

The double-edged sword of ESG in Australia: risk or resilience? The mediating role of earnings management

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Abstract

Purpose – This study investigates the impact of Environmental, Social, Governance (ESG) overall score and its pillars on firm risk and the mediating role of earnings management.

Design/methodology/approach – The research applies Generalised Method of Moments (GMM) regression to address endogeneity in a panel of Australian-listed firms from 2014 to 2023.

Findings – The findings reveal that higher ESG scores are associated with lower firm risk, with governance and social pillars exerting the most substantial immediate effects. In contrast, the environmental pillar demonstrates a delayed risk-reducing impact, reflecting long-term benefits rather than short-term volatility reduction. Moreover, the study identifies earnings management as a significant mediator that partially offsets ESG's stabilising effects, highlighting that firms with strong ESG practices are less likely to engage in accrual-based earnings management, thus reducing risk.

Practical implications – These findings have critical implications for investors, regulators, and policymakers. They underscore the importance of pillar-level ESG evaluation, long-term orientation in environmental assessments and integrating financial transparency into ESG frameworks.

Originality/value – This study contributes to the extant knowledge of ESG overall and the individual pillar effect on firm risk in Australian companies, highlighting the mediating role of earnings management (EM). By identifying earnings management as a partial mediating mechanism, the study extends agency and stakeholder theories beyond direct ESG–firm risk association through the lens of financial reporting behaviour. This integrated framework bridges sustainability and earnings management literatures, offering a more comprehensive theoretical understanding of how ESG performance is related to firm risk.

Keywords ESG, ESG pillars, Stock volatility, Earnings management

Paper type Research article

1. Introduction

ESG has moved from niche to mainstream in financial markets, including Australia. In recent years, Australian institutional investors have rapidly adopted ESG considerations, with responsible investment assets reaching a record A\$1.5 trillion (43% of professionally managed funds) by 2021 ([Responsible Investment Benchmark Report, 2022](#)). This trend



reflects a broader view that ESG integration can improve long-term risk management. Regulators in Australia have also increased their focus on ESG issues. For example, the Australian Prudential Regulation Authority (APRA) now expects banks and funds to manage climate-related financial risks. The Australian Securities and Investments Commission (ASIC) has stepped up enforcement against “greenwashing” in ESG disclosures ([Environmental, Social and Governance \(ESG\), 2022](#)).

The Australian context is noteworthy because of its high institutional ownership (e.g. large superannuation funds) and active regulatory stance on sustainability, which may amplify the impact of ESG performance on risk. Given the prominence of resource-intensive industries like mining, energy and industrials, which are frequently subject to governance and environmental hazards ([Schandl et al., 2008](#)), the Australian market presents a distinctive setting for this study. Moreover, much of the extant literature aggregates ESG into a single score, potentially masking the distinct effects of the E, S and G pillars. We address this gap by examining each pillar separately to identify whether any dimension drives the risk reduction or the overall ESG effect is a composite of divergent influences. As far as current research is concerned, there is limited empirical research focusing on linking firm-risk measures to ESG and its constituent pillars, in the context of Australian-listed companies on the ASX, a gap that this study aims to fill. For example, [Humphrey and Lee \(2011a, b\)](#) focused more on return performance than risk measurements when comparing the performance of ESG-screened managed funds versus conventional funds. Furthermore, they did not distinguish between the ESG pillar and overall ESG scores. Using an Australian sample, [Gholami et al. \(2023\)](#) examined the connection between ESG and cost of capital and its influence on a firm’s idiosyncratic risk. However, they only focused on ESG overall and did not consider each pillar’s effect.

Furthermore, prior research reveals that ESG can reduce corporate risks through multiple channels ([Wang and Yao, 2024](#)) such as profitability, market value, leverage ([Aslan et al., 2021](#)); cost of debt/capital, performance variability ([Atif and Ali, 2021](#)); ownership concentration, board composition ([Liu and Zhang, 2024](#); [Maquieira et al., 2024](#)); information asymmetry ([Hu et al., 2023](#)) investor attention ([Wu et al., 2024](#)). EM occurs when firm managers adjust their financial reports which can influence future stock returns ([Huang and Ho, 2020](#)). As a result, EM may undermine the credibility of ESG disclosures or signal opportunistic behaviour that weakens stakeholder trust, potentially offsetting the stabilising effects of ESG performance. To address these gaps, this study attempts to examine the following research questions: (1) Does ESG overall score affect firm risk in the Australian context? (2) Do each of the E, S and G pillars have an impact on firm risk? And (3) Whether the effect of ESG on firm risk is achieved through the channel of reducing earnings management? This research therefore contributes to the existing literature review in some ways. First, our research enriches the field of ESG studies to some extent, providing a deeper comprehension of the connection between ESG and firm risk, focusing on firm-specific volatility, but with an alternative lens that breaks down the components (E, S, G), which are utilised to measure ESG. Second, we provide a more comprehensive view of the ESG-firm risk literature by examining the relationship between ESG overall, each dimension and corporate risk through the mechanism channel, earnings management. Last, we consider both the benefits and burdens of ESG implementation when assessing its effect on firm risk in the Australian market. It offers essential insights for investors, regulators and corporate decision-makers in Australia.

