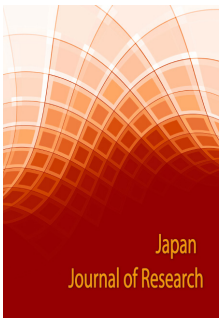
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Original Article



Assessing the Decision-Usefulness of ESG Reporting and Financial Transparency: Evidence from the U.S. Capital Markets and the Sustainability Capital Matrix Model (SCMM)

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Abstract

This study examines the decision usefulness of accounting information in U.S. capital markets by integrating traditional financial information with corporate and sustainability-related disclosures. It focuses on the value relevance of Earnings per Share (EPS) and Book Value per Share (BVPS), market reactions to financial and sustainability disclosures, sectoral differences in disclosure responses, sustainability-related capital allocation, and the influence of firm size and leverage on market valuation. A quantitative research design was employed, using panel data on 100 publicly listed U.S. non-financial firms from 2015 to 2025. The study applies the Ohlson valuation model, event study methodology, and the Sustainability Capital Matrix Model (SCMM).

The empirical results indicate that EPS and BVPS are positively and significantly associated with stock prices, supporting the value relevance of traditional accounting information. The event-study analysis reports a statistically significant Average Abnormal Return (AAR) of 1.80%, indicating that corporate disclosure events contain information relevant to capital-market participants. Sector-level results show differences in observed market reactions, although the proposed moderating effect of sector requires formal interaction regression for conclusive validation. The SCMM demonstrates that sustainability-related capital allocation gaps can be quantified by comparing actual allocation with benchmark requirements. Furthermore, firm size is positively and significantly associated with market valuation, whereas leverage is negatively associated but not statistically significant.

The results suggest that accounting information remains important for capital-market decision-making, while decision usefulness increasingly extends to corporate disclosure and sustainability information. The study emphasizes that such information's usefulness depends on its relevance, transparency, credibility, comparability, and economic substance. The research contributes to the accounting literature by integrating value relevance analysis, market reaction analysis, and sustainability capital-allocation assessment within a single framework.

Introduction

Capital market-based accounting research has extensively examined the relationship between accounting information and market reactions, particularly studies of the informational content and value relevance of earnings and financial disclosures [1-4].

Despite extensive research on the value relevance of accounting information, several important limitations remain unresolved in the existing literature. Traditional value-relevance studies have primarily focused on historical financial variables such as earnings, book value, and cash flows as determinants of firm valuation [4,5]. While these studies provide strong evidence that accounting information influences investor decision-making, they largely overlook the growing importance of sustainability disclosures and ESG-related transparency in modern capital markets.

In recent years, investors, regulators, and stakeholders have increasingly demanded non-financial information concerning environmental, social, and governance (ESG) performance. However, much of the existing ESG literature focuses on disclosure quantity rather than the credibility and economic substance of sustainability reporting. Consequently, a significant gap remains: whether sustainability disclosures provide incremental decision-useful information beyond traditional accounting measures and whether markets can distinguish genuine sustainability performance from symbolic reporting practices.

Moreover, prior studies rarely integrate value relevance analysis, market reaction

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analysis, and forensic sustainability assessment within a single empirical framework. Existing research generally examines either financial reporting quality or ESG disclosure effects independently, with limited attention given to quantitatively identifying inconsistencies between reported sustainability outcomes and actual capital allocation. This limitation is becoming increasingly significant amid growing concerns about greenwashing and opportunistic sustainability reporting.

To address these gaps, the current study integrates the Ohlson valuation model, event study methodology, and the Sustainability Capital Matrix Model (SCMM) into a unified analytical framework. By combining traditional accounting variables with sustainability transparency indicators and a quantitative forensic approach, the study extends the Decision Usefulness framework beyond conventional financial reporting. It provides empirical evidence on the credibility and market relevance of ESG disclosures in U.S. capital markets.

Despite years of research, key questions still linger about how effectively accounting information supports decision-making in today's financial markets. Changes in business models, the growth of intangible assets, and increasing demands for non-financial disclosures, such as sustainability and environmental data, have raised doubts about whether traditional financial statements fully reflect a company's economic value. Therefore, assessing the usefulness of accounting information remains a crucial issue in modern accounting research.

This study aims to assess the usefulness of accounting information for decision-making by examining the link between financial reporting and the economic choices investors and creditors make. Specifically, the research seeks to answer the following questions:

1. To what extent do traditional accounting variables, specifically Earnings per Share (EPS) and Book Value per Share (BVPS), explain variations in the market value of U.S. publicly listed firms?
2. Do financial and sustainability disclosures generate significant abnormal stock market reactions during announcement periods?
3. Does the market response to sustainability and financial disclosures differ across industry sectors, particularly between information-sensitive sectors and traditional industries?
4. Can the Sustainability Capital Matrix Model (SCMM) quantitatively identify misalignments between reported ESG outcomes and actual capital allocation?
5. Do firm-specific characteristics, such as firm size and financial leverage, significantly influence market valuation?

The study examines these research questions using quantitative econometric techniques, including the Ohlson valuation model, event study analysis, and the Sustainability Capital Matrix Model (SCMM).

This study improves the accounting and capital market literature in several important ways. First, it extends traditional value-relevance research by integrating sustainability and ESG disclosure variables into the Decision Usefulness framework, which has historically focused primarily on financial accounting measures such as earnings and book value. Second, the study contributes to the growing ESG reporting literature by examining whether sustainability transparency provides investors with incremental informational value beyond conventional financial disclosures. Third, unlike prior studies that examine financial reporting quality and ESG disclosures separately, this research develops a unified empirical framework combining the Ohlson valuation model, event study methodology, and the Sustainability Capital Matrix Model (SCMM).

This integrated approach enables the study to assess firm valuation, market reactions, and the quantitative alignment between sustainability reporting and actual capital allocation. Finally, the study introduces a forensic accounting perspective to ESG research by proposing the SCMM as a quantitative tool for identifying potential greenwashing and sustainability-related reporting manipulation.

This study is structured around three interrelated objectives designed to provide a comprehensive assessment of the informational role of financial and sustainability disclosures in capital markets.

Objective 1: Tests how EPS, book value, and disclosures explain firm value.

Objective 2: Examines abnormal returns (AAR/CAAR) around announcement events and ESG disclosures.

Objective 3: Evaluates whether ESG disclosures align with actual capital allocation and identifies sustainability gaps and greenwashing signals.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature on the usefulness and value relevance of ESG disclosures and market-based accounting research. It also presents the study hypotheses. Section 3 explains the research methodology, sample selection procedures, variable measurement, and data sources. Section 4 introduces the econometric models and analytical framework, including the Ohlson valuation model, event study methodology, and the Sustainability Capital Matrix Model (SCMM). Section 5 presents the hypothesis tests. Section 6 presents the discussion and empirical results. Finally, Section 7 concludes the study and discusses the implications for regulators and investors.

Literature Review

Decision usefulness is a key idea in modern financial accounting research. It sees accounting information not just as a way to measure "true income," but as part of a vital information system that supports efficient capital allocation amid uncertainty and contracting issues. In this approach, financial data is valued mainly for its ability to reduce information gaps and improve decision-making by external parties. This view appears in the FASB and IASB conceptual frameworks, which state that financial reports should provide information that helps investors, lenders, and creditors make resource-allocation choices. These frameworks highlight key qualitative qualities like relevance and faithful representation, which are essential to decision usefulness and directly link accounting measurement to economic decisions.

A central theoretical foundation of the decision-usefulness literature is information asymmetry between corporate insiders and external capital market participants. Managers possess private information regarding performance, investment opportunities, and risk exposure, as investors rely on publicly disclosed accounting information to infer firm value. In this context, financial reporting functions as an institutional mechanism that partially mitigates adverse selection and moral hazard problems in capital markets.

