






“Does ESG performance mitigate earnings management? Evidence from UK takeover targets”

AUTHORS	Ahmed Samaan  Tariq Elrazaz  Diaa Metwally  Elsayed Belal 
ARTICLE INFO	Ahmed Samaan, Tariq Elrazaz, Diaa Metwally and Elsayed Belal (2026). Does ESG performance mitigate earnings management? Evidence from UK takeover targets. <i>Problems and Perspectives in Management</i> , 24(1), 723-740. doi: 10.21511/ppm.24(1).2026.47
DOI	http://dx.doi.org/10.21511/ppm.24(1).2026.47
RELEASED ON	Monday, 30 March 2026
RECEIVED ON	Saturday, 16 August 2025
ACCEPTED ON	Tuesday, 10 February 2026
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

72



NUMBER OF FIGURES

0



NUMBER OF TABLES

9

© The author(s) 2026. This publication is an open access article.



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Type of the article: Research Article

Received on: 16th of August, 2025

Accepted on: 10th of February, 2026

Published on: 30th of March, 2026

© Ahmed Samaan, Tariq Elrazaz, Diaa Metwally, Elsayed Belal, 2026

Ahmed Samaan, Ph.D., Associate Professor, Accounting Department, Faculty of Commerce, Zagazig University, Egypt.

Tariq Elrazaz, Ph.D., Assistant Professor, Accounting Department, College of Business & Economics, United Arab Emirates University, United Arab Emirates. (Corresponding author)

Diaa Metwally, Ph.D., Associate Professor, Department of Accounting, Faculty of Business, Imam Mohammad Ibn Saud Islamic University (IMSIU), Saudi Arabia; Accounting Department, Faculty of Commerce, Zagazig University, Egypt.

Elsayed Belal, Ph.D., Associate Professor, Accounting Department, Faculty of Commerce, Zagazig University, Egypt.



This is an Open Access article, distributed under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

Conflict of interest statement:

Author(s) reported no conflict of interest

Ahmed Samaan (Egypt), Tariq Elrazaz (United Arab Emirates),
Diaa Metwally (Saudi Arabia, Egypt), Elsayed Belal (Egypt)

DOES ESG PERFORMANCE MITIGATE EARNINGS MANAGEMENT? EVIDENCE FROM UK TAKEOVER TARGETS

Abstract

This study examines whether environmental, social, and governance (ESG) performance mitigates earnings management within the setting of corporate takeovers in the United Kingdom. The study utilized a panel dataset of 380 UK takeover targets (1,121 firm-year observations) acquired from 2013 to 2023. We measure accrual-based earnings management using discretionary accruals. The findings reveal that targets manipulate their earnings in the first year with an earnings release prior to the acquisition relative to other periods in the three-year event period under study ($\beta = 0.0168$, $p < 0.10$). Crucially, firms with higher aggregate ESG scores exhibit substantially lower discretionary accruals ($\beta = -0.026$, $p < 0.05$), indicating that strong ESG performance constrains opportunistic reporting. This mitigating effect is driven primarily by the social pillar of ESG ($\beta = -0.00069$, $p < 0.01$). These results indicate that earnings management by takeover targets is concentrated in the period of greatest valuation scrutiny, highlighting the strategic nature of preacquisition reporting behavior. Moreover, our results further suggest that ESG performance, particularly social responsibility, acts as a governance mechanism that constrains managerial opportunism when incentives to manipulate earnings are strongest.

Keywords

ESG, mergers and acquisitions, earnings management, corporate governance, UK

JEL Classification

C31, C33, C36, G34, M41, Q56

INTRODUCTION

Mergers and acquisitions are among the most important events of corporate strategy, as they facilitate rapid growth, economies of scale, and enhanced diversification. Mergers and acquisitions are both a response to and a catalyst for market shifts, competitiveness, and the creation of shareholder value in the UK and globally (Malikov & Zalata, 2025; Tunyi et al., 2024). These corporate events often occur in periods of heightened uncertainty and negotiation pressure, which may create incentives for managers to manipulate earnings to influence reported financial performance. The economic impact of earnings management around mergers and acquisitions can be substantial due to the associated wealth transfers among stakeholders (Malikov & Zalata, 2025; Elrazaz, 2019; Elrazaz et al., 2021; Campa & Hajbaba, 2016; Farooqi et al., 2017). Such behavior is particularly relevant for takeover targets, whose valuation and bargaining position can be affected by the appearance of improved short-term performance. The pre-acquisition years leading up to a takeover are frequently distinguished by heightened managerial discretion, which makes it an essential time to evaluate the integrity and accuracy of financial statements (Botsari & Meeks, 2008, 2018). Accordingly, understanding the integrity of financial reporting in the pre-acquisition period is a matter of practical and academic importance. The economic impact

of earnings management around mergers and acquisitions can be substantial due to the associated wealth transfers among stakeholders. As such, in a given merger and acquisition, both acquirers and targets have strong incentives to manage earnings (Ben-Amar & Missonier-Piera, 2008; Pham et al., 2019; Vasilescu & Millo, 2016; Kim et al., 2022).

In recent years, the rise of environmental, social, and governance (ESG) performance as a measure of corporate responsibility has introduced a new dimension to financial reporting research. More specifically, the relationship between ESG activities and earnings management has emerged as a prominent area of inquiry in the accounting literature. This relationship falls squarely within the accounting literature as it examines how non-financial reporting dimensions, captured through ESG, interact with financial reporting practices such as earnings management, a key concern in accounting research. A few studies in the extant literature examined this relationship (Velte, 2019; Gonçalves et al., 2021; Gaio et al., 2022; Lestari & Muthmainnah, 2025); however, these studies do not investigate this relationship within the context of mergers and acquisitions. Firms with strong ESG profiles are expected to demonstrate higher ethical standards, greater transparency, and enhanced responsiveness to stakeholder expectations. In this study, we dissect ESG into its three pillars, enabling us to assess which dimensions are most closely associated with financial integrity and resilience in periods of heightened scrutiny and duress. Existing research presents conflicting and, at times, inconclusive evidence regarding the link between ESG and earnings management (Gavana et al., 2024; Chouaibi & Zouari, 2022; Kolsi et al., 2023). Whether these attributes translate into improved financial reporting discipline during critical events such as mergers and acquisitions remains insufficiently understood.

The scientific problem addressed in this study concerns the limited and inconclusive evidence regarding the capacity of ESG performance to mitigate earnings management among takeover targets. While managerial incentives to manipulate earnings before an acquisition are theoretically strong, it is unclear whether ESG-oriented firms behave differently. Despite the abundance of studies examining earnings management during takeovers and a growing body of research examining ESG and earnings quality, there is a significant gap in understanding how the various ESG pillars may act as mitigating forces against earnings management behavior, especially in scenarios with heightened financial scrutiny. Moreover, to date, little is known about how these dynamics play out specifically among UK takeover targets, particularly during the years leading up to an acquisition when earnings management is most likely to occur.

