.019)

Note: The figure in parentheses is the p value; NI – Net Income/average total assets; OCF – cash flows from operating activities/average total assets; ACC – (NI-OCF)/average total assets; SAR – holding period return of individual firm – yield to average of the group classified by business scale; ESG – a dummy variable equal to 1 if the KCGS ESG grade is S, A+, A, or B+, and 0 otherwise.

Table 5. Analysis of mean differences

Variable name	Firms with high ESG grade (N = 542)		Firms with low ESG grade (N = 2,705)		Diff.	t-stat.
	Average	STD	Average	STD		
NI_{t+1}	0.031	0093	0.019	0.105	0.012	2.70***
NI	0.028	0.063	0.020	0.064	0.008	2.78***
OCF	0.062	0.067	0.044	0.063	0.018	5.60***
ACC	–0.033	0.059	–0.024	0.064	–0.009	3.30***
SAR	0.004	0.350	–0.184	1.852	0.187	4.85***

Note: NI – Net Income/average total assets; OCF – cash flows from operating activities/average total assets; ACC – (NI-OCF)/average total assets; SAR – holding period return of individual firm – yield to average of the group classified by business scale.

3. Empirical results

3.1. Sustainable management activities and the persistence of earnings and earnings components

Table 6 presents the estimation results of Eqs (2) and (4) to analyze sustainable management activities, reported the persistence of earnings and earnings components. The regression coefficient (β_3) of the interaction between sustainable management and earnings (ESG×NI) in Panel A is 0.087 (t = 2.52), which is significant and positive at the 5% level, indicating that

the better the sustainable management activities are, the higher the earnings persistence is.

To examine the persistence of the earnings components in Panel B, this study divides earnings into cash flows and accruals. The regression coefficient (β_4) of the interaction between sustainable management and cash flows (ESG×OCF) is 0.083 (t = 2.223), and the regression coefficient (β_5) between sustainable management and accruals (ESG×ACC) is 0.089 (t = 2.12), which are significant and positive at the 5% level, indicating that the better the sustainable management is, the higher the persistence of the earnings components is. The persistence of cash flow (OCF) and accruals (ACC) are 0.671 and 0.502, respectively, showing a higher persistence of OCF than that of ACC (F test, $p < 0.0001$). This finding is consistent with Sloan (1996), who reports that persistence related to the future earnings of accruals as a component of net earnings is lower than the persistence of the future earnings of cash flows. The difference in the strengthening effects of sustainable management activities on the persistence of cash flows (ESG×OCF) and the persistence of accruals (ESG×ACC) is non-significant (the significance level of F test, which tests the equality of two coefficients, is <0.861). The result indicates that the persistence of the accruals of firms with excellent sustainable management activities is similar to the persistence of cash flows, which is consistent with the findings of previous studies (Moon, 2007; Kim et al., 2010) reporting that the earnings quality of firms performing sustainable management activities is high because of low accruals.

Considering the findings above, Hypothesis 1 that sustainable management is positively associated with the persistence of earnings and earnings components is supported.

Table 6. Sustainable management activities and the persistence of sustainable management analysis

Panel A: Earnings forecasting equation					
Variables	constant	ESG	NI	ESG×NI	adj.R^2
Coefficient	0.008	0.002	0.604	0.087	0.422
t-stat.	8.93***	0.70	42.52***	2.52**	

Panel B: Earnings forecasting equation with components of earnings							
Variables	constant	ESG	OCF	ACC	ESG×OCF	ESG×ACC	adj.R^2
Coefficient	0.003	0.000	0.671	0.502	0.083	0.089	0.436
t-stat.	2.62**	0.04	42.75*	31.15***	2.23**	2.12**	
F-test of OCF > ACC : 122.68, p = <0.0001							
F-test of ESG×OCF > ESG×ACC : 0.03, p = 0.861							

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; The number of samples for each model was 3,153 in Panel A and 3,159 in Panel B; NI – Net Income/average total assets; OCF – cash flows from operating activities/average total assets; ACC – (NI-OCF)/average total assets; SAR – holding period return of individual firm – yield to average of the group classified by business scale; ESG – a dummy variable equal to 1 if the KCGS ESG grade is S, A+, A, or B+, and 0 otherwise.[1]

[1] Cases of studentized residual values ±2 or higher were eliminated from each regression model.