Healy and Palepu [6] conceptualize disclosure as a mechanism that simultaneously reduces information asymmetry and

improves capital market efficiency by enhancing liquidity and lowering the cost of capital. Expanding on this perspective, Verrecchia [7] develops a general equilibrium disclosure framework in which firms' voluntary disclosure decisions are endogenous to capital market incentives, demonstrating that disclosure policy affects price formation and investor beliefs.

A dominant empirical stream in the decision-usefulness literature examines the value relevance of accounting information, defined as the statistical association between accounting numbers and equity market valuations. Ball and Brown [1] show that unexpected earnings move with stock prices, generating abnormal returns, while Beaver [2] documents increased trading volume and price volatility around earnings announcements.

These early results establish accounting earnings as informative signals in capital markets and are consistent with the Efficient Market Hypothesis [8], which posits that security prices reflect publicly available information. Ohlson [4] further formalizes this relationship by linking market value to accounting earnings, book value, and expected abnormal earnings, establishing a structural valuation model that remains central to empirical accounting research.

Subsequent studies, including Collins et al [5], confirm that earnings and book values jointly explain a substantial share of the cross-sectional variation in equity prices. However, Lev and Zarowin [9] document a decline in value relevance over time, attributing this trend to the growing importance of intangible assets, which traditional accounting systems do not fully capture.

Besides valuation studies, a considerable body of research explains how accounting disclosures influence market reactions. Beaver [2] and Foster [3] show that earnings announcements and financial statement releases lead to notable shifts in stock prices and increased trading activity, suggesting that investors quickly incorporate accounting information into their expectations.

Event study methodology further confirms that abnormal returns around disclosure events reflect the informational impact of accounting signals. Collectively, this literature supports the view that financial reporting plays a central role in price discovery and market efficiency.

The voluntary disclosure literature extends this framework by examining how firms strategically enhance their information environment. Diamond and Verrecchia [10] show that increased disclosure reduces information asymmetry, improves liquidity, and lowers the cost of capital. This line of research positions disclosure as a strategic instrument for reducing market frictions rather than merely a compliance requirement.

Recent literature has extended the decision usefulness to non-financial information, particularly ESG disclosures. Khan et al [11] show that ESG information is value-relevant when it is financially material, highlighting heterogeneity in the economic relevance of sustainability factors. Krüger [12] documents asymmetric market reactions to negative ESG events, indicating that investors place greater weight on downside sustainability risks.

Amel-Zadeh and Serafeim [13] further demonstrate that institutional investors actively seek ESG information for decision-making, driven by both risk management and return considerations. Berg et al [14] highlight persistent inconsistencies in ESG ratings stemming from measurement divergence, raising concerns about comparability and reliability.

Christensen et al [15] argue that ESG disclosures are often subjective and interpreted inconsistently, suggesting that increased disclosure does not necessarily enhance informational precision. Collectively, these results indicate that ESG reporting expands the informational set while introducing new interpretive uncertainty.

Recent research underscores the growing importance of ESG assurance and the credibility of ESG disclosures. Studies show that third-party assurance improves the perceived reliability of ESG reporting and enhances investor trust, though assurance practices vary widely in scope and rigor. Emerging evidence also highlights the risk of greenwashing, in which firms strategically increase ESG disclosure intensity without corresponding improvements in underlying environmental performance.

Recent machine learning analyses show that sustainability disclosures are often rhetorically inflated. Companies tend to highlight positive ESG aspects while minimizing negative environmental impacts. Overall, this body of research suggests that ESG reporting has a dual role: it improves transparency but also allows for strategic manipulation, complicating the traditional idea of decision usefulness.

Accordingly, the decision-usefulness paradigm remains theoretically robust but empirically evolving. Modern capital markets operate within a multi-layered information system in which financial, non-financial, and alternative data sources jointly shape investor decision-making. This evolution calls for an expanded conceptualization of accounting information that integrates traditional financial reporting with sustainability metrics, disclosure credibility mechanisms, and technological advancements in information processing.

This section outlines the study's theoretical foundations and develops research hypotheses on the Decision Usefulness of Accounting Information. The framework integrates insights from Agency Theory, the Efficient Market Hypothesis, and Signaling Theory. Together, these theories explain why financial reporting is essential in capital markets and how accounting information shapes investor behavior, firm valuation, and market efficiency.

Agency Theory, introduced by Michael C. Jensen and William H. Meckling, describes the relationship between principals (shareholders) and agents (managers). In modern corporations, ownership and control are typically separated, which can create potential conflicts of interest between managers and investors [16].

Managers may possess private information about the company's operations, financial health, and future outlook that shareholders cannot access directly. This information asymmetry can lead to agency problems, such as earnings manipulation, opportunistic behavior, or inefficient resource use.

Financial reporting is an essential governance tool that reduces information gaps between managers and external stakeholders. By providing standardized, audited financial data, accounting systems enable investors and creditors to monitor managerial actions and assess the company's financial health.

In this context, the value of accounting information depends primarily on its quality, reliability, and transparency. High-quality financial reporting reduces agency costs by enhancing accountability and providing better oversight of managerial actions.

Recent research further demonstrates that ESG and sustainability information is increasingly relevant to capital-market participants; therefore, its informational value still depends on the quality, comparability, credibility, and regulatory context of the disclosure. Migliavacca [17], using a large sample of European non-financial firms, examines the value relevance of sustainability information alongside traditional accounting

numbers and shows that the explanatory power of conventional accounting information has evolved as sustainability considerations have become increasingly important to investors. Recent event-based evidence also indicates that capital markets respond to developments in mandatory sustainability and climate-related reporting. Pandey et al [18] document significant stock-market reactions to mandatory sustainability reporting and find that these reactions vary across sectors and by firms' ESG characteristics. Similarly, Kim [19] finds a significant market reaction among S&P 500 firms to the SEC's proposed mandatory climate-disclosure requirements, demonstrating that changes in ESG reporting requirements can contain economically relevant information for investors.

More evidence: Phang [20] further examines investors' responses to climate-change disclosures and highlights that disclosure characteristics shape how investors interpret and respond to climate-related information. Collectively, these studies suggest that ESG reporting can provide incremental information to capital markets, but that its usefulness depends not only on the quantity of disclosure but also on its relevance, credibility, comparability, and ability to communicate economically material sustainability information. This evidence supports further examining ESG disclosure within a decision-usefulness and market-reaction framework.

Empirical studies suggest that firms with greater reporting transparency typically have lower agency costs and higher market valuation [6]. Therefore, the usefulness of accounting information for decision-making is closely linked to its ability to reduce agency conflicts and enhance investor confidence. From this theoretical perspective, the following hypotheses are proposed:

Value Relevance of Financial Information (Ohlson Model)

H1a: There is a strong positive correlation between Earnings per Share (EPS) and the market price of equity.

H1b: A significant positive relationship exists between Book Value per Share (BVPS) and the market price of equity.

Information Content of Disclosures (Event Study)

H2: Corporate financial and sustainability disclosures contain significant informational content that prompts a positive market reaction (Abnormal Returns) on announcement days.

Moderating Effect of Sector Sensitivity

H3: The market response to corporate disclosures is notably more pronounced in information-sensitive sectors (Technology and Healthcare) than in traditional sectors (Utilities and Industrials).

Forensic Utility of the Sustainability Capital Matrix Model (SCMM)

H4: The gap between actual capital allocation and reported sustainability outputs (the "Sustainability Gap") can be quantitatively measured by a technical coefficient matrix.

Control Variables and Company Attributes

H5a: Firm size (SIZE) is positively associated with market valuation.

H5b: Financial Leverage (LEV) is negatively associated with market valuation.