1. LITERATURE REVIEW AND HYPOTHESES

Prior research on earnings management in mergers and acquisitions reveals inconsistent and context-dependent findings, influenced by factors such as the nature of the transaction and the method of negotiation (Anagnostopoulou & Tsekrekos, 2015). Davis and Khadivar (2024) and Dokas et al. (2025) have substantiated that earnings inflation prior to mergers by targets continues, despite regulatory efforts to enhance transparency and audit oversight. The diversity of findings underscores the absence of consensus regarding the timing and direction of earnings management by takeover targets. A growing body of literature also examines the role of environmental, social, and governance (ESG)

performance in shaping financial reporting quality. Such ESG factors have gained prominence as indicators reflecting a company's commitment to ethical conduct and sustainable operations. High ESG performance is often linked to enhanced transparency, accountability, and overall long-term value creation. Accordingly, ESG may serve as a governance mechanism constraining earnings management, especially in periods of heightened due diligence and scrutiny, such as mergers and acquisitions. Furthermore, companies with stable ESG performance incur higher reputational costs if discrepancies in behavior, such as earnings manipulation, are exposed, thereby deterring earnings management. Recently, Jin (2025) has underscored the necessity of comprehending the distinct impacts of environmental, social, and governance

actions on financial outcomes. Similarly, Khan et al. (2016) reached the same consensus and brought forward the notion that disaggregating ESG into its different pillars provides a better understanding of how ESG influences financial performance and outcomes.

Although the extant literature extensively covers earnings management during takeovers (Tunyi et al., 2024; Missonier-Piera & Spadetti, 2023; Kim et al., 2022) and is increasingly addressing ESG and earnings quality (Lestari & Muthmainnah, 2025; Rahman et al., 2024), a notable deficiency persists in comprehending how the three distinct ESG pillars, environmental, social, and governance, function as mitigating influences against opportunistic earnings management, especially in mergers and acquisitions. The impact of ESG on mitigating earnings management remains inconclusive. Several studies provide evidence that firms exhibiting superior ESG performance tend to possess enhanced profit quality (Rezaee & Tuo, 2019). Nevertheless, several firms have been alleged to exploit ESG indicators for greenwashing or to distort their financial performance, therefore misleading investors (Chen et al., 2024).

The mixed empirical evidence on earnings management by takeover targets, combined with the unresolved debate surrounding the effectiveness of ESG performance as a disciplining mechanism, points to a clear gap in the literature. From a theoretical perspective, agency theory, stakeholder theory, and legitimacy theory provide important insights into how and why ESG practices may limit management opportunism, especially in the context of takeovers. Agency theory is concerned with various contractual relationships (formal and informal) binding several parties, such as managers, shareholders, employees, stakeholders, etc. According to Jensen and Meckling (1976), managers may behave in an opportunistic manner, undertaking self-serving activities that could be detrimental to the welfare and interests of shareholders. In this vein, and within the context of takeovers, a conflict of interest is apparent between the managers/shareholders of the target and those of the acquiring firm. In addition to agency theory, stakeholder theory, and legitimacy theory provide important insights into how and why ESG practices may limit management opportunism, especially in the context of takeovers.

Accordingly, this study investigates a crucial inquiry: Do ESG commitments signify genuine ethical behavior and institutional rigor, or are they just superficial gestures susceptible to disintegration when short-term profits are threatened (Talpur et al., 2024). We posit that if organizations are genuinely adhering to stakeholder orientation and sustainability principles, we would anticipate reduced attempts at earnings management, even during corporate events such as mergers and acquisitions. Several studies in the extant literature provide evidence supporting the assumptions of stakeholder theory. This evidence confirms that companies that prioritize sustainability are more likely to meet stakeholder expectations, which regard EM practices as unethical and socially intolerable (Vatis et al., 2025). This suggests that managers are incentivized to generate high-quality reports and adhere to more stringent ethical standards, thereby decreasing their involvement in earnings management (Aouadi & Marsat, 2018; Aljifri & Elrazaz, 2024). In the same vein, Jin (2025), Chouaibi and Zouari (2022), and Yoon et al. (2019) find similar evidence that ESG performance scores act as an efficient and effective mitigating tool for earnings management behavior. In light of the above, we posit that according to stakeholder theory, takeover targets with robust ESG performance profiles will exert additional effort to uphold transparent and ethical financial reporting standards, particularly in periods of heightened external scrutiny, such as mergers and acquisitions (Sun et al., 2024).

In summary, prior research provides contradictory evidence on earnings management in takeover settings and limited insight into whether ESG performance, overall or across its individual dimensions, mitigates such behavior. These gaps motivate the present study, which examines whether UK takeover targets engage in accrual-based earnings management prior to acquisition and whether ESG performance, both in aggregate and by pillar, constrains this behavior.

Accordingly, the following hypotheses are proposed:

H1: Takeover targets engage in accrual-based earnings management in the years leading up to the acquisition announcement.

H2: Takeover targets exhibiting stronger ESG performance scores will engage less in accrual-based earnings management during the pre-takeover period.

2. METHODS

This paper utilizes three primary theoretical perspectives to formulate the study hypotheses, namely agency theory, stakeholder theory, and legitimacy theory. Each of these theories offers a distinct lens for analyzing and understanding managerial opportunistic behavior in the context of earnings management and firm-level ESG performance. Based on prior evidence of upward accrual manipulation in takeover contexts, we posit that UK target firms engage in earnings management in the years preceding acquisition (H1). We further propose that ESG performance mitigates this behavior, with stronger ESG profiles expected to constrain such manipulation (H2).

2.1. Sample selection and data collection

This study examines the impact of ESG factors on earnings management using an initial sample of 380 publicly listed UK takeover targets acquired between 2013 and 2023. We obtained relevant merger and acquisition deal information from the London Stock Exchange Group (LSEG) (previously known as Thomson Refinitiv Eikon) database, such as deal value, announcement date, SIC codes, listing status, and method of payment. Furthermore, financial firm-level data to construct our earnings management proxy and various control variables were obtained from the DataStream database. In line with the relevant literature, firms in the financial sector (SIC codes 60–69) are excluded from the sample (Schiemann & Tietmeyer, 2022). Table 1 summa-

rizes the relevant criteria and sample construction process as extracted from the Thomson Refinitiv Eikon database. The dataset used in this study has been deposited in the Zenodo open-access repository (Elrazaz, 2025).