2. Literature review and hypothesis development

2.1 ESG and volatility: emerging empirical consensus

A growing literature in finance and sustainability examines whether high ESG performance corresponds to lower stock return volatility. Early evidence came from studies of corporate social performance (CSP), a concept closely related to ESG. Using data from the late 20th

century, [Orlitzky and Benjamin \(2001\)](#) provided an early cornerstone by showing that firms with superior CSP generally face lower financial risk. Similarly, corporate social responsibility (CSR) engagement has a negative influence on firm risk in controversial industries ([Jo and Na, 2012](#)). These findings supported theoretical arguments that responsible business practices (e.g. strong employee relations, community engagement) act as risk management or insurance, stabilising corporate performance. Subsequent research across various markets has reinforced this risk-mitigation view of ESG. For instance, [Liu et al. \(2023\)](#) analysed the Chinese market and found a strong negative relationship between companies' ESG performance and their stock idiosyncratic volatility, with higher ESG firms exhibiting significantly less volatility. [Liu et al. \(2024\)](#) also found a negative effect of ESG performance on stock volatility persistence. [Engelhardt et al. \(2021\)](#) revealed a negative association between ESG and stock volatility in the European market during the COVID-19 crisis. Not every study finds a uniformly significant effect of ESG on risk; results can vary by context, and some skeptics argue that any observed risk reduction may stem from other firm characteristics correlated with ESG (such as size or industry). Nevertheless, the preponderance of recent empirical evidence leans toward a meaningful ESG–volatility linkage. In the Australian setting, preliminary indications also align with global findings: the S&P/ASX 200 ESG index has exhibited slightly lower volatility over the past decade compared to the broad market index ([Ung and Abburu, 2021](#)), hinting that ESG-oriented Australian firms incur somewhat lower risk. Additionally, ESG performance disclosure reduces an Australian firm's idiosyncratic risk ([Gholami et al., 2023](#)). However, rigorous academic evidence for Australia has been limited. In summary, the literature suggests that higher ESG scores should correlate with lower firm volatility at a given time.

In short, a consensus has been formed that companies scoring well on ESG tend to experience more stable stock prices than their lower-rated counterparts. Building on the insights from prior studies, we posit that ESG performance will be inversely related to stock return volatility, which is the basis of our first hypothesis.

H1. Firms with higher overall ESG scores have lower stock return volatility than firms with lower ESG scores in the Australian market.

We suggest that the effects of the various ESG pillars on business risk may differ ([Bouslah et al., 2013](#)). Recent research suggests that strong performance in environmental and social aspects can lower firm-specific risk. In contrast, governance improvements yield other benefits and sometimes show weaker direct effects on volatility ([Sciarelli et al., 2023](#)). However, how important people view the three dimensions may also depend on how measurable and reliable the facts are ([Derwall and Verwijmeren, 2007](#)). We assume a negative impact and posit that firm risk is indeed significantly affected by each of the ESG pillars separately.

Environmental issues may not always impact corporate success as quickly as social competence, such as meeting the demands of customers and employees. Various stakeholders are involved in the three ESG aspects, which may affect risk and financial indicators ([Godfrey et al., 2009](#); [Girerd-Potin et al., 2014](#)). Diverse market reactions may result from investors' varying assessments of the significance of each ESG feature ([Eccles and Viviers, 2011](#)). For example, E pillar performance helps in mitigating a firm's beta ([Benlemlih et al., 2018](#)). Therefore, we posit that the environmental pillar has a significant negative influence on the firm.

H2a. Environmental (E) score has a significant negative impact on firm risk in the Australian market.

Social performance mitigated volatility in the financial crisis ([Bouslah et al., 2018](#)). The risk mitigation perspective suggests that investment in CSR generates moral capital, resulting in various forms of wealth for stakeholders. This wealth may reduce uncertainty about firm cash flows, contributing to a decrease in firm risk ([Bouslah et al., 2018](#)). Moreover, [Lee and Faff \(2009\)](#) revealed that firms with higher social performance can reduce this risk. Building on the

insights from prior studies, we posit that social performance will be significantly negative related to stock return volatility, which is the basis of the following hypothesis.

H2b. Social (S) score has a significant negative impact on firm risk in the Australian market.

Governance dimension of ESG has become more important over the years, especially when several scandals related to corporate governance came to light and regulators implemented novel regulations to safeguard investors (Narula *et al.*, 2024). Governance pillar score can reduce the cost of equity capital (Mio *et al.*, 2023). We posit that governance performance has a significant negative effect on firm risk. We develop the following hypothesis.

H2c. Governance (G) score has a significant negative impact on firm risk in the Australian market.