3.2. Capital market reactions to sustainable management activities

The results of the estimation of Eqs (2) and (5) and Eqs (4) and (6) using Mishkin's (1983) method to analyze capital market reactions to sustainable management activities, earnings, and earnings components are presented in Table 7. The results in Panel A do not reject the null hypothesis $\beta_2 + \beta_3 = \beta_2^* + \beta_3^*$ (p = 0.799) that investors' expectations of earnings persistence were the same based upon sustainable management. Thus, investors rationally evaluate earnings persistence based upon sustainable management activities because the regression coefficient ($\beta_2 + \beta_3$) of actual earnings persistence based upon sustainable management was the same as the regression coefficient ($\beta_2^* + \beta_3^*$) on investors' expectations of earnings persistence.

Table 7. Analysis of capital market reactions to sustainable management activities

Panel A: Market pricing tests for earnings							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	0.002	0.002	β_1^*	–0.114	0.068	$\beta_1 = \beta_1^*$	5.29, p = 0.065
β_2	0.604	0.014	β_2^*	–0.065	0.411	$\beta_2 = \beta_2^*$	4.52, p = 0.034
β_3	0.087	0.035	β_3^*	0.572	0.793	$\beta_3 = \beta_3^*$	0.40, p = 0.528
Likelihood Ratio Test of : 0.06, p = 0.799							
Panel B: Market pricing tests for the components of earnings							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	0.000	0.003	β_1^*	–0.112	0.075	$\beta_1 = \beta_1^*$	3.40, p = 0.066
β_2	0.671	0.016	β_2^*	–0.061	0.452	$\beta_2 = \beta_2^*$	4.42, p = 0.036
β_3	0.502	0.016	β_3^*	–0.036	0.453	$\beta_3 = \beta_3^*$	2.26, p = 0.132
β_4	0.083	0.037	β_4^*	0.554	0.843	$\beta_4 = \beta_4^*$	0.33, p = 0.565
β_5	0.089	0.042	β_5^*	0.567	0.950	$\beta_5 = \beta_5^*$	0.27, p = 0.606
Likelihood Ratio Test of : 0.12, p = 0.726							
Likelihood Ratio Test of : 0.01, p = 0.943							

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; The number of samples for each model was 3,153 in Panel A and 3,159 in Panel B; ASE is Asymptotic Standard Error; NI – Net Income/average total assets; OCF – cash flows from operating activities/average total assets; ACC – (NI–OCF)/average total assets; SAR – holding period return of individual firm – yield to average of the group classified by business scale; ESG – a dummy variable equal to 1 if the KCGS ESG grade is S, A+, A, or B+, and 0 otherwise.

This study divides current earnings (NI) into cash flows (OCF) and accruals (ACC) to examine the persistence of earnings components and report the results in Panel B. The results do not reject the null hypothesis $\beta_2 + \beta_4 = \beta_2^* + \beta_4^*$ (p = 0.726) that investors' expectations of

the persistence of cash flows were the same based upon sustainable management or the other null hypothesis $\beta_3 + \beta_5 = \beta_3^* + \beta_5^*$ (p = 0.943) that investors' expectations of the persistence of accruals were the same. This study can interpret these findings to mean that the persistence of cash flows and accruals based upon sustainable management activities is consistent with investors' expectations.

Taken together these findings support Hypothesis 2 that investors rationally assess the persistence of earnings and earnings components based upon sustainable management activities.