For our sampled UK takeover targets, ESG data were obtained from the LSEG. The LSEG Database determines the ESG score, which ranges from 0 to 100. The minimal score for companies with no ESG performance is 0, and the maximum score for companies with high ESG performance is 100. LSEG scores are unique compared to other providers' ratings since they are computed by the data provider, hence removing the need for researchers to use judgment in score calculation. Similar studies in the literature examining ESG performance use LSEG scores as a metric to assess ESG performance (Yin & Xu, 2025).

This study is based on a final sample of 1,121 firm-year observations for 374 publicly listed UK takeover targets acquired between 2013 and 2023, categorized into 11 industrial categories according to The Refinitiv Business Classifications (TRBC) in LSEG. All continuous variables used in the empirical models and analyses were winsorized at the 1st and 99th percentiles to reduce the impact of extreme values and outliers.

2.2. Variable construction

2.2.1. Dependent variable: Discretionary accruals (Proxy for earnings management)

This study uses accrual-based earnings management as the main proxy for earnings manipulation in takeover targets for numerous significant reasons. Accrual-based earnings management is generally acknowledged as the most direct and

Table 1. Sample collection and data processing

Request	Operator	Description	Number of firms
Target Nation	Include	United Kingdom	121,407
Date announced	Between	2013 to 2023	38,874
Date Effective/Unconditional	Between	2013 to 2023	34,650
Target public status	Include	Public	976
Target Macro Industry	Exclude	Financials	815
Final Consideration Structure	Include	Cash Only, Cash and Stock Combination, Stock Only	580
Deal Status Rollup	Include	Completed	580
Percent of shares held after transaction	Between	50% to High	389
Deal Attitude	Include	Friendly, Hostile	380

obvious indicator of management discretion over reported profits during takeovers (Lalwani & Jain, 2025). Target managers are motivated to use accruals to alter valuations without the operational disturbances or expenses linked to real earnings management, making accrual manipulation both more feasible in acquisition contexts. Secondly, accrual-based earnings management proxies, particularly those derived from well-established models such as the Modified Jones model (Dechow et al., 1995), provide methodological consistency and comparability across firms and event periods (Kothari et al., 2016). According to Zang (2012), however, real earnings management is more difficult to identify and evaluate, especially when companies undergo operational modifications characteristic of mergers and acquisitions. Finally, recent studies examining ESG and earnings management routinely use accrual-based earnings management to investigate this relationship (Yoon et al., 2018), enabling us to contrast this study's findings with prior research.

Consistent with prior studies in the literature (Botsari & Meeks, 2008; Elrazaz, 2019; Aljifri & Elrazaz, 2024), we calculate total accruals using a cash flow methodology as per the Modified Jones Model (Dechow et al., 1995) in its cross-sectional variant (Gonçalves et al., 2021). Discretionary accruals (*DACCs*), our proxy for firm-level earnings management, are estimated as follows:

$$DACC_{ip} = TACC_{ip} / A_{ip-1} - \left[a_{jp} + b_{1jp} \left(\Delta REV_{ip} / A_{ip-1} - \Delta REC_{ip} / A_{ip-1} \right) + b_{2jp} \left(PPE_{ip} / A_{ip-1} \right) \right], \quad (1)$$

where $TACC_{jp}$ is total accruals for estimation portfolio j for firm i in event year p , ΔREV_{jp} is change in revenue (total sales) for estimation portfolio j for firm i in event year p . ΔREC_{jp} is net receivables in year t less net receivables in year $t-1$; while PPE_{jp} is gross property, plant, and equipment.

2.2.2. Independent explanatory variable: Environmental, social, and governance scores (ESG)

The primary independent explanatory variable of concern in this study is overall ESG performance, referred to as *ESG_combined*. ESG performance

measures are sourced from the London Stock Exchange Group (LSEG), which offers a thorough and standardized assessment of corporate ESG policies. The *ESG_combined* score is a composite metric derived from a weighted aggregate of several data points in the environmental, social, and governance sectors, with the weighting system indicating the relative significance of each indicator. *ESG_combined* scores range from 0 to 100, with higher values signifying superior ESG performance among takeover target companies that satisfy LSEG's basic data disclosure criteria. In our empirical analysis, we disaggregate the overall *ESG_combined* metric into its three component dimensions: environmental (*Env_score*), social (*Soc_score*), and governance (*Gov_score*), to analyze their individual impact, if any, on earnings management.

2.2.3. Control variables

Following prior studies in the literature, we include a vector of firm-specific control variables that have been shown to influence the degree of earnings management. The inclusion of these firm-level control variables in the empirical models aims to mitigate any possible endogeneities linked to omitted variables (Gujarati & Porter, 2009). First, we control for target firm size (*Tsize*), measured as the natural logarithm of total assets. Firm size is included as a control variable, as most studies on earnings management find evidence that larger firms face greater scrutiny and can devote more resources to sophisticated earnings manipulation (Adeneye et al., 2024). Second, the market-to-book ratio (*Tmtb*), defined as the market value of common equity divided by the book value of common equity, is included as a control variable to proxy for firm growth opportunities, since the extant literature finds evidence that high-growth firms often face greater incentives and opportunities for earnings management (Banerjee et al., 2024). Sales growth (*Tsgrowth*) is also included as an additional variable to further control for growth dynamics, calculated as one-year growth in sales.

Third, return on assets (*Troa*), calculated as net income before extraordinary items divided by lagged total assets, is included as a measure of profitability since prior studies in the literature find evidence indicating that less profitable firms may be more

inclined to manipulate earnings (Drempetic et al., 2020). Fourth, firm leverage (*Tlvrgr*) is included as a control variable and calculated as the ratio between total debts and total assets. Prior studies in the literature find evidence that highly leveraged firms manage their earnings upwards, resulting in high abnormal accruals as an attempt to avoid violating debt covenants (Bassiouny, 2016). Fifth, firm age (*Tage*) calculated as the numbers of years from the date of incorporation to the acquisition year is included to control for firm maturity (Pasko et al., 2021). Sixth, we also include a binary loss indicator (*Tloss*), which takes the value of 1 if a firm reports a net loss, 0 otherwise. Firms incurring losses are more likely to manipulate earnings to meet earnings thresholds or avoid negative market judgments (Yami et al., 2023; Bansal, 2024).

Finally, we add the proportion of independent directors (*Tindp*) and proportion of female directors (*Tfml*) to control for board effectiveness and board gender diversity, respectively (Srinidhi et al., 2011; Peni & Vähämaa, 2010). Recent studies indicate that boards with a higher proportion of independent directors are more successful in mitigating opportunistic financial reporting, particularly in high-stakes corporate events such as mergers and acquisitions (Chen et al., 2015).