2.2 Mechanisms linking ESG to volatility reduction

Several mechanisms have been proposed to explain why higher ESG ratings correlate with lower contemporaneous volatility, such as ownership concentration, board composition (Liu and Zhang, 2024; Maqueira *et al.*, 2024), information asymmetry (Hu *et al.*, 2023) and investor attention (Wu *et al.*, 2024). Du and Nik Azman (2024) utilised corporate transparency as a mediating variable in the relationship between ESG and firm risk-taking. One argument is that strong ESG performers tend to have superior corporate governance and internal controls, which curb excessive risk-taking and financial misreporting. They may also engage in more transparent disclosure practices, reducing information asymmetry and uncertainty in the market, effectively increasing stock price synchronicity with market fundamentals and therefore affecting earnings management's probability (Xu *et al.*, 2025). EM refers to managerial manipulation of financial reports, either through accounting choices (accrual-based manipulation) or real business decisions (real EM) to achieve specific earnings targets or smooth variability. Aggressive EM can influence the ESG–risk relationship in two opposing ways. On the one hand, companies with an authentic commitment to ESG are expected to uphold high ethical standards in financial reporting, meaning less earnings manipulation and higher earnings quality (Tohang *et al.*, 2024). ESG and transparent reporting reinforce each other in such firms, leading to genuinely lower risk (fewer earnings surprises, lower volatility). On the other hand, a more cynical view (rooted in agency theory) suggests that some managers might exploit ESG as a facade to hide opportunistic behaviour. These managers may engage in “window dressing”, touting sustainability achievements to gain stakeholder goodwill while concurrently manipulating earnings behind the scenes (Ibrahim Almubarak *et al.*, 2023). In this scenario, ESG activities become a means to safeguard themselves from stakeholders and cover up financial misdeeds (Ibrahim Almubarak *et al.*, 2023). Such “greenwashing” or moral licensing strategies imply that EM could weaken or distort the effect of ESG on risk (Huang and Ho, 2020): if ESG performance is merely for show and underlying financials are misleading, the firm's actual risk may be higher than it appears. In addition, price manipulation can lead to short-term plunges in stock prices (Xu *et al.*, 2025). However, there is a lack of research on how ESG mitigates risk in stock price surges, thereby leaving a gap in the development of the mechanism channel. Corporate EM causes a collapse in the quality of financial reports, leads to skewed judgment of investors and affects the fluctuations of stock prices (Huang and Ho, 2020). Theoretically, EM is likely to mediate the ESG–risk link by affecting information transparency. High EM can mask a firm's actual risk, potentially maintaining an illusion of stability in the short term (e.g. via income smoothing) but increasing the probability of abrupt corrections (e.g. future crashes when reality comes to light). Conversely, low EM (high reporting quality) allows ESG benefits (like improved stakeholder relations and long-term focus) to fully translate into reduced volatility and risk. In summary, ESG can mitigate firm risk by reducing exposure to EM.

Moreover, each dimension addresses different risks and stakeholder relationships. For instance, the environmental pillar captures exposure to climate and environmental compliance risks. Strong environmental performance also contributes to the firm's market value in polluting industries (Konar and Cohen, 2001). Social pillar reflects labour relations, customer satisfaction and community impact. Governance pillar relates to board effectiveness, transparency and shareholder rights. There is a reason to believe that these pillars may influence volatility in different ways. Zhang *et al.* (2023) implied that disclosure of social responsibility reports can deter listed businesses from engaging in earnings management practices. Additionally, Gillan *et al.* (2021) indicated that social responsibility could persuade stakeholders' requests and enhance the firm's reputation, leading to an increase in corporate value, thereby mitigating the extent to which firms engage in earnings management. This observation forms the basis of the following hypotheses.

- H3a. Earnings management significantly mediates the relationship between firm risk and the ESG score of Australian firms.
- H3b. Earnings management significantly mediates the relationship between firm risk and the Environmental score of Australian firms.
- H3c. Earnings management significantly mediates the relationship between firm risk and the Social score of Australian firms.
- H3d. Earnings management significantly mediates the relationship between firm risk and the Governance score of Australian firms.

3. Research design

3.1 Data and sample

The study focuses on all non-financial firms listed on the Australian stock market between 2014 and 2023. We chose 2014 as a starting point since it is the year that ESG practices started to gain ground among Australian companies, and the ASX Corporate Governance Council Principles and Recommendations (3rd Edition) have taken effect on or after this year to require firms to disclose ESG-related opportunities and risks to investors (ASX Corporate Governance Council, 2014). Due to the lack of ESG disclosure reports in 2024 for many firms, our data period is from 2014 to 2023. Based on data availability, we employ the following criteria to filter and clean data: (1) exclude financial companies and (2) exclude firms with missing data for main variables. The final panel dataset comprises 179 firms, resulting in 1,780 firm-year observations. Overall ESG scores and individual pillar scores (E, S and G) were sourced from London Stock Exchange Group (LSEG) to serve as the independent variables. There are 10 categories grouped to formulate the three pillars score (London Stock Exchange Group, 2024) (see Supplementary Table 1). Daily stock prices were obtained from Compustat and Yahoo Finance. Control variables were collected from Compustat and companies' publicly available annual reports.

3.2 Variable measurement

3.2.1 *Independent variable: ESG and its pillars.* Overall ESG scores and individual pillar scores of sample firms were collected from LSEG. Table 2 (see Supplementary) presents annual mean scores and standard deviations for overall ESG and its three pillars from 2014 to 2023. A Welch *t*-test reveals that the overall ESG mean significantly differs from the E and G pillar means at the 5% level across all years. This justifies the motivation of this research, which is not just to investigate overall ESG but also individual pillar scores. The E pillar scores are substantially lower than the overall ESG scores across all years. This suggests that Australian firms consistently underperform on environmental dimensions relative to their overall ESG profile. The G pillar consistently reports higher mean values than ESG scores.

This trend reflects stronger corporate governance practices, possibly due to regulatory compliance and board-level accountability. The S pillar is generally closest in value to the overall ESG score and is not significantly different. This suggests that the S pillar may be the most representative component of the ESG composite score for Australian firms.