4. Robustness check

The ESG assessment of the KCGS consist of four area: ESG integration, environmental management (E), social responsibility management (S), and governance (G). This study examines on each of E or S or G in additional analysis. The results of the persistence of earnings and earnings components for each area of sustainable management activities are presented in Table 8. In Panel A, the regression coefficient of G×NI is 0.108 (t = 2.64) in the governance evaluation (G) model and significant at the 5% level. The regression coefficients of G×OCF is 0.071 (t = 1.94) and G×ACC is 0.108 (t = 2.64) in Panel B, and are significant at the 5% level, indicating that the better the governance is, the higher the persistence of earnings and earnings components are. The results may be due to the close relationship between the quality of earnings and governance in that the factors to evaluate governance consist of the independence, activities, expertise, and independence of the external auditors of the board of directors.

Table 8. Additional analysis of sustainable management activities and the persistence of sustainable management

Panel A: Earnings forecasting equation						
Variables	Environment (E)		Social responsibility (S)		Governance (G)	
	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
constant	0.008	8.52***	0.007	7.79***	0.008	8.68***
E (or S or G)	0.000	0.21	0.006	2.97***	0.002	0.96
NI	0.611	39.33***	0.606	41.69***	0.603	42.12***
E (or S or G)×NI	0.0025	0.79	0.033	1.02	0.086	2.50**
adj.R2	0.412		0.417		0.422	
Panel B: Earnings forecasting equation with components of earnings						
Variables	Environment (E)		Social responsibility (S)		Governance (G)	
	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
constant	0.003	2.99***	0.002	2.26**	0.002	2.11**
E·S·G	–0.003	–1.26	0.003	1.25	0.003	1.00
OCF	0.681	39.87***	0.673	42.11***	0.671	42.52***

End of Table 8

Variables	Environment (E)		Social responsibility (S)		Governance (G)	
	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
ACC	0.520	29.07***	0.515	31.07***	0.498	30.64***
E (or S or G)×OCF	0.020	0.59	0.031	0.89	0.071	1.94**
E (or S or G)×ACC	–0.026	–0.73***	0.023	0.60	0.108	2.64***
adj.R2	0.432		0.435		0.437	
F-test of OCF > ACC	104.20, p < 0.0001		109.26, p = <0.0001		128.78, p = <0.0001	
E (or S or G)×OCF > E (or S or G)×ACC	3.08, p = 0.079		0.06, p = 0.811		1.05, p = 0.305	

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; The number of samples for each model was 2,991 (E), 3,155 (S), and 3,153 (G) in Panel A; and 2,996 (E), 3,157 (S), and 3,159 (G) in Panel B; NI – Net Income/average total assets; OCF – cash flows from operating activities/average total assets; ACC – (NI-OCF)/average total assets; SAR – holding period return of individual firm – yield to average of the group classified by business scale; ESG – a dummy variable equal to 1 if the KCGS ESG grade is S, A+, A, or B+, and 0 otherwise.

The results for the analysis of capital market reactions to the earnings and earnings components of the factors based upon sustainable management are presented in Table 9. The examination of investors' expectations of the persistence of earnings and earnings components based upon the evaluation of governance in Table 8 show that the null hypothesis $\beta_2 + \beta = \beta_2^* + \beta_{33}^*$ (p = 0.725) in Panel A and the null hypothesis $\beta_2 + \beta_4 = \beta_2^* + \beta_4^*$ (p = 0.722) and $\beta_3 + \beta_5 = \beta_3^* + \beta_5^*$ (p = 0.769), in Panel B were not rejected. Since these findings mean that the persistence of earnings and earnings components based upon the governance-related sustainable management activities are consistent with investors' expectations of the persistence of earnings and earnings components, this study can conclude that investors rationally assess the persistence of earnings and earnings components based upon governance-related activities.