2.3. Empirical model specifications

2.3.1. Takeover targets accrual-based earnings management

To examine our first research hypothesis positing that takeover targets manage their earnings via accruals (DACCs) in the years preceding the acquisition announcement (H1), we employ an OLS regression framework (Equation 2), while explicitly accounting for other determinants of firms' earnings management behavior. The baseline model is delineated in Equation (2). Following Elrazaz et al. (2021) and Malikov and Zalata (2025), all OLS regressions are estimated while clustering at the 'target' firm level. This methodological aspect allows us to address heteroskedasticity and serial correlation concerns in our models. Furthermore, industry and year dummies are included in the OLS regressions to account for industry and time-fixed effects (Petersen, 2009). We do not report industry and year fixed effects for the sake of brevity.

$$\begin{aligned}
 DAACs_{it} = & \beta_0 + \beta_1 Pre_Takeover_2_{it} \\
 & + \beta_2 Pre_Takeover_1_{it} \\
 & + \beta_3 Takeover_Year_{it} + \beta_4 Controls_{it} + \varepsilon_{it},
 \end{aligned} \tag{2}$$

where $DAACs_{it}$ is discretionary accruals for target firm i in year t as calculated from the Modified Jones model (Dechow et al., 1995). $Pre_Takeover_2_{it}$ is a dummy variable equal to 1 if year t is two years prior to the acquisition, zero otherwise. $Pre_Takeover_1_{it}$ is a dummy variable equal to 1 if year t is one year prior to the acquisition, zero otherwise; while $Takeover_Year_{it}$ is a dummy variable equal to 1 if year t is the acquisition year, zero otherwise. $Controls_{it}$ is a vector of firm-level control variables. ε_{it} is the random error term.

Our main explanatory variables of interest are the three time-indexed dummy variables: $Pre_Takeover_2$, $Pre_Takeover_1$, and $Takeover_Year$, which mark the timeline of each target firm's acquisition. More specifically, the coefficients β_1 , β_2 , and β_3 capture variations in discretionary accruals over the two years before the acquisition and in the acquisition year, respectively. If any of these coefficients are positive and statistically significant, the findings would corroborate hypothesis H1, suggesting that takeover targets engage in earnings management in the periods preceding an acquisition. The individual magnitude and significance of each coefficient will indicate in which specific year(s) earnings management is most pronounced for the targets in our sample.

2.3.2. ESG performance and earnings management in takeover targets

In testing our second hypothesis (H2) positing that takeover targets with higher ESG performance scores will engage less in accrual-based earnings management during the pre-takeover period, we employ two baseline fixed effects regression models, specifically equation (3) and equation (4). The dependent variable in all models is discretionary accruals (DACCs), our proxy for accrual-based earnings management. Equation (3) evaluates the relationship between a target firm's ESG performance and the extent of accrual-based EM. In this specification, ESG in equation (3) is operational-

ized in two ways, where we first run the regression with the aggregated *ESG_combined* score as the primary explanatory variable of interest. Second, equation (3) is run separately for the individual ESG pillars, namely, *Env_score*, *Soc_score*, and *Gov_score*.

$$DAACs_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Controls_{it} + \varepsilon_{it}, \quad (3)$$

where $DAACs_{it}$ is discretionary accruals for target firm i in year t . ESG_{it} denotes the ESG performance of target firm i in year t ; it is first operationalized using *ESG_combined* as the main independent variable in the model, followed by the use of the three distinct ESG pillars. $Controls_{it}$ is a vector of firm-level control variables. ε_{it} is the random error term.

In this model, a statistically significant negative β_1 coefficient would support our second hypothesis (H2), indicating that takeover targets firms with higher ESG scores exhibit lower levels of earnings management. When extending the model to include the individual ESG pillars, the β coefficients would measure the separate impacts of environmental, social, and governance performance, respectively. Negative and significant estimates for these coefficients would imply that each ESG pillar independently contributes to constraining earnings management, providing nuanced support for H2.

As a final stage, equation (4) builds on equations (2) and (3) and assesses the moderation effect of a takeover target's ESG performance on the variation in earnings management during takeovers. We examine whether high-ESG firms have a distinct accruals pattern prior to, and throughout the acquisition, in contrast to low-ESG firms. Similar to equation (3), we estimate this moderation model twice; once using the *ESG_combined* score, and again using the three pillar scores in place of the single ESG term (with each pillar score interacted with the takeover timing dummies as stipulated in equation (2)). In all our models, we use firm-level standard error clustering at the target firm level to mitigate concerns of heteroskedasticity and serial correlation, while including industry and year fixed effects to further diminish any omitted variable biases.

$$\begin{aligned} DAACs_{it} = & \beta_0 + \beta_1 Pre_Takeover_2_{it} \\ & + \beta_2 Pre_Takeover_1_{it} \\ & + \beta_3 Takeover_Year_{it} + \beta_4 ESG_{it} \\ & + \beta_5 (Pre_Takeover_2_{it} \cdot ESG_{it}) \\ & + \beta_6 (Pre_Takeover_1_{it} \cdot ESG_{it}) \\ & + \beta_7 (Takeover_Year_{it} \cdot ESG_{it}) \\ & + \beta_8 Controls_{it} + \varepsilon_{it}, \end{aligned} \quad (4)$$

3. RESULTS AND DISCUSSION

Panel A of Table 2 presents the distribution of target firms in our sample by industry, Panel B presents the distribution of deals by year for the period 2013 to 2023, while Panel C shows the distribution of the sample across the years according to the method of payment. The distribution of targets per industry is according to The Refinitiv Business Classifications (TRBC) in LSEG. Overall, 11 industry sectors are represented in the sample, where such industry groupings will be used to estimate discretionary accruals according to the cross-sectional earnings management model used in the study. Distributions reported in Panel A of Table 2 indicate that the targets making up the sample span across numerous industries, with the greatest concentration of firms represented in the high technology sector, precisely 86 firms constituting 22.99% of the total sample. This is followed by consumer products and services (12.03%), industrials (11.23%), and healthcare (9.89%), with the telecommunications sector least represented, comprising only 1.87% of the sample.