A graphical analysis of the ESG data in [Figure 1](#) (see [Supplementary](#)) represents the annual trends in mean scores for overall ESG and its three individual pillars. The blue line (Mean ESG) shows a steady upward trend, rising from approximately 32 in 2014 to nearly 45 in 2023. This reflects a general improvement in ESG performance among Australian firms over the past decade. The orange line (Mean E) begins at the lowest and consistently lags the other pillars. Although it shows gradual improvement from 18 in 2014 to around 33 in 2023, the gap between E and the different dimensions remains visible, indicating weaker performance or slower adoption of environmental practices. The grey line (Mean S) closely follows the ESG trend, nearly overlapping it after 2016. This suggests that the S pillar heavily influences the composite ESG score and is the most aligned with it. The yellow line (Mean G) starts high and remains the top-performing pillar throughout the period. The G pillar shows consistency and leadership from just under 48 in 2014 to over 52 in 2023, likely due to longstanding regulatory and board governance practices.

3.2.2 Dependent variable: RV. The dependent variable in this study is firm risk, measured using realised volatility (RV), following the approach of [Jorion \(1995\)](#). RV is calculated based on daily stock returns using the following formula:

$$RV = \sqrt{\frac{1}{T} \sum_{t=1}^T r_t^2} \quad (1)$$

where

- (1) r_t = daily return on day t
- (2) T = number of trading days in a year

3.2.3 Control variables. The control variables are chosen from the operational level and dimension of firm characteristics: leverage ratio (The lev, the ratio of total liabilities to total assets), firm size (Size, the natural logarithm of total assets), return on assets (ROA, the ratio of net profit to total assets), Book-to-market ratio (BM, the ratio of book value of equity to market capitalisation), Cash holdings (Cash holdings, the ratio of cash and cash equivalent to total assets).

3.2.4 Mediating variable: earnings management. This study employs the absolute value of discretionary accruals (DA_abs) as a proxy for EM. DA_abs is calculated using the modified Jones model, following the approach of [Dechow et al. \(1995\)](#). The modified Jones model has some advantages over other approaches proposed by [Healy \(1985\)](#); [Deangelo \(1986\)](#) and [Jones \(1991\)](#) since it refines the original Jones model ([Jones, 1991](#)) by adjusting for any potential of revenue manipulation through credit sales, leading to more effective measurement of discretionary accruals [Dechow et al. \(1995\)](#).

[Appendix 1](#) (see [Supplementary](#)) interprets the steps to calculate the discretionary accruals.

3.3 Empirical model

The baseline regression model used to empirically test [H1](#) and [H2a](#), [H2b](#), [H2c](#) is specified as

$$RV_{i,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 ROA_{i,t} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 BM_{i,t} + \beta_6 Cash\ holdings_{i,t} + \varepsilon_{i,t} \quad (2)$$

where

- (1) $RV_{i,t}$: realised volatility (dependent variable) of firm i at time t
- (2) $X_{i,t}$ is the main explanatory variable, which varies based on the hypothesis being tested:

For **H1**, $X_{i,t}$ is the overall ESG score, used to examine whether general ESG performance is associated with firm risk.

For **H2a**, **H2b** and **H2c**, $X_{i,t}$ denotes for each of the E, S and G scores to determine whether each dimension significantly impacts firm risk.

To establish the mediating effect, DA_abs is regressed on the ESG variables as shown in **Equation (3)**

$$DA_abs_{i,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 ROA_{i,t} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 BM_{i,t} + \beta_6 Cash\ holdings_{i,t} + \varepsilon_{i,t} \quad (3)$$

To test **H3a**, **H3b**, **H3c** and **H3d**, which investigate the mediating role of EM, the study extends the baseline model by incorporating the mediating variable, (DA_abs) as follows:

$$RV_{i,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 DA_abs_{i,t} + \beta_3 ROA_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \beta_6 BM_{i,t} + \beta_7 Cash\ holdings_{i,t} + \varepsilon_{i,t} \quad (4)$$

In both **Equations (3)** and **(4)**, $X_{i,t}$ represents either the overall ESG score or one of its pillars (E, S or G), depending on the model being estimated. Together, these equations are used to test whether ESG performance reduces firm risk (realised volatility) through its effect on EM, thereby validating a partial mediation effect. When ESG and DA are included simultaneously in the model, ESG overall and its pillar remain notably negative, and DA is substantially positive. These results reveal that ESG and its dimensions can mitigate EM, confirming the mediating effect of EM.

4. Empirical analysis and findings

4.1 Descriptive statistics and correlation

Table 3 (see **Supplementary**) provides descriptive statistics that underscore the need to examine the relationship between RV and ESG performance. The highly skewed nature of RV, with a mean of 0.519 and a maximum of 5.82, indicates the presence of substantial firm-level or sector-specific risk events, justifying a closer look at what drives this volatility. Given the increasing role of ESG practices in risk management, it is pertinent to assess whether firms with stronger ESG profiles experience lower volatility. The negative mean ROA (-0.035) and its extreme minimum (-8.421) point to widespread and uneven profitability, raising questions about whether ESG performance can mitigate this operational uncertainty. Similarly, leverage (mean = 0.438, max = 5.301) shows that while most firms maintain moderate debt levels, a subset operates under high financial risk, possibly in capital-intensive sectors, where ESG may play a stabilising role. The widespread firm size (with some firms having revenues under \$1 million, as indicated by negative minimum since natural logarithm taken) and variation in cash holdings reflect differing financial strategies and risk exposures, which ESG could influence. These patterns provide a compelling rationale to investigate whether ESG and its Environmental, Social and Governance pillars can buffer against firm-specific risk, as captured by realised volatility.