Information-sensitive sectors such as Technology and Healthcare are expected to exhibit stronger market reactions to disclosure announcements because investors in these industries rely heavily on forward-looking and non-financial information. In contrast, traditional industries such as Utilities and Industrials typically depend more on stable operating performance and tangible assets. Accordingly, the study examines whether disclosure-related abnormal returns differ across sectors.

Research Methodology

To examine sectoral differences in market reactions, the study classified sample firms into four major industry groups: Technology, Healthcare, Industrials, and Utilities. The study uses sector-specific events to compare abnormal returns across information-sensitive and traditional industries.

Research Design

This study employs a quantitative capital market research design to examine the decision usefulness of accounting and sustainability-related information in U.S. capital markets. The research design evaluates whether traditional accounting variables and sustainability disclosure indicators provide information relevant to firm valuation and investor decision-making.

The study employs a multi-method empirical framework comprising the Ohlson valuation model, event study methodology, and the Sustainability Capital Matrix Model (SCMM). The integration of these methods enables the analysis to capture three complementary dimensions of decision usefulness: (1) the value relevance of accounting information, (2) short-term market reactions to disclosure events, and (3) the consistency between reported sustainability outcomes and actual capital allocation.

The Ohlson [4] model remains among the most widely accepted valuation frameworks in accounting research for examining the relationship between accounting fundamentals and equity market value. The model is particularly appropriate for this study because it collects traditional accounting measures and sustainability-related disclosure variables within a unified valuation specification. By extending disclosure and transparency indicators, the study assesses whether the information increases explanatory power beyond earnings and book value.

Event study methodology is also used to assess whether financial and sustainability disclosures elicit abnormal stock market reactions during announcement periods. This approach is appropriate because abnormal returns around disclosure events provide direct evidence of the informational content and market relevance of corporate disclosures. The event study framework also enables sector-level comparisons of market sensitivity to disclosures across information-intensive and traditional industries.

The methodology also clarifies the firm's classification into information-sensitive and traditional industry groups and explains the rationale for conducting a comparative sector-level event study. These revisions ensure that the sector-wise analysis is theoretically motivated, methodologically justified, and fully integrated into the overall research framework.

To complement the valuation and market reaction analyses, the study incorporates the Sustainability Capital Matrix Model (SCMM) as a forensic analytical mechanism designed to evaluate the alignment between sustainability disclosures and actual resource allocation. Unlike conventional ESG disclosure indices that primarily measure disclosure intensity, the SCMM

provides a quantitative framework that identifies potential sustainability gaps and greenwashing risk through technical coefficient analysis.

The empirical analysis uses panel data on publicly listed U.S. firms from 2015 to 2025. Longitudinal firm-level data emphasizes statistical inference and allows evaluation of valuation and disclosure effects over time. Regression analysis estimates the relationships among accounting variables, disclosure indicators, and market valuation, while abnormal return analysis measures investor reactions to disclosure announcements.

The selected methodology is appropriate because it unifies valuation analysis, disclosure effects, and forensic sustainability assessment within a single empirical framework. This design strengthens the study's ability to assess the evolving role of accounting and sustainability information in modern capital markets.

Quantitative Research Method

The study further employs a quantitative methodology, using statistical and econometric techniques to analyze numerical data. Quantitative methods enable precise measurement of inter-variable relationships, hypothesis testing, and statistically grounded generalizations.

Regression analysis is employed to examine the relationship between accounting variables (earnings, book value, disclosure indicators) and market variables (stock prices and abnormal returns). These models are standard in value relevance research, particularly the Ohlson Model [4], which connects accounting information to market value.

Quantitative methods offer several benefits in accounting research. First, they allow researchers to measure the size and statistical significance of relationships between financial reporting variables and market outcomes.

Second, they support testing various theoretical predictions regarding investor behavior and market efficiency. Finally, quantitative techniques facilitate the analysis of large datasets across firms and time periods, strengthening the reliability and robustness of empirical results.

Justification of the Research Design

Empirical, analytical, and quantitative methods are particularly effective for studies evaluating the usefulness of accounting information in financial markets. Capital markets generate large volumes of numerical data, such as stock prices, financial statement metrics, and trading activity, that statistical models can analyze systematically.

Furthermore, prior accounting research indicates that quantitative capital markets studies effectively determine whether financial reporting information affects investor decisions. Research by Beaver [2] and Ohlson [4] has successfully used quantitative methods to link accounting disclosures to firm value.

By adopting this research design, the current study aims to provide solid empirical evidence on the usefulness of accounting information in capital markets. The methodology enables the study to evaluate whether accounting earnings, financial disclosures, and reporting transparency help investors make much better decisions and improve market efficiency.

Data Collection and Sample Selection

This section describes the methods used to collect data and select the sample for the empirical analysis. The study explores the relationship between accounting information and capital market behavior to evaluate the Decision Usefulness of Accounting Information. Consistent with previous capital market research published in accounting journals, the study uses secondary financial and market data from publicly accessible sources.

Data Collection

This study introduces publicly accessible financial and market databases. The study takes financial statement data from companies' annual reports and audited financial statements, which provide detailed information on accounting variables such as earnings, book value, and total assets. These reports, prepared in accordance with recognized accounting standards, are intended to furnish investors and other stakeholders with reliable information.

Market data, including stock prices and trading volumes, is collected from stock exchange databases and financial information platforms. This data enables the study to analyze how financial reporting information affects investor behavior and market valuation.

The primary categories of data utilized in the study include:

- **Accounting data:** earnings per share (EPS), book value per share (BVPS), total assets, and financial disclosure indicators.
- **Market data:** stock prices, market capitalization, and stock returns.
- **Disclosure data:** information obtained from annual reports and corporate disclosures that show the level of transparency in financial reporting.

Gathering data from these sources enables the study to analyze the relationship between accounting information and market outcomes, a common approach in value relevance and capital market research.

Sample Selection

The population of this study comprises publicly listed non-financial companies operating in the U.S. capital markets from 2015 to 2025. Because the population is finite and identifiable through stock exchange listings and financial databases, the study does not use probabilistic sample-size formulas, such as Cochran's formula, which are more appropriate for survey-based or indeterminate populations.

Instead, the study uses a purposive sampling approach common in archival accounting and capital market research. Firms were selected based on the availability and completeness of financial, market, and ESG disclosure data required to estimate the Ohlson valuation model, conduct the event study analysis, and apply the Sustainability Capital Matrix Model (SCMM).

The sample selection process applied the following criteria:

1. The firm must have been continuously listed during the study period (2015–2025).
2. Complete financial statement data, including Earnings per Share (EPS), Book Value per Share (BVPS), total assets, and leverage information, must be available.
3. Historical stock price and trading data must be accessible for event study estimation.
4. ESG and sustainability disclosure information must be available through corporate reports and ESG databases.
5. Financial institutions, including banks and insurance companies, were excluded due to their distinct regulatory structures and financial reporting characteristics.

After applying these criteria and excluding firms with incomplete observations, the final sample consisted of 100 publicly listed U.S. firms representing multiple industry sectors. The resulting balanced panel dataset provides sufficient observations for regression analysis and market reaction testing and is consistent with prior empirical accounting and capital market studies.

The sample comprises publicly listed companies because they publish audited financial statements, and their stock prices are publicly observable in capital markets. Publicly traded companies therefore provide an appropriate setting for examining how accounting information influences investor decision-making and stock market responses.

After applying the sample selection criteria and removing firms with incomplete data, the final sample includes firms that provide both financial reporting data and relevant market information. This dataset allows the study to estimate econometric models that analyze the value relevance and informational content of accounting data.

Justification of the Sampling Approach

Using publicly listed companies as the sample aligns with previous accounting research examining the relationship between accounting information and capital markets. Research such as Ray Ball and Philip Brown [1] has demonstrated that earnings reports and financial disclosures influence stock prices and investor behavior.