Panel B of Table 2 presents the distribution of deals by year for the period 2013 to 2023. The largest concentration of takeovers is in 2019, which accounts for 14.44% of the sample. Other years with relatively high merger and acquisition activity include 2018 (9.63%), 2014 (9.36%), and 2015 (9.36%). The lowest deal volumes occurred in 2017 and 2023, each with 6.95% of the total deals. In terms of the consideration structure used in the deal, Panel C of Table 2 shows the distribution of the sample across the years according to the method of payment (Cash only deals/Stock-for-Stock deals/Mixed payment deals). As shown in Panel C, 81.50% of the deals are financed purely by cash, 10.70% of the deals are stock-for-stock, and the re-

Table 2. Takeover targets distributions by industry, acquisition year, and method of payment

Panel A: Industry Distribution of Targets			Panel B: Deals Distribution by Year		
Target Industry	Freq.	%	Acquisition Year	Freq.	%
Consumer Products and Services	45	12.03	2013	31	8.29
Consumer Staples	16	4.28	2014	35	9.36
Energy and Power	33	8.82	2015	35	9.36
Healthcare	37	9.89	2016	33	8.82
High Technology	86	22.99	2017	26	6.95
Industrials	42	11.23	2018	36	9.63
Materials	27	7.22	2019	54	14.44
Media and Entertainment	30	8.02	2020	32	8.56
Real Estate	27	7.22	2021	34	9.09
Retail	24	6.42	2022	32	8.56
Telecommunications	7	1.87	2023	26	6.95
Total	374	100%	Total	374	100%

Panel C: Distribution of targets by year and consideration structure				
Acquisition year	Cash	Cash and stock	Stock	Total
2013	24	4	3	31
2014	26	4	5	35
2015	27	4	4	35
2016	27	3	3	33
2017	20	3	3	26
2018	31	4	1	36
2019	45	1	8	54
2020	27	1	4	32
2021	31	1	2	34
2022	24	4	4	32
2023	23	0	3	26
Total	305 (81.5%)	29 (7.8%)	40 (10.7%)	374 (100%)

maining 7.80% are financed by a combination of cash and stock. The finance literature has extensively documented the predominance of cash consideration in mergers and acquisitions (Faccio & Masulis, 2005).

Table 3 reports the summary statistics for all continuous variables employed in the empirical analysis. The primary explanatory variables, ESG_combined, Env_score, Soc_score, and Gov_score have mean values of 44.27%, 37.80%, 46.81%, and 46.45%, respectively, on a scale ranging from zero to 100%. These scores indicate considerable variation in corporate ESG performance among the target firms in our sample, which is consistent with prior studies (Taliento et al., 2019; Kotzian, 2024; Tohang et al., 2024; Sun et al., 2024; Gavana et al., 2024). The disparity between the minimum and maximum values of various ESG proxies may be ascribed to the differing degrees of preparedness across UK takeover targets in our sample to implement corporate ESG performance initiatives (Guerrero & Viteri, 2025). Focusing on the dif-

ferent ESG pillars, the reported scores show that firms in the sample tend to achieve higher performance levels in social and governance dimensions (means of 46.81 and 46.45, respectively) than in the environmental dimension (mean = 37.80), echoing the patterns reported by García-Sánchez and García-Meca (2017), who find that firms often prioritize governance and social initiatives over environmental disclosures.

In our sample of UK targets, the mean value of discretionary accruals (DACCs), our proxy for accruals earnings management, is zero, with a standard deviation of 0.12 and values ranging from -0.50 to 0.36. This distribution suggests that while some targets engage in income-increasing strategies, others adopt income-decreasing practices, consistent with prior studies in the literature reporting similarly centered discretionary accruals, while also underscoring the heterogeneous nature of earnings management across firms (Gokhale & Pillai, 2024; Kothari et al., 2005). In terms of control variables, the mean return on assets (Troa) of

Table 3. Descriptive statistics

No.	Variables	N	Mean	SD	Min	Max	75 th Percentile	95 th Percentile
1	DACCs	1,121	0	0.12	-0.50	0.36	0.06	0.17
2	ESG combined	1,121	44.27	17.57	2.76	86.77	56.55	75.23
3	Env score	1,121	37.80	23.76	0	95.95	52.46	81.63
4	Soc score	1,121	46.81	20.22	3.67	92.49	59.23	82.62
5	Gov score	1,121	46.45	20.80	1.97	95.46	62.6	82.86
6	Troa	1,121	-0.04	0.20	-1.28	0.27	0.05	0.15
7	Tsize	1,121	12.11	1.99	7.94	16.66	13.65	15.36
8	Tmtb	1,121	1.88	3.81	-22.92	16.29	2.71	6.67
9	Tlvrg	1,121	0.21	0.21	0	1.07	0.33	0.57
10	Tsgrowth	1,121	0.13	0.65	-1	5.02	0.18	0.68
11	Tloss	1,121	0.37	0.48	0	1	1	1
12	Tage	1,121	26.51	26.64	2.00	124.00	30	98
13	Tindp	1,121	57.53	16.94	0	100.00	66.67	86.67
14	Tfml	1,121	21.16	13.16	0	71.43	28.57	44.44

-0.04 and a loss frequency (Tloss) of 37% indicate relatively weak profitability among our sample of takeover targets. This finding is in line with prior research indicating that less profitable, or loss-making firms, are more prone to be targets of acquisitions and may have greater incentives to manipulate earnings (Vasilescu & Millo, 2016; Elrazaz et al., 2021). Board structure is characterized by a mean of 57.5% independent directors and 21.2% female directors, consistent with recent evidence of rising board diversity in Europe (Dutordoir et al., 2024). These results are aligned with the broader earnings management and ESG literature, reinforcing the appropriateness of the selected controls and the representativeness of our sample.

Table 4 presents the results for the Pearson correlation matrix among the variables used in our study. The overall ESG score displays an insignificant correlation with DACCs (0.11), suggesting that, at the aggregate level, ESG performance does not exhibit a straightforward influence on earnings management behavior in our sample, warranting a more granular multivariate regression analysis. The robust positive correlations across ESG and its components indicate that companies often exhibit consistent performance across all ESG dimensions, consistent with other studies in the literature (Velte, 2019; Almubarak et al., 2023). However, this does not raise multicollinearity concerns since we use the *ESG_combined* score and each of its pillars as separate individual dependent variables in our empirical models.

Table 4. Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DACCs	1													
ESG_combined	0.11	1												
Env score	0.14	0.82*	1											
Soc score	0.02	0.89*	0.69*	1										
Gov score	0.10	0.73*	0.37*	0.47*	1									
Troa	0.58*	0.10	0.16*	0.02	0.06	1								
Tsize	0.08	0.47*	0.43*	0.47*	0.32*	0.22*	1							
Tmtb	0.03	-0.05	-0.09	-0.02	-0.01	0.02	0.03	1						
Tlvrg	-0.33*	0.07	-0.02	0.04	0.08	-0.29*	0.26*	-0.01	1					
Tsgrowth	0.03	-0.05	-0.10	-0.02	-0.02	0.00	-0.03	0.00	-0.02	1				
Tloss	-0.33*	-0.02	-0.01	-0.01	0.01	-0.42*	-0.25*	-0.01	0.04	0.03	1			
Tage	0.10*	0.29*	0.23*	0.31*	0.17*	0.13*	0.14*	-0.05	-0.03	-0.05	-0.12*	1		
Tindp	0.10	0.25*	0.10	0.15*	0.38*	0.11	0.26*	-0.06	0.02	0.02	-0.05	0.07	1	
Tfml	0.03	0.31*	0.18*	0.19*	0.39*	-0.21*	0.18*	0.07	0.14*	0.03	0.09	0.07	0.28*	1

Note: Pearson Correlation Matrix for key variables for firm-year observations. *, **, *** indicate 10%, 5%, and 1% levels of significance, respectively.