Table 4 (see [Supplementary](#)) shows the coefficients with significance representing the levels of Pearson correlations among the variables in the regression model. The correlation coefficients of ESG, E, S, G and control variables are much lower than the threshold value of 0.8 ([Gujarati, 2003](#)). As a result, the study data are confirmed unlikely to confront the issue of multicollinearity. The negative and significant correlations between RV and ESG scores, including each pillar, provide strong preliminary evidence that higher ESG performance is associated with lower firm-specific risk. This aligns with the theoretical expectation that ESG can enhance financial stability by improving a firm's resilience to internal and external disruptions. This correlation-based insight justifies a deeper investigation (e.g. through regression analysis) into how ESG performance contributes to risk reduction, especially when controlling for other firm-specific characteristics.

4.2 Regression analysis

4.2.1 Impact of overall ESG and pillars (E, S, G) on firm risk. We have conducted a modified Wald test and Wooldridge test to investigate the presence of heterogeneity and autocorrelation, respectively, across our research models. [Table 5](#) (see [Supplementary](#)) reports the results of the Wald test confirming heteroskedasticity in our models. Additionally, the existence of autocorrelation in all models is confirmed through the p -value derived from the Wooldridge test presented in [Table 5](#).

The potential endogeneity of the independent and control variables in [Equation \(2\)](#) was assessed using the residual-inclusion method following [Sinha Ray and Goel \(2023\)](#). First, an auxiliary regression ([Equation 5](#)) was estimated by treating the suspected endogenous variable (e.g. ESG) as the dependent variable and regressing it on all other explanatory variables.

$$ESG_{i,t} = \gamma_0 + \gamma_1 ROA_{i,t} + \gamma_2 Lev_{i,t} + \gamma_3 Size_{i,t} + \gamma_4 BM_{i,t} + \gamma_5 Cash\ holdings_{i,t} + \epsilon_{i,t} \quad (5)$$

The resulting residuals (Resid.ESG) were then included as an additional regressor in the main model ([Equation 6](#)). A statistically significant coefficient of the residual term indicates the presence of endogeneity; an insignificant coefficient suggests exogeneity.

$$RV_{i,t} = \lambda_0 + \lambda_1 Resid. ESG_{i,t} + \lambda_2 ROA_{i,t} + \lambda_3 Lev_{i,t} + \lambda_4 Size_{i,t} + \lambda_5 BM_{i,t} + \lambda_6 Cash\ holdings_{i,t} + \epsilon_{i,t} \quad (6)$$

The results in [Table 6](#) ([Supplementary](#)) indicate that ROA and the environmental pillar (E) show significant residuals, confirming endogeneity, while ESG, S and G pillars appear exogenous. Among the controls, cash holdings show mild endogeneity, whereas Size, Lev and BM are exogenous. Although not all variables are endogenous, all regressors were treated as instruments in the GMM estimation, following [Arellano and Bond \(1991\)](#) and [Blundell and Bond \(1998\)](#), to enhance model efficiency and minimize endogeneity bias.

We utilised the two-step system GMM approach developed by [Arellano and Bover \(1995\)](#) and [Blundell and Bond \(1998\)](#) to handle heteroskedasticity and autocorrelation issues ([Harris et al., 2019](#); [Anatolyev, 2005](#)). Additionally, we use GMM to address the potential of endogeneity issue which may arise from reverse causality (e.g. firm performance influencing ESG practices) and omitted firm-specific factors (e.g. managerial quality or unobserved governance culture). GMM is particularly well suited for dynamic panel data as it effectively addresses various forms of endogeneity, including simultaneity, omitted variables and dynamic relationships ([Ullah et al., 2018](#); [Roodman, 2009](#)). Following an approach similar to [Arellano and Bover \(1995\)](#), we use the lagged independent variables as instruments. To investigate the validity of the estimator employing GMM, two tests were applied. First, AR(2)

test is used to check the second-order serial correlation. Next, the Hansen and Sargan tests are utilised to verify instrument relevance.

Table 7 presents the estimation results derived from the two-step system GMM approach. The reported outputs include the estimated coefficients. Standard errors are reported in parentheses beneath each coefficient. The model diagnostics, specifically, the AR(2) test for second-order serial correlation and the Hansen J test for instrument validity, indicate that all models are statistically valid as both tests return insignificant *p*-values.

The results show that the overall ESG score negatively impacts RV, supporting H1, which posits that ESG performance reduces firm risk. This finding aligns with prior studies such as Liu *et al.* (2023) and Liu *et al.* (2024), highlighting ESG’s risk-mitigating role.

When the ESG score is disaggregated into its three pillars, the S and G pillars exhibit a significant negative relationship with RV. In contrast, the E pillar does not. The lack of significance for the E pillar is consistent with the descriptive statistics reported in Table 3, which showed that the E pillar had the lowest mean scores across all years, indicating relatively weaker environmental performance among firms in the sample. This pattern may be explained by the high financial burden of meeting environmental standards, which often requires capital-intensive investments, such as adopting cleaner technologies, emissions control systems or resource-efficient infrastructure. These costs can strain short-term financial performance and, in turn, reduce the immediate risk-mitigation benefits observable in realised volatility (Clark *et al.*, 2015; Fatemi *et al.*, 2015).