Table 9. Additional analysis of capital market reactions to sustainable management activities

Panel A1: Market pricing tests for earnings from environmental activities (E)							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	0.004	0.002	β_1^*	–0.103	0.063	$\beta_1 = \beta_1^*$	5.27, p = 0.022
β_2	0.611	0.016	β_2^*	–0.162	0.492	$\beta_2 = \beta_2^*$	4.53, p = 0.033
β_3	0.025	0.031	β_3^*	0.681	0.782	$\beta_3 = \beta_3^*$	0.80, p = 0.370
Likelihood Ratio Test of $\beta_2 + \beta_3 = \beta_2^* + \beta_3^*$: 0.03, p = 0.864							

Continued of Table 9

Panel A2: Market pricing tests for earnings from social responsibility activities (S)							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	0.006	0.002	β_1^*	–0.124	0.071	$\beta_1 = \beta_1^*$	7.37, p = 0.007
β_2	0.605	0.145	β_2^*	–0.099	0.428	$\beta_2 = \beta_2^*$	4.74, p = 0.029
β_3	0.034	0.032	β_3^*	0.731	0.781	$\beta_3 = \beta_3^*$	0.91, p = 0.341
Likelihood Ratio Test of $\beta_2 + \beta_3 = \beta_2^* + \beta_3^*$: 0.00, p = 1.000							
Panel A3: Market pricing tests for earnings from governance activities (G)							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	0.002	0.002	β_1^*	–0.090	0.062	$\beta_1 = \beta_1^*$	3.41, p = 0.65
β_2	0.602	0.014	β_2^*	–0.041	0.407	$\beta_2 = \beta_2^*$	4.11, p = 0.043
β_3	0.086	0.034	β_3^*	0.482	0.776	$\beta_3 = \beta_3^*$	0.27, p = 0.604
Likelihood Ratio Test of $\beta_2 + \beta_3 = \beta_2^* + \beta_3^*$: 0.12, p = 0.725							
Panel B1: Market pricing tests for the components of earnings from environmental activities (E)							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	–0.003	0.002	β_1^*	–0.095	0.097	$\beta_1 = \beta_1^*$	2.55, p = 0.110
β_2	0.682	0.017	β_2^*	–0.169	0.565	$\beta_2 = \beta_2^*$	4.13, p = 0.042
β_3	0.520	0.018	β_3^*	–0.206	0.545	$\beta_3 = \beta_3^*$	2.75, p = 0.097
β_4	0.020	0.034	β_4^*	0.541	0.851	$\beta_4 = \beta_4^*$	0.40, p = 0.182
β_5	–0.026	0.036	β_5^*	0.798	0.525	$\beta_5 = \beta_5^*$	0.87, p = 0.351
Likelihood Ratio Test of $\beta_2 + \beta_4 = \beta_2^* + \beta_4^*$: 0.22, p = 0.639							
Likelihood Ratio Test of $\beta_3 + \beta_5 = \beta_3^* + \beta_5^*$: 0.02, p = 0.898							
Panel B2: Market pricing tests for the components of earnings from social responsibility activities (S)							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	0.003	0.003	β_1^*	–0.122	0.078	$\beta_1 = \beta_1^*$	4.44, p = 0.036
β_2	0.672	0.016	β_2^*	–0.096	0.480	$\beta_2 = \beta_2^*$	4.44, p = 0.035
β_3	0.510	0.016	β_3^*	–0.102	0.450	$\beta_3 = \beta_3^*$	2.67, p = 0.102
β_4	0.031	0.035	β_4^*	0.711	0.847	$\beta_4 = \beta_4^*$	0.72, p = 0.397
β_5	0.023	0.038	β_5^*	0.760	0.925	$\beta_5 = \beta_5^*$	0.71, p = 0.400
Likelihood Ratio Test of $\beta_2 + \beta_4 = \beta_2^* + \beta_4^*$: 0.01, p = 0.919							
Likelihood Ratio Test of $\beta_3 + \beta_5 = \beta_3^* + \beta_5^*$: 0.02, p = 0.889							