Our primary variable of interest, DACCs (discretionary accruals), shows a moderate positive correlation with Troa (0.58), suggesting that more profitable firms are more inclined to manage their earnings (Jamadar et al., 2022). DACCs also display a significant negative association with Tlvrg (-0.33) and Tloss (-0.33), indicating that higher leverage and loss reporting are related to diminishing discretionary accruals, a pattern aligned with findings that financial constraints and subpar performance limit managerial discretion (Burgstahler & Dichev, 1997).

3.1. Multivariate analysis results and discussion

Model (1) examined whether discretionary accruals increase in the years preceding a takeover, capturing the timing of earnings management. Model (2) assessed the relationship between ESG performance, both overall and by pillar, and earnings management. Model (3) explored whether ESG moderates earnings management across the pre-takeover period.

3.1.1. Multivariate analysis of baseline earnings management

Table 5 presents the results from estimating the multiple regression model specified in equation (1), where discretionary accruals (DACCs), derived from the cross-sectional modified-Jones model, serve as the proxy for accrual-based earnings management. The findings indicate that, among the main explanatory variables (*Pre_Takeover_2*, *Pre_Takeover_1*, *Takeover_Year*), only coefficient β_2 is statistically significant for our sample of takeover targets. This result suggests that target firms engage in earnings management during the first year with an earnings release preceding the acquisition, compared with other periods in the three-year event window, validating our first baseline earnings management hypothesis (H1). More specifically, the coefficient β_2 on the explanatory variable *Pre_Takeover_1* (column 2) is positive and statistically significant at the 10% level of significance (0.01683, $p < 0.10$). These results are consistent with prior studies in the literature indicating that takeover targets manage their earnings upwards in the period(s) leading up to the acquisition year (Campa & Hajbaba, 2016; Davis & Khadivar, 2024; Elrazaz et al., 2021).

Regarding the control variables, the results broadly align with those reported in the extant literature.

Table 5. Baseline takeover targets earnings management

Variables	(1) DACCs	(2) DACCs	(3) DACCs
Takeover_t2	-0.01423 (0.00938)		
Takeover_t1		0.01683* (0.00916)	
Takeover_t			-0.00519 (0.0116)
Tsize	-0.00204 (0.0027)	-0.00188 (0.0027)	-0.00201 (0.00271)
Tlvrg	-0.02882 (0.02581)	-0.02836 (0.02579)	-0.02994 (0.02584)
Troa	0.26023*** (0.03504)	0.25948*** (0.03502)	0.25944*** (0.0351)
Tmtb	0.00166 (0.00138)	0.00168 (0.00137)	0.00163 (0.00138)
Tsgrowth	-0.00785 (0.00781)	-0.00822 (0.00779)	-0.0086 (0.00782)
Tloss	-0.02752** (0.01137)	-0.02677** (0.01136)	-0.02695** (0.0114)
Tage	0.00039** (0.00017)	0.00039** (0.00017)	0.00039** (0.00017)
Tindp	(0.00040) (0.00039)	(0.00033) (0.00039)	0.00042 (0.00019)
Tfml	(-0.00107)** (0.00052)	(-0.00102)* (0.00053)	0.00038* (0.00040)
Constant	0.12323*** (0.03736)	0.10709*** (0.03622)	0.10882*** (0.0363)
Observations	1,121	1,121	1,121
R-squared	0.20625	0.20752	0.20377
Adj R ²	0.18262	0.18393	0.18007
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: Robust standard errors clustered at the target firm level are in parentheses. (*, **, and ***) represent significance levels of 0.10, 0.05, and 0.01, respectively.

3.1.2. Multivariate analysis of baseline ESG and earnings management

Table 6 presents results of the multivariate baseline analysis between *ESG_combined*, in addition to each of its individual pillars (*Env_score*, *Soc_score*, *Gov_score*), and takeover targets' accrual earnings management, as proxied by discretionary accruals calculated from the Modified Jones model (Dechow et al., 1995). For robustness, we also run our models using an alternative measure of accrual earnings man-

agement using Kothari et al.'s (2005) specification. It is noted that the ROA control variable (Troa) is eliminated from the models when accruals, as derived from Kothari et al.'s (2005) model, are used as the independent variable. As shown in column (1), the coefficient on the main *ESG_combined* explanatory variable is negative and statistically significant ($-0.026, p < 0.05$). Column (2) displays similar results when we use an alternative accrual earnings management proxy as derived from Kothari et al.'s

(2025) model, where the main *ESG_combined* explanatory variable is still negative and statistically significant ($-0.025, p < 0.05$). These findings suggest that discretionary accruals are lower in UK takeover target firms with higher ESG performance, even after controlling for various firm characteristics.

Overall, these results support our second hypothesis (H2), indicating that takeover target firms with higher ESG scores exhibit lower levels of earnings