Similarly, research by William H. Beaver 1968 shows that trading activity and market reactions rise around financial reporting events, indicating that investors actively use accounting information when making investment decisions.

Therefore, analyzing financial and market data from publicly traded companies provides a strong empirical foundation for evaluating the usefulness of accounting information for decision-making.

Variable Measurement (EPS, Book Value, Stock Price, Disclosure Index)

This section explains how the key variables for the empirical analysis are measured. Following established practices in capital market research published in accounting journals, this study examines both accounting and market variables to assess the decision usefulness of accounting information. The analysis incorporates dependent, independent, and control variables, with their measurement methods and expected signs presented in Table 1 of Appendix 1.

Sources of Data

The empirical analysis. This study uses secondary financial and market data from several reputable databases and publicly available financial reports for the period 2015–2025.

The financial accounting variables, including earnings per share (EPS) and book value per share (BVPS), were sourced from companies' annual financial statements and consolidated reports. These data were obtained from corporate disclosures and regulatory filings available through the U.S. Securities and Exchange Commission's (SEC) EDGAR database.

The stock price data and market valuation indicators were collected from leading financial sources, including Bloomberg, Refinitiv (formerly Thomson Reuters Eikon), and Yahoo Finance. These platforms provide historical stock price data and market capitalization figures needed for empirical valuation analysis.

The firm-level control variables, such as firm size and leverage, were sourced from financial databases such as Compustat, which provides standardized financial statement data for publicly listed companies.

The study combined financial statement data with market data from multiple sources to form a comprehensive dataset. This method facilitates testing the Ohlson Model and exploring the relationship between accounting information and stock prices.

Model Development

This study employs econometric models commonly used in capital markets research, with a focus on accounting, to analyze the relationship between accounting information and stock market behavior. Specifically, it uses two well-known empirical methods: the value-relevance regression model and the event study model. These models assess the Decision Usefulness of Accounting Information by determining whether accounting variables such as earnings and book value explain changes in a company's market value and whether financial reporting events trigger abnormal stock returns.

Event Study Methodology

To evaluate market reactions to financial and sustainability disclosures, the study employs an event study methodology widely used in accounting and finance research. The event study examines whether disclosure announcements generate abnormal stock returns beyond expected market performance.

The study is a one-day window centered on the disclosure announcement date (t = 0). Abnormal Returns (AR) are calculated as the difference between actual returns and expected returns, estimated using the market model:

$$ARit = Rit - (\alpha i + \beta i Rmt)$$

Where:

ARit = abnormal return for firm i at time t

Rit = actual stock return

Rmt = market return

αi and βi = estimated market model parameters

The Average Abnormal Return (AAR) is then calculated across all sample firms to measure the aggregate market response to disclosure events:

$$AARt = (1/N) \Sigma ARit$$

The event study methodology is appropriate because it captures investors' immediate reactions to newly disclosed financial and ESG-related information, consistent with the Efficient Market Hypothesis and prior market-based accounting studies.

To improve replicability, the event study sets the disclosure announcement date to t=0, estimates expected returns using the market model over a pre-event estimation period, and computes abnormal returns (AR), Average Abnormal Returns (AAR), and Cumulative Abnormal Returns (CAR). The analysis is then repeated across the Technology, Healthcare, Industrials, and Utilities sectors to assess differences in market responses. For the SCMM, the study explicitly gathered the technical coefficient matrix A, sustainability-output vector E, and capital-allocation vector X. The benchmark capital requirement was then calculated as X* = A^(-1)E and compared with the actual sustainability-related capital allocation X. The difference between benchmark and actual capital allocations was used to identify and quantify measurable sustainability gaps.

Sustainability Capital Matrix Model (SCMM)

To assess the consistency between reported ESG outcomes and actual capital allocation, the study uses the Sustainability Capital Matrix Model (SCMM) as a forensic analytical tool. The SCMM uses a technical coefficient matrix framework that estimates the optimal capital allocation needed to achieve specific sustainability outputs.

The model is expressed as follows:

$AX = E$

Where:

A = technical coefficient matrix representing the relationship between capital inputs and ESG outputs

X = vector of optimal capital allocation

E = vector of reported sustainability outputs

The optimal capital requirement is estimated by solving:

$X^* = A^{-1}E$

The resulting estimates provide a quantitative benchmark for evaluating whether firms allocate sufficient capital resources to support reported ESG outcomes. Significant deviations between actual investment levels and estimated sustainability requirements may indicate potential sustainability misrepresentation or greenwashing.

The SCMM extends traditional value relevance analysis by introducing a quantitative forensic mechanism for evaluating the credibility of sustainability reporting.

To provide a systematic empirical application of the Sustainability Capital Matrix Model (SCMM), I apply the model to each firm-year observation in the study sample. For each observation, I construct the sustainability-output vector (E), the technical coefficient matrix (A), and the actual sustainability-related capital allocation vector (X) using data from the study period. The benchmark capital requirement is then estimated as $X^* = A^{-1}E$, and the Sustainability Gap (SG) is calculated as SG = X - X*. The resulting firm-year Sustainability Gap measures are subsequently summarized for the full sample and, where appropriate, disaggregated by industry sector. This procedure extends the SCMM beyond purely numerical Explanation by assessing whether firms' actual sustainability-related capital allocations relate to the capital requirements implied by their reported sustainability outputs.

Statistical Procedures and Diagnostic Tests

The regression analysis was conducted using SPSS. Descriptive statistics, correlation analysis, and multiple regression analysis were conducted to examine the relationships between accounting variables and firms' market valuation. Descriptive statistics summarized the distribution and characteristics of the study variables, while correlation analysis assessed the direction and strength of their bivariate associations. Multiple regression analysis was the primary method for examining whether accounting variables are associated with market valuation while controlling for the effects of other relevant variables. Diagnostic tests assessed multicollinearity, normality, and heteroscedasticity. Variance Inflation Factor (VIF) values were examined to ensure that multicollinearity did not materially affect the regression estimates.

Value Relevance Model

The first econometric model examines the value relevance of accounting information, that is, the extent to which a company's financial data is associated with its market value. Value relevance research assesses how well accounting variables, including earnings and book value, explain differences in stock prices across firms.

Stock Price (P)

This study's dependent variable is the stock price, which reflects the company's market value. Stock prices reflect investors' expectations of a company's future profitability and risk. According to the Efficient Market Hypothesis, stock prices rapidly adjust to publicly available information, including accounting disclosures.

Stock price is measured using the closing market price per share at the end of the fiscal year or at a specified point after the release of the firm's financial statements. Using the post-disclosure stock price gives the market time to incorporate and reflect the information contained in the newly released financial statements.

The stock price variable is widely used in value-relevance decisions to examine the association between accounting information and firms' market values. [P(it) = Market price per share of firm (i) at time (t)].

Pit=stock price of firm (i) in year (t) =Market price of firm (i) in year (t).

A more value-relevance-style equation is often written as a linear regression linking stock price to accounting variables, as follows:

Pit=α+β1 (Accounting Variable 1) it+β2(Accounting Variable 2) it+εit=α+β1(Accounting Variable 1)it+β2(Accounting Variable 2)it+εit.

This clearly demonstrates that the stock price depends on the accounting figures.

For example, Firm A in the year 2025 has a market price per share of $50. Using the notation: (Pit) = PA,2025=50PA,2025=50

To give a slightly more value-relevant interpretation with hypothetical coefficients:

PA, 2025 = 2 + 1.5·BVPSA, 2025 + 0.8·EPSA, 2025 PA, 2025 = 2 + 1.5·BVPSA, 2025 + 0.8·EPSA, 2025

Where: BVPS = book value per share, EPS = earnings per share

The numbers (2, 1.5, 0.8) are hypothetical coefficients, so if Firm A had BVPS = 20 and EPS = 3: PA,2025 =2+1.5(20) + 0.8(3) = 2+30+2.4=34.4. The model predicts the stock price is $34.40.