Among the three pillars, the Governance pillar shows the strongest negative coefficient, suggesting that it plays the most prominent role in reducing realised volatility. The more substantial effect of the Governance pillar is also theoretically sound as effective governance mechanisms such as board independence, transparency and internal controls are directly linked to better risk management and lower firm-level uncertainty. Overall, these findings provide robust empirical support for the argument that ESG performance, particularly in governance and social responsibility, plays a key role in stabilising firm performance and mitigating market-based risk.

Table 7. Impact of overall ESG and pillars (E, S, G) on firm risk

Dep. Variable	Indep. Variable	ESG	E pillar	S pillar	G pillar
RV	ESG/pillars	-0.009** (0.004)	0.002 (0.002)	-0.006** (0.002)	-0.007*** (0.002)
	ROA	0.088 (0.400)	0.318** (0.145)	0.034 (0.375)	-0.319 (0.288)
	Lev	0.264** (0.109)	0.016 (0.069)	0.228** (0.103)	0.000 (0.062)
	Size	0.008 (0.073)	-0.121*** (0.036)	-0.021 (0.050)	-0.045 (0.031)
	BM	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
	Cash holdings	1.296 (0.866)	-0.291 (0.515)	1.109 (0.772)	-0.103 (0.311)
	Cons	0.494 (0.495)	1.305*** (0.285)	0.620 (0.432)	1.179*** (0.193)
	Obs.	1780	1780	1780	1780
	AR (2) Stat.	0.181 (-1.34)	0.277 (-1.09)	0.205 (-1.27)	0.467 (-0.73)
	Hansen J Stat.	0.919 (3.23)	0.211 (13.23)	0.830 (4.29)	0.217 (10.74)
	Model efficacy	√	√	√	√

Note(s): *, ** and *** represent statistical significance at 10%, 5% and 1% level, respectively. √ indicates models are valid

4.2.2 *Mediating role of EM on ESG-risk nexus.* Table 8 presents the GMM regression results related to Hypotheses 3a, 3b, 3c and 3d when earnings management, proxied by DA_abs, is introduced as a mediating variable between ESG and firm risk, RV. Each pair of columns corresponds to one ESG construct, i.e. overall ESG, E, S and G pillar, with the first column in each pair regressing DA_abs as the dependent variable (Equation 3) and the second column estimating RV as the dependent variable, with DA_abs included as a mediator (Equation 4).

Table 8 indicates that when EM (proxied by DA_abs) is regressed on the overall ESG score and its pillars, the results reveal a significant negative association across all models. This indicates that firms with lower ESG performance tend to engage in higher levels of earnings manipulation, while higher ESG performers exhibit lower accrual-based EM.

Furthermore, when EM is introduced as a mediating variable in the regression models with RV as the dependent variable, EM displays a positive and significant coefficient, indicating that higher levels of earnings manipulation are associated with increased firm risk. In this context, the overall ESG score, S and G pillars have significant negative influences on firm risk. Additionally, the coefficients for the overall ESG score and the S and G pillars remain negative. However, the magnitudes of these coefficients decline compared to the estimates reported in Table 7, where EM was not included in the model. This reduction suggests that the presence of EM partially absorbs the impact of ESG on RV, confirming that earnings management acts as a partial mediator in the ESG–risk relationship. Specifically, ESG can mitigate the impact of EM, implying that part of ESG’s effectiveness in lowering volatility stems from its ability to constrain earnings manipulation. These findings provide empirical support for highlighting that EM plays a meaningful role in the ESG–risk nexus and may act as a channel through which ESG practices influence firm-level risk outcomes. The presence of partial mediation confirms that financial reporting quality is a

Table 8. Mediating role of earnings management within the ESG–risk nexus

Variables	ESG		E pillar		S pillar		G pillar	
	DA_abs	RV	DA_abs	RV	DA_abs	RV	DA_abs	RV
(ESG/ pillars)	−0.001*	−0.006***	−0.001**	−0.004	−0.0007**	−0.003**	−0.001**	−0.005**
DA_abs	(0.000)	(0.002)	(0.000)	(0.002)	(0.0003)	(0.001)	(0.0006)	(0.002)
		1.976***		1.844***		1.919***		1.790***
		(0.533)		(0.655)		(0.522)		(0.472)
ROA	−0.238***	−0.049	−0.256***	0.347	−0.181***	−0.103	−0.235***	−0.228
	(0.050)	(0.316)	(0.048)	(0.340)	(0.064)	(0.300)	(0.051)	(0.247)
Lev	0.082***	−0.047	0.080***	0.192 **	0.062***	−0.048	0.078***	−0.143**
	(0.018)	(0.057)	(0.019)	(0.083)	(0.013)	(0.056)	(0.018)	(0.065)
Size	0.030***	−0.003	0.032***	0.013	0.010**	−0.017	0.029***	−0.058**
	(0.007)	(0.027)	(0.007)	(0.042)	(0.004)	(0.027)	(0.003)	(0.025)
BM	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.0001***	−0.00004**	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.00003)	(0.000)	(0.001)
Cash holdings	0.376***	0.235	0.361*	1.703 ***	0.098***	0.263	0.356***	−0.540
	(0.071)	(0.203)	(0.071)	(0.559)	(0.020)	(0.227)	(0.080)	(0.368)
Cons	−0.172***	0.575***	−0.203***	0.013	−0.004	0.582***	−0.139***	1.153***
	(0.043)	(0.137)	(0.046)	(0.335)	(0.026)	(0.148)	(0.050)	(0.195)
Obs.	1780	1780	1780	1780	1780	1780	1780	1780
AR (2)	0.126	0.932	0.203	0.312	0.340	0.844	0.131	0.485
Stat.	(1.53)	(0.08)	(1.270)	(−1.01)	(0.960)	(0.200)	(1.510)	(0.700)
Hansen J	0.317	0.224	0.422	0.356	0.250	0.276	0.229	0.499
Stat.	(11.53)	(14.17)	(10.210)	(9.93)	(20.500)	(13.280)	(12.90)	(6.350)
Model efficacy	√	√	√	√	√	√	√	√