End of Table 9

Panel B3: Market pricing tests for the components of earnings from governance activities (G)							
Coefficients	Forecasting equation		Coefficients	Valuation equation		Mispricing	
	Estimates	ASE		Estimates	ASE	Null Hypo.	Likelihood Ratio
β_1	0.003	0.003	β_1^*	–0.098	0.071	$\beta_1 = \beta_1^*$	2.93, p = 0.087
β_2	0.671	0.016	β_2^*	–0.077	0.464	$\beta_2 = \beta_2^*$	4.45, p = 0.035
β_3	0.498	0.016	β_3^*	0.019	0.412	$\beta_3 = \beta_3^*$	1.72, p = 0.189
β_4	0.071	0.037	β_4^*	0.557	0.843	$\beta_4 = \beta_4^*$	0.35, p = 0.551
β_5	0.107	0.041	β_5^*	0.340	0.919	$\beta_5 = \beta_5^*$	0.06, p = 0.799
Likelihood Ratio Test of $\beta_2 + \beta_4 = \beta_2^* + \beta_4^*$: 0.13, p = 0.722							
Likelihood Ratio Test of $\beta_3 + \beta_5 = \beta_3^* + \beta_5^*$: 0.09, p = 0.769							

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; ASE refers to Asymptotic Standard Error; The number of samples for each model was 2,991 (Environment), 3,155 (Social responsibility), and 3,153 (Governance) in Panel A, and 2,996 (Environment), 3,157 (Social responsibility), and 3,159 (Governance) in Panel B; NI – Net Income/average total assets; OCF – cash flows from operating activities/average total assets; ACC – (NI-OCF)/average total assets, SAR – holding period return of individual firm – yield to average of the group classified by business scale; ESG – a dummy variable equal to 1 if the KCGS ESG grade is S, A+, A, or B+, and 0 otherwise.

Conclusions

Since the 2000s, the demand for CSR increased with the expansion of global interest in society and the environment. Consequently, sustainable management emerged as a management method necessary to survive. This study empirically analyzed sustainable management activities, earnings persistence and capital market reactions using the ESG assessment of the KCGS.

The results of the present study are as follows. First, the persistence of earnings and earnings components improves for firms with better sustainable management activities. Second, investors in the capital market rationally assess the persistence of earnings and earnings components based upon sustainable management activities.

This study extended the results of previous studies reporting that firms' sustainable management activities increase their financial performance or firm value, and reduces earnings management. This study presented empirical evidence in terms of the effect of earnings persistence; that is, whether firms' sustainable management activities improve earnings quality. Consequently, an increase in earnings persistence due to sustainable management can be the cause of improved corporate value. Furthermore, the results confirmed that investors in the capital market use sustainable management as a signal to assess the persistence off earning and earnings components. These research findings provide useful information for investors and firms that perform sustainable management activities. This study showed that investors reasonably evaluate the quality of earning of sustainable management firms. Sustainability ratings can be useful information for investors about their investments. This is the contribution point of this study.

The results of this study need to be interpreted in consideration of the following limitations. First, because only limited data were used in the period since the ESG assessment was conducted, there is a limit to generalizing the results in other samples or periods. It should be considered that the results of market rationality verification are also those of limited samples used in this study. Second, in this study, samples were divided based on the results of the ESG evaluation and the relative earnings persistence between the samples was analyzed. Similarly, if relevant missing variables exist that distinguish samples, such factors may affect the results. Finally, it is necessary to develop a model that take into account the issue of endogeneity by investigating the relationships between firms' sustainable management activities, earnings quality, and corporate value. In general, endogeneity may exist between two variables because firms with high earnings quality or corporate value could also actively implement sustainable management activities, thereby leading to high ESG grades.

In future research, it is necessary to study the relationship between sustainability management and earnings persistence by company size. In addition, it is possible to study the reaction of investors accordingly. This is because, depending on the size of a firm, the form and purpose of sustainable management may appear differently, and investors may react differently.

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Author contributions

HYM and JYY conceived the study and were responsible for the design and development of the data analysis. HYM and JYY were responsible for data collection and analysis. HYM was responsible for data interpretation. JYY wrote the first draft of the article. HYM and JYY reviewed.

Disclosure statement

The authors declare no conflict of interest.

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