This shows how accounting variables drive stock prices in value-relevance research.

The stock price variable is commonly used in value relevance decisions to analyze the relationship between accounting figures and market value.

Earnings per Share (EPS)

Earnings per Share (EPS) is a fundamental measure of a company's profitability and financial health. Investors commonly use earnings data to evaluate firm value and make investment decisions. EPS is calculated by dividing net income available to common shareholders by the number of outstanding shares:

EPS it = Net Income it Outstanding Shares it EPS it = Net Income/Outstanding Shares it

A robust body of literature has established a positive relationship between EPS and stock prices, indicating that higher earnings typically translate into higher market valuations [1].

Book Value

Book Value per Share (BVPS) shows the company's net asset value allocated to each common share. It reflects the accounting value of shareholders' equity and helps investors understand the company's financial health. BVPS is calculated by dividing the total shareholders' equity by the number of outstanding shares.

BVPS (it) = Total Shareholders' Equity (it) \ Number of Outstanding Shares) it(.

Where: BVPS (it) = book value per share of firm (i) in year (t). The relationship between book value and stock prices has been extensively studied in the accounting literature. For example, the Ohlson Model, developed by James A. Ohlson, shows that both earnings and book value are key determinants of a firm's market value [4].

The Disclosure Index

The Disclosure Index quantifies the transparency of a company's financial reporting. It reflects the quantity of detailed, relevant information firms include in their annual reports and corporate disclosures. The index is typically developed using a checklist of disclosure items based on financial reporting standards or prior research. Each disclosure item is assigned a score according to whether the firm discloses the specified information. The disclosure index is calculated as follows:

DISC (it) = Number of Disclosed Items (it) \ (Total Possible Disclosure Items).

Where: DISC (it) = disclosure index of firm (i) in year (t). The Disclosure Index measures the proportion of relevant disclosure items a firm includes in its financial reports.

Where:

- DISC (it) =1 → firm discloses all items (full transparency)
- DISC (it) =0.5 → firm discloses half of the possible items
- DISC (it) = 0 → firm does not disclose any items

Firm size

Firm size is measured as the natural logarithm of total assets.

SIZE (it) = ln (TA (it))

Where:

- SIZE (it) = firm size of firm (i) in year (t)
- TA=(it)) = total assets of firm (i) in year (t)
- nl = natural logarithm, Larger TA → higher SIZE

Using the logarithm reduces scale differences, making comparisons between small and large firms easier. Size is often used as a control variable in regressions on stock price, disclosure, or performance.

Financial Leverage (LEV).

Financial leverage measures the proportion of a firm's assets financed by debt.

LEV (it) = TD (it)\TA (it)

Where:

- LEV (it) = financial leverage of firm (i) in year (t)
- TD (it) = total debt of firm (i) in year (t)
- TA (it) = total assets of firm (i) in year (t)

LEV = 0.5 → 50% of assets are financed by debt.

Higher LEV → greater financial risk, which may affect stock price or investor perception

This study uses a value-relevance model to examine how accounting information influences a firm's stock price, which reflects its market value and investor expectations. The dependent variable, stock price (Pit), is modeled using key accounting indicators: earnings per share (EPS), book value per share (BVPS), and the disclosure index (DISC), along with control variables for firm size (SIZE) and financial leverage (LEV). EPS indicates profit sharing, while BVPS shows shareholders' equity per share; both are positively associated with stock prices.

The disclosure index measures the transparency of financial reporting, with higher scores indicating more comprehensive disclosures. Firm size, measured as the natural logarithm of total assets, and leverage, the proportion of assets financed by debt, are included to control for scale and financial risk. This regression setup shows how accounting information and corporate transparency influence firm valuation, consistent with value-relevance research and the Ohlson model.

The Ohlson Model

This study adopts the Ohlson Model, a valuation framework developed by James A. Ohlson that links accounting variables to market value and has become a cornerstone of accounting research.

The regression model used in the study is defined as follows:

$Pit = \alpha + \beta1EPSit + \beta2BVPSit + \beta3DISCit + \beta4SIZEit + \beta5LEVit + \varepsilon itPi\ t = \alpha + \beta1EPSit + \beta2BVPSit + \beta3DISCit + \beta4SIZEit + \beta5LEVit + \varepsilon it$

Where:

P(it) = stock price of firm (i) in year (t).

EPS (it) = earnings per share of firm (i) in year (t).

BVPS (it) = book value per share of firm (i) in year (t).

DISC (it) = disclosure index of firm (i) in year (t).

SIZE (it) = firm size measured by the natural logarithm of total assets

LEV (it) = financial leverage

(a) Represents the expected value of the stock price when all explanatory variables are zero

The betas (β1 to β5) indicate how much the stock price changes for a one-unit change in each explanatory variable, holding all other variables constant.

In practice, because variables like EPS, BVPS, SIZE, and LEV usually can't be zero, the intercept doesn't always have a direct economic interpretation. The intercept (α) shifts the regression line and represents the predicted stock price when all explanatory variables in the model are equal to zero. It can also be interpreted as the baseline component of stock price that is not explained by the variables included in the model.

The coefficients (β_1 and β_2) capture the incremental association of earnings and book value with stock price, respectively. Positive and statistically significant coefficients suggest that these accounting measures are value-relevant and provide investors with useful information for assessing firm value. Refined Sentence. Similarly, a statistically significant coefficient on the disclosure index (β_3) indicates that financial disclosure is significantly associated with firm valuation. A positive coefficient suggests that greater disclosure is associated with higher firm valuation, whereas a negative coefficient indicates an inverse association.

Hypothesis Testing

This study tested the proposed hypotheses using the methods outlined in the research methodology; the hypotheses H1a, H1b, H5a, and H5b were analyzed with the Ohlson value-relevance regression model, while H2 was assessed through an event-study approach focusing on abnormal returns. H3 was investigated via sector-specific abnormal returns, which necessitate a formal interaction regression for final validation. H4 was examined using the Sustainability Capital Matrix Model (SCMM), quantifying sustainability gaps with empirical data, though a formal regression is needed for a definitive conclusion.

H1a: Earnings per Share and Market Price

H1a: There is a strong positive correlation between Earnings per Share (EPS) and the market price of equity.

The regression results indicate that EPS has a positive and statistically significant relationship with stock price. The estimated coefficient for EPS is 3.25, with a standard error of 0.72, a t-statistic of 4.51, and a p-value of less than 0.001. Since the coefficient is positive and statistically significant at the 1% level, the results provide strong empirical support for H1a.

Therefore, H1a is supported. The results indicate that higher earnings per share are associated with higher market prices, consistent with the value-relevance perspective of accounting information.

H1b: Book Value per Share and Market Price

H1b: A significant positive relationship exists between Book Value per Share (BVPS) and the market price of equity.

The estimated coefficient for BVPS is 1.87, with a standard error of 0.64 and a t-statistic of 2.92. The corresponding p-value is 0.004, which is statistically significant at the 1% level. The positive coefficient indicates that higher book value per share is associated with higher stock prices.

Accordingly, the empirical evidence supports the proposed relationship.

Therefore, H1b is supported.

H2: Information Content of Corporate Disclosures

H2: Corporate financial and sustainability disclosures contain significant informational content that prompts a positive market reaction (Abnormal Returns) on announcement days.

H2 was examined using an event-study methodology. The results show an overall Average Abnormal Return (AAR) of 1.80%, with a t-statistic of 2.32 and a p-value of 0.022. The positive AAR indicates that firms experienced a positive abnormal market reaction around the disclosure events.