Table 6. Relationship between ESG and the takeover target's earnings management

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DACCs	Kothari Accruals	DACCs	Kothari Accruals	DACCs	Kothari Accruals	DACCs	Kothari Accruals
ESG_combined	-0.02635** (-2.29693)	-0.02538** (-2.29109)						
Env_score			-0.00002 (-0.07536)	0.00004 (0.21982)				
Soc_score					-0.00069*** (-2.82695)	-0.00067*** (-2.83963)		
Gov_score							-0.00031 (-1.2127)	-0.00031 (-1.25771)
Tsize	0.01622*** (4.33385)	0.01813*** (5.0152)	0.01329*** (3.39879)	0.01484*** (3.93283)	0.01792*** (4.58796)	0.01977*** (5.24487)	0.01417*** (3.91162)	0.01618*** (4.62684)
Tlvrg	-0.03332 (-1.61421)	-0.02644 (-1.3264)	-0.03204 (-1.52701)	-0.02468 (-1.21848)	-0.03571* (-1.73359)	-0.02866 (-1.44179)	-0.03165 (-1.5181)	-0.02478 (-1.23114)
Troa	0.32091*** (6.63602)		0.30737*** (6.30249)		0.30847*** (6.44942)		0.3192*** (6.48365)	
Tmtb	-0.00104 (-1.02612)	-0.00084 (-0.862)	-0.00109 (-1.06571)	-0.00088 (-0.88485)	-0.00078 (-0.77278)	-0.00059 (-0.60528)	-0.00106 (-1.04012)	-0.00086 (-0.87566)
Tsgrowth	-0.03532* (-1.96348)	-0.00607 (-0.3496)	-0.03081* (-1.67908)	-0.00086 (-0.04836)	-0.03539** (-1.98108)	-0.00614 (-0.35635)	-0.03004* (-1.66407)	-0.00096 (-0.05484)
Tloss	-0.03046** (-2.57271)	-0.02841** (-2.48449)	-0.03231*** (-2.67909)	-0.03048*** (-2.61901)	-0.03229*** (-2.73094)	-0.03027*** (-2.65259)	-0.0299** (-2.49346)	-0.02781** (-2.40274)
Tage	0.00023 (1.55691)	0.00027* (1.91217)	0.00018 (1.25031)	0.00022 (1.59232)	0.00028* (1.89031)	0.00032** (2.25202)	0.00019 (1.28304)	0.00023 (1.64362)
Tindp	0.00021 (0.72962)	0.00017 (0.60289)	0.00007 (0.23072)	0.00003 (0.10226)	0.00013 (0.44422)	0.00009 (0.31057)	0.00022 (0.71284)	0.00018 (0.61006)
Tfml	-0.00025 (-0.64113)	-0.00038 (-1.01827)	-0.00041 (-1.03493)	-0.00055 (-1.44329)	-0.00036 (-0.94102)	-0.00048 (-1.31299)	-0.00031 (-0.76206)	-0.00043 (-1.11158)
Constant	-0.1198** (-2.36682)	-0.15687*** (-3.20972)	-0.16372*** (-3.32375)	-0.19491*** (-4.09994)	-0.20282*** (-4.183)	-0.23682*** (-5.06125)	-0.1735*** (-3.6616)	-0.2089*** (-4.56713)
Observations	1,121	1,121	1,121	1,121	1,121	1,121	1,121	1,121
Adjusted R ²	0.39478	0.23314	0.38155	0.21375	0.4035	0.24175	0.38429	0.22034
F-stat	15.8722	7.93182	15.00456	7.17131	16.35531	8.23747	15.23016	7.44342
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: t-statistics (in parentheses) are calculated using robust standard errors clustered at the target firm level. (*, **, and ***) represent significance levels of 0.10, 0.05, and 0.01, respectively.

management. This discovery reinforces the notion in the extant literature that a strong ESG framework is correlated with more transparent financial reporting (Almubarak et al., 2023; Tohang et al., 2024). Our results are consistent with recent studies in the literature documenting a negative relationship between ESG and earnings management (Cho et al., 2015; Vatis et al., 2025).

Turning to the three individual ESG pillars, results reported across columns (3)–(8) indicate that the social dimension (*Soc_score*) is the only pillar displaying a negative and statistically significant coefficient when using DACCs as the independent variable (column 5) (-0.00069 , $p < 0.01$). Reported results are robust to using an alternative measure of earnings management (Kothari Accruals), displaying a negative and statistically significant coefficient (column 6) (-0.00067 , $p < 0.01$). These results indicate that takeover targets with enhanced social responsibility performance are less inclined to manipulate their earnings, as compared to their counterparts. Apparently, the social dimension appears to be the main driver behind the ESG-earnings management relationship nexus in our sample of takeover targets. Examining the control variables across all models in Table 6, the results are largely in line with those documented in the existing literature.

3.1.3. Multivariate analysis of ESG dimensions as moderators of earnings management

Building on the findings reported in Tables 5 and 6, which indicate that takeover targets in our sample engage in income-increasing accrual-based earnings management, we examine whether environmental, social, and governance (ESG) performance mitigates such instances of accrual-based earnings management. By interacting the time-based takeover dummy (*Takeover_t*) with ESG variables, we provide further robustness for testing our second hypothesis (H2), and evaluate whether high-ESG targets are less likely to engage in earnings management before an acquisition, specifically in the first year prior to acquisition. Table 7 presents the results of this multivariate analysis. Column (1) of Table 7 examines the moderating effect of our overall ESG performance proxy (*ESG_combined*) on takeover targets' accrual

earnings management, specifically in the first year prior to acquisition (*Takeover_{t1}*). The coefficient for the *Takeover_{t1}* variable is positive and statistically significant (0.05681 , $p < 0.01$), indicating that discretionary accruals are significantly higher in the year immediately preceding a takeover, providing further robustness to our results (Table 5). This result also implies that accruals manipulation is elevated in comparison to other years surrounding the takeover announcement, including the acquisition year itself (*Takeover_t*) and the second year before the acquisition (*Takeover_{t2}*).

These findings align with prior research showing that takeover targets tend to manage earnings upward in the period(s) preceding the acquisition year (Campa & Hajbaba, 2016; Davis & Khadivar, 2024; Elrazaz et al., 2021). More importantly, the interaction term *ESG_Prel*, which captures the moderating impact of ESG on earnings management, specifically in the year prior to the takeover, is negative and statistically significant (-0.00122 , $p < 0.01$). This finding provides evidence suggesting that takeover targets with higher ESG performance scores, in contrast to their counterparts, are less inclined to manipulate their earnings in the pre-takeover year. This finding highlights the moderating effect of ESG on accrual earnings management, further validating our second hypothesis (H2).

Turning to column (2) in Table 7, replacing the combined *ESG_combined* score with *Soc_score*, our proxy for the social performance dimension, we find a negative and statistically significant coefficient (-0.00067 , $p < 0.05$) for our interaction variable. This result indicates that takeover targets with high *Soc_score* performance exhibit lower discretionary accruals in the first year preceding the acquisition, as compared to their counterparts, thus providing further robustness to our findings (Table 6). This moderating effect highlights the unique role of the social pillar in mitigating accrual earnings management. Collectively, our findings indicate that UK takeover targets adopt income-increasing accruals earnings management in the first year prior to the acquisition; nevertheless, robust ESG performance, particularly in the social dimension, mitigates this tendency.

Table 7. Moderating effect of ESG on earnings management

Variables	(1) ESG	(2) Soc_score
	DACCs	DACCs
Takeover_t1	0.05681*** (0.01768)	0.02925* (0.01636)
ESG_combined	-0.00070* (0.00037)	
ESG_Pre1	-0.00122*** (0.00035)	
Soc_score		-0.00108* (0.00065)
Soc_Pre1		-0.00067** (0.00030)
Troa	0.41715*** (0.06444)	0.39786*** (0.06487)
Tsize	0.04732* (0.02726)	0.02359 (0.02781)
Tmtb	-0.00273 (0.00193)	-0.00246 (0.00199)
Tlvrg	-0.03333 (0.07793)	-0.02652 (0.08185)
Tsgrowth	-0.05212*** (0.01749)	-0.05579*** (0.01844)
Tloss	-0.03508*** (0.01247)	-0.03034** (0.01249)
Tage	0.00023 (0.00014)	0.00032 (0.00015)
Tindp	-0.00027 (0.00060)	0.00006 (0.00063)
Tfml	-0.00015 (0.00066)	-0.00096 (0.00076)
Constant	-0.61370 (0.37774)	-0.15937 (0.39600)
Observations	1,121	1,121
F-stat	13.34321	7.45922
Adj R ²	0.09443	0.11708
Industry FE	Yes	Yes
Year FE	Yes	Yes

Note: Robust standard errors clustered at the target firm level are in parentheses. (*, **, and ***) represent significance levels of 0.10, 0.05, and 0.01, respectively.