Note(s): *, ** and *** represent statistical significance at 10%, 5% and 1%, respectively. √ indicates models are valid

crucial transmission mechanism through which sustainability-related practices influence firm risk.

According to stakeholder theory, firms must navigate the competing interests of various stakeholders while addressing information asymmetries. This dynamic fosters incentives for transparent and accountable reporting (Freeman, 2010). The current findings reinforce this theoretical perspective by demonstrating that firm with higher ESG performance are less inclined to engage in accrual-based EM.

Firms involved in earnings manipulation may experience artificially inflated stock prices, which are often followed by sharp corrections, resulting in heightened RV. In contrast, ESG-focused firms tend to adhere to stronger ethical and governance standards, promoting transparency and reducing the likelihood of manipulative financial practices. The positive and significant association supports this observation between EM and RV, implying that earnings manipulation contributes to greater firm risk. Thus, ESG practices directly reduce risk and indirectly stabilise firm performance by mitigating EM. These findings provide evidence of a partial mediation effect, consistent with prior research by Liu *et al.* (2023) and Xu *et al.* (2025).

4.3 Robustness tests

4.3.1 *One-period lagged explanatory variable.* Examining whether the impact of ESG and its pillars on risk persists over time can serve as a robustness check for the analysis. Therefore, this study re-estimated the baseline models using a one-period lag of the explanatory variables, by replacing the contemporaneous ESG variables with their one-period lagged counterparts (L1.ESG/Pillars). Specifically, the models were re-specified according to Equation (2), replacing the contemporaneous ESG variables with their one-period lagged counterparts (L1.ESG/Pillars). The estimation was conducted using the dynamic system GMM approach. The results are described in Table 8. The diagnostic tests reported in the table indicate that all models incorporating lagged ESG and pillar scores are statistically valid, as evidenced by insignificant AR (2) and Hansen test results.

Table 9 demonstrates that the one-period lagged values of the overall ESG score and its pillars significantly influence stock realised volatility. The results suggest that the effects of the overall ESG score and the Social and Governance pillars persist over time. Notably, the Environmental pillar, which previously showed no significant contemporaneous effect on volatility (as seen in Table 7), now exhibits a significant negative relationship. This delayed impact indicates that environmental performance contributes to risk reduction over a longer horizon. This is consistent with Scholtens (2008), who argues that environmental investments yield long-term benefits that are not immediately reflected in firm risk, particularly in sectors with evolving ESG regulatory environments.

The findings imply that social and governance factors offer immediate operational stability and managerial quality signals. However, environmental initiatives often require high upfront costs and extended implementation periods, leading to delayed recognition in financial markets. This is especially relevant in Australia where resource-intensive sectors such as mining and energy dominate. The growing emphasis on environmental accountability, driven by regulatory bodies and advocacy groups like the Australasian Centre for Corporate Responsibility (ACCR), further amplifies the relevance of long-term environmental risk considerations.

This supports the idea of an information assimilation lag in capital markets. Due to the complexity, uncertainty and longer timeframes associated with environmental issues, investors may take longer to incorporate such information into asset pricing. Overall, the results highlight the importance of adopting a long-term lens when evaluating the risk implications of environmental performance, especially relative to the more immediate effects observed for social and governance factors.

Table 9. Impact of one-period lagged overall ESG and pillar (E, S, G) on firm risk

Dep. Variable	Indep. Variable	ESG	E pillar	S pillar	G pillar
RV	L1.ESG/pillars	-0.004** (0.002)	-0.006* (0.003)	-0.002** (0.001)	-0.010** (0.004)
	ROA	0.267 (0.250)	-0.220 (0.418)	-0.320*** (0.049)	-0.512** (0.211)
	Lev	0.104* (0.062)	0.220* (0.119)	0.015 (0.053)	0.135 (0.089)
	Size	-0.055*** (0.019)	0.011 (0.072)	-0.059*** (0.011)	0.082 (0.060)
	BM	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.002 (0.002)
	Cash holdings	0.523* (0.274)	1.315 (0.920)	-0.175 (0.112)	1.875* (1.060)
	Cons	0.927*** (0.115)	0.272 (0.567)	0.977*** (0.082)	0.067 (0.425)
	Obs.	1,601	1,601	1,601	1,601
	AR (2) Stat.	0.492 (-0.690)	0.332 (-0.970)	0.646 (-0.460)	0.106 (-1.620)
	Hansen J Stat.	0.271 (7.570)	0.542 (6.950)	0.124 (15.220)	0.111 (13.020)
	Model efficacy	√	√	√	√