Because the p-value is below the 5% significance level, the observed abnormal return is statistically significant.

Therefore, H2 is supported. The result suggests that the examined corporate financial and sustainability disclosures contain information that is reflected in short-window stock-market reactions.

H3: Sectoral Differences in Market Reaction

H3: The market response to corporate disclosures is more pronounced in information-sensitive sectors (Technology and Healthcare) than in traditional sectors (Utilities and Industrials).

The sector-specific event-study results show differences in abnormal returns across the four sectors. Technology firms recorded an AAR of 2.41%, while Healthcare firms recorded an AAR of 2.12%. In comparison, Utilities recorded an AAR of 0.68%, and Industrials recorded 0.92%.

These descriptive sector-level results indicate that Technology and Healthcare have larger abnormal returns than Utilities and Industrials. However, the study implies that a formal interaction regression between disclosure and information-sensitive sector classification is required to show whether the differences are significant.

Therefore, H3 cannot be considered conclusively tested based on the reported sector-specific AARs alone. The evidence is consistent with the proposed hypothesis, but a formal interaction-effect regression is required before making a definitive statistical conclusion. Future research should investigate this further.

H4: Sustainability Gap and the SCMM

H4: The gap between actual capital allocation and reported sustainability outputs (the "Sustainability Gap") can be quantified using a technical coefficient matrix, as assessed using the Sustainability Capital Matrix Model (SCMM). This model uses the technical coefficient matrix to estimate benchmark capital allocations based on reported sustainability outputs, expressed as:

$X^* = A^{-1}E$

The SCMM results provide quantitative measures of the deviations between actual capital allocations and benchmark allocations derived from sustainability outputs. These results demonstrate the matrix-based potential framework to quantify sustainability-related gaps in capital allocation. However, the analysis also acknowledges that formal panel regression models of capital allocation are required to provide a more comprehensive empirical assessment of H4 and to establish whether the observed relationships remain significant after controlling for relevant firm- and time-specific factors.

Therefore, H4 is supported at the measurement framework level, but its full empirical validation remains incomplete pending the required regression estimates. A Sustainability Gap does not by itself establish greenwashing; it identifies an inconsistency that requires further investigation.

H5a: Firm Size and Market Valuation

H5a: Firm size (SIZE) is positively associated with market valuation.

The regression results report a positive coefficient for SIZE of 0.75, with a standard error of 0.36, a t-statistic of 2.08, and a p-value of 0.039. The coefficient is positive and statistically significant at the 5% level.

Thus, the empirical evidence indicates a positive association between firm size and stock price, consistent with the proposed hypothesis. Therefore, H5a is supported.

H5b: Financial Leverage and Market Valuation

H5b: Financial Leverage (LEV) is negatively associated with market valuation.

The estimated coefficient for LEV is −11.24, indicating a negative relationship between financial leverage and stock price. However, the coefficient has a p-value of 0.259, which is above the conventional 5% significance level.

Although the estimated coefficient has the expected negative sign, the relationship is not statistically significant. Consequently, the evidence is insufficient to support the proposed relationship between financial leverage and market valuation. Therefore, H5b is not supported. supported.

Summary of Hypothesis Testing

Hypothesis	Empirical Test	Key Result	Conclusion
H1a	Ohlson regression	EPS $\beta = 3.25$, $p < 0.001$	Supported
H1b	Ohlson regression	BVPS $\beta = 1.87$, $p = 0.004$	Supported
H2	Event study	AAR = 1.80%, $p = 0.022$	Supported
H3	Sectoral event study/interaction analysis	Technology = 2.41%; Healthcare = 2.12%; Utilities = 0.68%; Industrials = 0.92%	Inconclusive; formal interaction test required
H4	SCMM	Quantitative sustainability-gap measurement demonstrated	Partially supported; regression test required
H5a	Ohlson regression	SIZE $\beta = 0.75$, $p = 0.039$	Supported
H5b	Ohlson regression	LEV $\beta = -11.24$, $p = 0.259$	Not supported

The empirical results provide statistically significant support for H1a, H1b, H2, and H5a. H5b shows a negative coefficient in the predicted direction, but the relationship is not statistically significant.H3 interaction test required. H4 partially supported; regression test required.

Results and Discussion

Discussion

The empirical results confirm that traditional accounting information remains strongly linked to equity valuation. Notably, the positive, statistically significant coefficients on Earnings per Share (EPS) and Book Value per Share (BVPS) show that stock prices reflect both profitability metrics and balance-sheet data. EPS has a coefficient of 3.25 with $p < 0.001$, while BVPS has a coefficient of 1.87 ($p = 0.004$. These outcomes align with the value-relevance perspective of the Ohlson framework, which suggests that accounting information is pertinent for explaining market-based measures of firm value. Additionally, the correlation data in Appendix 1 indicate positive relationships between stock price and EPS ($r = 0.62$) and between stock price and BVPS ($r = 0.58$), further supporting their connection to market valuation.

The results further indicate that different forms of corporate information do not necessarily share the same statistical relationship with stock price. The Financial Disclosure Level (DISC) has a positive coefficient of 22.31, but its p-value of 0.077 does not meet the conventional 5% significance threshold. Thus, although the estimated relationship is positive, the evidence is insufficient to conclude that financial disclosure is statistically associated with stock price at the 5% level. This result suggests that the quantity of disclosed information, as measured by the disclosure index, may not independently explain market valuation. However, the Transparency Index (TRANS) is positive and statistically significant, with a coefficient of 19.87 and $p = 0.041$. This distinction is important because the variables capture different dimensions of corporate information: DISC measures the proportion of disclosed checklist items, whereas TRANS incorporates clarity, timeliness, voluntary disclosure, and compliance with accounting standards.

The control-variable results provide additional evidence on firm characteristics and stock-price valuation. Firm Size (SIZE) has a positive, statistically significant coefficient of 0.75 ($p = 0.039$), supporting H5a. In contrast, Leverage (LEV) has a negative coefficient of −11.24 but is statistically insignificant ($p = 0.259$). Although the estimated coefficient aligns with the hypothesized negative direction, the results do not provide sufficient statistical evidence to support H5b. These results are consistent with the descriptive and correlation evidence in Appendix 1, where SIZE is positively associated with stock price ($r = 0.51$); in contrast, LEV has a weak negative correlation with stock price ($r = -0.12$).

The event-study results offer a complementary perspective on the informational relevance of corporate disclosures. Unlike the Ohlson regression, which examines cross-sectional associations among accounting and firm-specific variables and the stock price, the event study focuses on abnormal stock-price movements around disclosure events. For the full sample, the average abnormal return (AAR) is 1.80%, with a t-statistic of 2.32 and a p-value of 0.022. This statistically significant positive AAR indicates that the disclosure events in the sample were associated with positive abnormal market returns over the one-day event window. Consequently, the evidence supports H2 and indicates that the examined disclosure events contained information that drove short-window market reactions.

Sector-level results show variation in market response across industries. Technology firms report an AAR of 2.41% ($p = 0.006$), while Healthcare firms report an AAR of 2.12% ($p = 0.018$). In comparison, Utilities report an AAR of 0.68% ($p = 0.413$), and Industrials report an AAR of 0.92% ($p = 0.256$). Financial Services and Consumer Goods also have positive AARs of 1.45% and 1.35%, respectively, but their p-values of 0.058 and 0.063 do not meet the 5% significance threshold. Retail reports an AAR of 1.18% ($p = 0.134$). Thus, sector-level evidence shows differences in the magnitude and statistical significance of abnormal returns, with significant results in Technology and Healthcare. However, these differences alone do not constitute a formal statistical test of a sectoral moderation effect. As reported in Appendix 1, a disclosure information-sensitive-sector interaction regression is required to test H3 directly in future research.

The SCMM results provide a separate quantitative assessment of sustainability-related capital allocation. The model estimates benchmark capital requirements using $X^* = A^{-1}E$, enabling a comparison of actual capital allocation with the estimated benchmark requirements. Table 6 reports an average actual capital allocation of $385.00 million and an average benchmark requirement of $294.50 million, yielding an average sustainability gap of $90.50 million. These results demonstrate how the SCMM quantifies differences between actual capital allocation and benchmark sustainability requirements.

Table 7 further distinguishes between environmental and social sustainability allocations. The average environmental sustainability gap is 90.5. The average social sustainability gap is 55.0, with the total sustainability gap at 145.5. These results show that the framework effectively measures the differences between actual and benchmark allocations for both environmental and social sustainability outputs. However, these descriptive SCMM results do not show evidence of a statistically significant causal or inferential link between sustainability outputs and capital allocation. Appendix 1 notes that a panel regression analysis involving X1, X2, E1, and E2 is necessary to test hypothesis H4 fully.

The three empirical objectives provide distinct forms of evidence. Objective 1 evaluates value relevance using regression analysis; Objective 2 examines short-window market reactions using an event-study design and sector comparison; and Objective 3 quantifies sustainability-related capital gaps using the SCMM framework. As summarized in Table 8, the available evidence supports the reported results for H1a, H1b, H2, H5a, and H5b.

Results

The study examines four main areas: the value relevance of accounting information, market reactions to disclosure events, sectoral differences in abnormal returns, and sustainability-related capital allocation. The sample consists of 100 firms over 2015–2025. Descriptive statistics show mean values of 142.35 for stock price, 4.82 for EPS, 28.45 for BVPS, 0.71 for DISC, 0.68 for TRANS, 22.45 for SIZE, and 0.43 for LEV.

The correlation analysis shows positive associations between stock price and EPS, BVPS, DISC, TRANS, and SIZE, while leverage has a weak negative correlation. These results provide preliminary evidence of relationships among the variables but do not replace the multivariate regression analysis.

The Ohlson model explains 63% of the variation in stock prices based on adjusted R^2. EPS and BVPS are both positive and statistically significant, supporting H1a and H1b. DISC is positive but not significant, whereas TRANS is positive and significant. Among the control variables, SIZE is significant and positive, while LEV is negative but insignificant.

The event study reports an overall AAR of 1.80% ($p = 0.022$), indicating a significant positive market response to the examined disclosure events. At the sector level, Technology and Healthcare show statistically significant abnormal returns, while the remaining sectors do not. Nevertheless, these sectoral differences do not test H3. The SCMM results indicate mean environmental and social sustainability gaps of 90.5 and 55.0, respectively, with a total gap of 145.5.

Conclusions

This study investigated the relevance of accounting information to equity valuation, market responses to corporate disclosures, sectoral variation in disclosure effects, and sustainability-related capital allocation. The results demonstrate that accounting-based information and corporate transparency remain important components of the information environment that influence equity markets. The evidence also indicates that corporate disclosure events can generate significant short-term market responses, although the magnitude of these responses varies across sectors.

The analysis further demonstrates the usefulness of the SCMM framework for identifying and quantifying sustainability-related capital gaps. However, the sectoral patterns identified in the event study and the sustainability gaps estimated through the SCMM are interpreted as preliminary evidence rather than definitive tests of the corresponding hypotheses. Formal assessment of H3 requires an interaction-based regression, while H4 requires panel-data analysis to examine the relationship between sustainability outcomes and capital allocation.

Finally, the study contributes to the literature by combining accounting-based valuation analysis, event-study methodology, and sustainability-related capital assessment within a single empirical framework. The results support several proposed relationships while also identifying areas where further econometric testing is necessary. Future research can build on these results by incorporating interaction effects, longitudinal analysis, and additional firm- and sector-specific characteristics to provide a more comprehensive assessment of the relationships examined.

Declaration of Generative AI and Assisted Technologies in the Writing Process

In preparing this work, the author used traditional AI methods to gather data from sources like the Refinitiv Eikon ESG Database [21], Bloomberg L.P. [22], S&P Compustat [23], and the U.S. Securities and Exchange Commission [24]. The goal was to test five hypotheses through accounting data, earnings per share (EPS), book value per share (BVPS), total assets, and financial disclosure indicators. Market data: stock prices, market capitalization, and stock returns. Disclosure data: information obtained from annual reports and corporate disclosures that show the level of transparency in financial reporting.

After compiling these datasets, the author reviewed and edited the content as necessary and assumes full responsibility for the final publication. AI was used solely to support data processing and statistical computation.

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Appendix

Table 1. *Key Variables for the Empirical Analysis*

Variable	Type	Measurement	Expected Effect
Stock Price (P)	Dependent	Closing market price per share at fiscal year-end	-
Market Return (R)	Dependent	Percentage change in stock price from the previous year	-
Investment Decision Indicators (IDI)	Dependent	Composite indicators based on trading volume, institutional ownership changes, and analyst recommendations	Positive (+)
Earnings per Share (EPS)	Independent	Net income/number of outstanding shares	Positive (+)
Book Value per Share (BVPS)	Independent	Shareholders' equity/number of outstanding shares	Positive (+)
Financial Disclosure Level (DISC)	Independent	Number of disclosed items / total checklist items (0–1)	Positive (+)
Transparency Index (TRANS)	Independent	Index based on clarity, timeliness, voluntary disclosure, and compliance with accounting standards	Positive (+)
Environmental Sustainability Output (E1)	SCMM Input	Standardized index of environmental sustainability outputs, including emissions reduction, renewable-energy use, energy efficiency, waste reduction, and water efficiency; scaled from 0 to 1	Positive (+)
Social Sustainability Output (E2)	SCMM Input	Standardized index of social sustainability outputs, including employee training, workplace safety, employee well-being, diversity, and community engagement; scaled from 0 to 1	Positive (+)
Firm Size (SIZE)	Control	Natural logarithm of total assets	±
Leverage (LEV)	Control	Total debt / total assets	Negative (−)
Industry Dummy	Control	Categorical variable based on industry classification	±
Year Dummy	Control	Fiscal year indicators, 2015–2025	±

Notes: E1 and E2 are SCMM sustainability-output measures and are not included as independent variables in the Ohlson regression unless theoretically specified. Expected effects reflect theoretical expectations rather than empirical statistical results.

Table 2. *Descriptive Statistics*

Variable	Mean	SD	Minimum	Maximum
Stock Price (P)	142.35	98.47	10.50	485.00
Market Return (R, %)	6.21	15.32	−42.50	38.10
Investment Decision Indicators (IDI)	0.58	0.21	0.10	0.95
Earnings per Share (EPS)	4.82	5.36	0.15	18.20
Book Value per Share (BVPS)	28.45	21.75	1.10	92.50
Financial Disclosure Level (DISC)	0.71	0.14	0.35	0.95
Transparency Index (TRANS)	0.68	0.13	0.40	0.92
Firm Size (SIZE)	22.45	1.78	19.20	26.80
Leverage (LEV)	0.43	0.19	0.05	0.82