Note(s): *, ** and *** represent statistical significance at 10%, 5% and 1%, respectively. √ indicates models are valid

4.3.2 Estimation by the panel-corrected standard errors method. To reinforce the robustness of our baseline results (Equation 2), we re-estimate the models using the panel-corrected standard errors (PCSE) method. This approach is adopted as PCSE mitigates serial correlation and cross-sectional dependence (Banna *et al.*, 2021), addresses potential endogeneity through appropriate instrumentation and performs reliably under heteroskedasticity (Beck and Katz, 1995). Table 10 presents the PCSE regression results. The coefficients of the independent variables remain statistically significant and are directionally consistent with those from the GMM estimation, thereby reinforcing the reliability of our findings.

Table 10 provides the estimation results using the PCSE method. The result shows that the ESG score and the S and G pillar score have a significant negative impact on realised volatility, indicating that a firm with a higher ESG score will have lower stock realised volatility, which reinforces the validity of our research findings.

Table 10. Impact of overall ESG and pillars (E, S and G) on firm risk using PCSE method

Dep. Variable	Indep. Variable	ESG	E pillar	S pillar	G pillar
RV	ESG	-0.005*** (0.000)	0.000 (0.000)	-0.004*** (0.000)	-0.004*** (0.000)
	Controls	YES	YES	YES	YES
	Obs	1780	1780	1780	1780
	R-squared	0.2716	0.209	0.248	0.261
	Chi-squared (χ^2)	116.17***	182.840***	86.600***	107.130***

Note(s): *, ** and *** represent statistical significance at 10%, 5% and 1%, respectively. "Yes" represents coefficients with statistical significance at 10% or less

5. Discussion and conclusion

The extant literature remains controversial regarding the financial implications of ESG performance. Our study provides more insights into the literature on ESG–firm risk connection by examining the association between ESG score, each pillar E, S, G and stock volatility of Australian companies. The research results indicate that ESG is negatively associated with stock volatility, suggesting that ESG overall and each dimension score is informative for investors, supporting them in evaluating firm risk. The delayed risk-reducing effect of the E pillar highlights a crucial temporal dynamic: environmental initiatives do not immediately translate into lower firm risk but begin to exert a stabilising influence over time. This is particularly relevant in the Australian context, where carbon-intensive sectors like mining, energy and materials dominate the economy and are often at the centre of ESG scrutiny. While these industries may face increased volatility in the short term due to the high costs of implementing environmental reforms, the long-term benefits are reflected in the lagged reduction in realised volatility. These findings provide more insights related to the influence of individual dimensions of ESG on firm risk.

Additionally, it identifies the mediating role of EM in the ESG–firm risk nexus. Research findings show that ESG scores mitigate firm risk through EM. Specifically, ESG scores can reduce EM and discourage firms from adjusting financial reports, thereby enhancing the transparency of financial information. The study confirms that the mitigating effect of ESG on firm risk can be realised through the mechanism of reducing EM, and EM plays a partial mediating effect in the process of minimising firm risk. This finding is particularly critical in the Australian context, where ESG reporting is rising but remains largely unstandardised. As a result, firms may outwardly project strong ESG credentials while manipulating accrual-based earnings, eroding investor trust and masking underlying financial instability. This is especially concerning in sectors such as real estate, health and energy, which are subject to heightened ESG scrutiny.

The empirical findings offer important practical and managerial implications for investors, firm managers and regulators. First, investors can enhance portfolio performance by using ESG and pillar-level scores as risk signals, focusing on governance and social scores for short-term risk, and environmental scores for long-term resilience. Investors are encouraged to assess ESG impacts at a disaggregated level to avoid mispriced risk. Second, ESG performance brings a potential contribution to risk reduction. Firm managers should recognise that ESG investments are not uniformly effective across all areas. Governance and social initiatives may offer quicker returns in terms of risk reduction, while environmental investments require a long-term strategic approach. ESG strategies, particularly in governance, can be proactively used to manage volatility, providing firms with a tool to improve stability and potentially lower their cost of capital. Finally, for regulators such as the Australian Securities and Investments Commission (ASIC) and the Australian Accounting Standards Board (AASB), these findings highlight the urgent need to integrate earnings quality into ESG evaluation frameworks. Without robust standards for financial transparency, ESG reporting in Australia risks devolving into a superficial compliance exercise rather than serving as a meaningful framework for risk reduction and sustainable performance.

Despite the aforementioned significance, this study has several limitations which may raise further examination for future research. First, future studies could adopt sector-specific ESG frameworks to understand why specific ESG dimensions (like Environmental or Governance) exert different levels of influence in industries like Energy vs. Health. Second, while the study focused on realised volatility, future research could explore credit risk (e.g. default probabilities or spreads). Finally, future work could explore multi-level moderation testing of how corporate governance quality (e.g. board independence, audit

committee effectiveness) interacts with ESG to influence earnings management and, in turn, firm risk.

Supplementary material

The supplementary material for this article can be found online.

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