N = 100 firms; study period = 2015–2025

Table 3. *Pearson Correlation Matrix*

Variable	P	R	IDI	EPS	BVPS	DISC	TRANS	SIZE	LEV
P	1.00	0.41***	0.36***	0.62***	0.58***	0.41**	0.47**	0.51***	−0.12
R	0.41***	1.00	0.29*	0.35**	0.32**	0.21	0.23	0.19	−0.09
IDI	0.36***	0.29*	1.00	0.28*	0.25*	0.32*	0.35*	0.17	−0.05
EPS	0.62***	0.35**	0.28*	1.00	0.71***	0.42**	0.39**	0.54***	−0.23*
BVPS	0.58***	0.32**	0.25*	0.71***	1.00	0.38**	0.36**	0.47***	−0.19
DISC	0.41**	0.21	0.32*	0.42**	0.38**	1.00	0.51***	0.33*	−0.11
TRANS	0.47**	0.23	0.35*	0.39**	0.36**	0.51***	1.00	0.37**	−0.14
SIZE	0.51***	0.19	0.17	0.54***	0.47***	0.33*	0.37**	1.00	−0.28*
LEV	−0.12	−0.09	−0.05	−0.23*	−0.19	−0.11	−0.14	−0.28*	1.00

N = 100

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 4. *Ohlson [4] Model Regression Results*

Variable	Coefficient (β)	Std. Error	t-statistic	p-value
EPS	3.25	0.72	4.51	<0.001***
BVPS	1.87	0.64	2.92	0.004**
DISC	22.31	12.45	1.79	0.077
TRANS	19.87	9.62	2.07	0.041*
SIZE	0.75	0.36	2.08	0.039*
LEV	−11.24	9.88	−1.14	0.259
Constant	−18.57	24.12	−0.77	0.443
Adjusted R^2	0.63			

Dependent variable: Stock Price (P); N = 100; robust standard errors
Notes: * p < 0.05; ** p < 0.01; *** p < 0.001. Robust standard errors are reported.

Table 5*. Event Study Results*

Industry / Sample	Mean AAR (%)	t-statistic	p-value
All Firms	1.80	2.32	0.022*
Technology	2.41	2.89	0.006**
Healthcare	2.12	2.44	0.018*
Financial Services	1.45	1.91	0.058
Utilities	0.68	0.82	0.413
Consumer Goods	1.35	1.87	0.063
Industrials	0.92	1.14	0.256
Retail	1.18	1.51	0.134

Average Abnormal Returns (AAR) around disclosure events; one-day event window
Notes: * p < 0.05; ** p < 0.01. AAR = Average Abnormal Return.

Table 6: *Descriptive Statistics of SCMM Measures*

SCMM Measure	Mean ($M)	Median ($M)	Std. Dev. ($M)	Minimum ($M)	Maximum ($M)
Actual Capital Allocation (X)	385.00	365.00	142.50	150.00	720.00
Benchmark Capital Requirement (X*)	294.50	280.00	108.75	120.00	550.00
Sustainability Gap (SG = X − X*)	90.50	75.00	68.40	−45.00	310.00

Source: Prepared by the researcher based on the Sustainability Capital Matrix Model (SCMM).

Table 7. *Objective 3: Sustainability Capital Matrix Model Results*

Variable	N	Mean	Std. Dev.	Min	Max
Environmental output (E1)	1,100	120.0	35.0	30	220
Social output (E2)	1,100	80.0	25.0	20	160
Actual environmental allocation (X1)	1,100	385.0	142.5	150	720
Benchmark environmental allocation (X*1)	1,100	294.5	108.75	120	550
Actual social allocation (X2)	1,100	265.0	96.5	100	510
Benchmark social allocation (X*2)	1,100	210.0	82.5	85	420
Environmental Sustainability Gap (SG1)	1,100	90.5	68.4	−45	310
Social Sustainability Gap (SG2)	1,100	55.0	51.2	−30	225
Total Sustainability Gap	1,100	145.5	91.7	−75	535

Panel A. Descriptive Statistics

Table 8. *Integrated Empirical Evidence Across the Three Objectives*

Objective	Empirical Test	Principal Measure	Reported Evidence	Hypothesis
Objective 1	Value-relevance regression	EPS, BVPS, DISC coefficients	Regression estimates required	H1a, H1b, H5a, H5b
Objective 2	Event study	AAR/CAR/CAAR	Overall AAR = 1.80%, p<0.05p<0.05	H2
Objective 2	Sector comparison	Sector-specific AAR	Technology = 2.41%; Healthcare = 2.12%; Utilities = 0.68%; Industrials = 0.92%	H3
Objective 2	Interaction analysis	DISC × information-sensitive sector	Regression estimate required in future research	H3
Objective 3	SCMM	X* = A^(-1)E	Benchmark allocations and gaps	H4
Objective 3	Capital-allocation panel regression	X1,X2 on E1,E2	Regression estimates required in future research	H4

Notes: Objectives 2 and 3 use distinct empirical procedures rather than being treated as descriptive extensions of Objective 1. Objective 2 identifies the short-window market response to disclosure events and tests cross-sector heterogeneity; Objective 3 quantifies the relationship between sustainability outputs and the capital allocated to generating those outputs through the SCMM framework. This structure places the three objectives on a comparable empirical footing while preserving the different identification strategies appropriate to each research question.

Appendix (2)

A list of 100 publicly traded companies, the sample of the empirical study (from major global stock exchanges). These span different industries to ensure variability in accounting and market features.

100 American Companies

1. Apple Inc.
2. Microsoft Corporation
3. Alphabet Inc.
4. Amazon.com, Inc.
5. Meta Platforms, Inc.
6. Tesla, Inc.
7. Berkshire Hathaway Inc.
8. Johnson & Johnson
9. Visa Inc.
10. Procter & Gamble Co.
11. UnitedHealth Group Incorporated
12. The Home Depot, Inc.
13. Mastercard Incorporated
14. NVIDIA Corporation
15. The Walt Disney Company
16. PepsiCo, Inc.
17. The Coca-Cola Company
18. Intel Corporation
19. Cisco Systems, Inc.
20. Exxon Mobil Corporation
21. Chevron Corporation
22. Pfizer Inc.
23. Merck & Co., Inc.
24. Abbott Laboratories
25. McDonald's Corporation
26. Nike, Inc.
27. Adobe Inc.
28. International Business Machines Corporation (IBM)
29. Oracle Corporation
30. Salesforce, Inc.
31. Starbucks Corporation
32. AT&T Inc.
33. Verizon Communications Inc.
34. The Boeing Company
35. Caterpillar Inc.
36. 3M Company
37. American Express Company
38. Bank of America Corporation
39. Wells Fargo & Company
40. Citigroup Inc.
41. Netflix, Inc.
42. Qualcomm Incorporated
43. Texas Instruments Incorporated
44. General Motors Company
45. Ford Motor Company
46. General Electric Company
47. Honeywell International Inc.
48. Lockheed Martin Corporation
49. RTX Corporation
50. Union Pacific Corporation
51. United Parcel Service, Inc. (UPS)
52. FedEx Corporation
53. Deere & Company
54. American Tower Corporation
55. Prologis, Inc.
56. NextEra Energy, Inc.
57. Duke Energy Corporation
58. Southern Company
59. Dominion Energy, Inc.
60. ConocoPhillips
61. Occidental Petroleum Corporation
62. Marathon Petroleum Corporation
63. Phillips 66
64. Valero Energy Corporation
65. Bristol Myers Squibb Company

66. Eli Lilly and Company
67. AbbVie Inc.
68. Amgen Inc.
69. Gilead Sciences, Inc.
70. Thermo Fisher Scientific Inc.
71. Danaher Corporation
72. Medtronic plc
73. Stryker Corporation
74. CVS Health Corporation
75. Delta Air Lines, Inc.

Details of the Dataset.

1. Company: Name of the firm (100 listed companies).
2. Year: Fiscal year from 2015 to 2025.
3. P (Stock Price): Closing stock price at fiscal year-end or after the annual report release.
4. EPS (Earnings per Share): Net income/number of outstanding shares.
5. BVPS (Book Value per Share): Total equity/number of outstanding shares.
6. DISC (Disclosure Index): Proportion of disclosure items included in the annual report (0–1 scale).
7. SIZE: Natural logarithm of total assets.
8. LEV: Total debt / total assets.