3.2. Additional analysis and robustness checks

3.2.1. Heterogeneity control of ESG-earnings management using quantile regression (QR)

In response to recent studies in the extant literature that question the excessive reliance on linear models in examining the relationship between ESG and earnings management, which presume a uniform effect of ESG across all levels of earn-

ings management activity, we conduct a robustness check using a quantile regression approach (Usman et al., 2022). We run quantile regressions aiming to capture the differential effects of ESG across different quantiles of earnings management, specifically the 25th, 50th, and 75th percentiles. Table 8 provides further robustness checks on our baseline OLS regression results previously displayed in Table 6, which examine the relationship between ESG and earnings management. We find that the impact of ESG on earnings management is consistently negative across all quantiles, albeit with varying degrees of significance. All control variables retain their statistical inferences as previously reported.

3.2.2. Endogeneity concerns

Several studies in the literature examining the ESG-earnings management relationship nexus have highlighted concerns regarding the presence of endogeneity between the two variables (Choi et al., 2018; Kolsi et al., 2023; Velte, 2019; Chouaibi & Zouari, 2022). Therefore, we take into consideration whether the findings from our main analysis may have been driven by endogeneity issues. Our main baseline OLS models treat ESG and earnings management as exogenously determined; however, we recognize that the relationship between these variables may be subject to endogeneity. Accordingly, in order to address this issue and control for endogeneity, we conduct several tests. Following Aljifri and Elrazaz (2024), we employ a two-stage least squares (2SLS) regression and run post-estimation tests for endogeneity and over-identifying restrictions. The results of these tests are presented in Table 9. More specifically, we run the Durbin–Wu–Hausman (Hausman, 1978) test for endogeneity under the null hypothesis that the relationship between ESG and earnings management is exogenous. Rejecting the null hypothesis would imply that the relationship between these two variables is endogenous, and vice versa. Results of the Durbin–Wu–Hausman test, as displayed in Table 9, indicate that the null hypothesis is not rejected; as such, we can safely posit that ESG and earnings management are not endogenously determined. We further extend our robustness and endogeneity checks by testing for over-identifying restrictions in the 2SLS estimation. To

Table 8. ESG-earnings management, quantile regression (QR)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	DACCs	DACCs	DACCs	Kothari Accruals	Kothari Accruals	Kothari Accruals
	25 th Percentile	50 th Percentile	75 th Percentile	25 th Percentile	50 th Percentile	75 th Percentile
ESG_combined	-0.01684 (0.01633)	-0.03546*** (0.01279)	-0.02220* (0.01283)	-0.01953 (0.01627)	-0.02540** (0.01104)	-0.03349** (0.01350)
Tsize	0.01899*** (0.00533)	0.01617*** (0.00417)	0.01311*** (0.00419)	0.02362*** (0.00531)	0.01854*** (0.00360)	0.00878** (0.00440)
Tlvrg	0.00490 (0.02938)	-0.02084 (0.02301)	-0.02086 (0.02308)	-0.01584 (0.02928)	-0.02416 (0.01986)	0.00614 (0.02428)
Troa	0.40799*** (0.06883)	0.28173*** (0.05390)	0.28231*** (0.05408)	-0.14840** (0.06859)	-0.31841*** (0.04653)	-0.31075*** (0.05689)
Tmtb	-0.00099 (0.00144)	-0.00149 (0.00113)	0.00012 (0.00113)	-0.00148 (0.00144)	-0.00103 (0.00097)	-0.00112 (0.00119)
Tsgrowth	-0.04054 (0.02560)	-0.05057** (0.02005)	-0.04073** (0.02012)	-0.01655 (0.02552)	-0.02561 (0.01731)	-0.01653 (0.02116)
Tloss	-0.03102* (0.01685)	-0.02698** (0.01320)	-0.02307* (0.01324)	-0.01901 (0.01680)	-0.02370** (0.01139)	-0.02441* (0.01393)
Tage	0.00026 (0.00021)	0.00028* (0.00016)	0.00053*** (0.00016)	0.00029 (0.00020)	0.00030** (0.00014)	0.00023 (0.00017)
Tindp	0.00027 (0.00042)	0.00036 (0.00033)	-0.00004 (0.00033)	0.00006 (0.00042)	0.00012 (0.00028)	-0.00010 (0.00034)
Tfml	-0.00028 (0.00056)	-0.00026 (0.00044)	-0.00056 (0.00044)	-0.00040 (0.00056)	-0.00019 (0.00038)	-0.00028 (0.00046)
Constant	-0.24233*** (0.07204)	-0.09790* (0.05641)	-0.05416 (0.05660)	-0.28992*** (0.07179)	-0.16638*** (0.04870)	0.04391 (0.05955)
Observations	1,121	1,121	1,121	1,121	1,121	1,121
Pseudo R ²	0.27382	0.21849	0.16442	0.19978	0.11897	0.10119

Note: Standard errors are in parentheses. (*, **, and ***) represent significance levels of 0.10, 0.05, and 0.01, respectively.

assess whether the instrumental variables (IVs) are correlated with the error term, we employ Basman’s (1960) specification test. As shown in Table 9, the results confirm the validity of the IVs used in the 2SLS model, suggesting that endogeneity does not pose a concern for our estimates.

Table 9. Endogeneity tests

Specification Tests	Values	
Durbin (score) chi ²	F = 0.11	p-value = 0.7357
Wu-Hausman	F = 0.10	p-value = 0.7448
Sargan (score) chi ²	X ² = 3.31	p-value = 0.3458
Basman (score) chi ²	X ² = 3.10	p-value = 0.3751

CONCLUSION

This study uses a comprehensive sample of UK publicly listed takeover targets acquired between 2013 and 2023 to examine the relationship between earnings management and environmental, social, and governance (ESG) performance in the context of corporate takeovers in the United Kingdom. The study also examines whether ESG performance, disaggregated into environmental, social, and governance dimensions, acts as a mitigating factor against such opportunistic behavior. Our findings reveal that takeover targets manipulate their earnings in the first year with an earnings release prior to the acquisition, relative to other periods. More importantly, our results also indicate that robust ESG performance, particularly in the social dimension, mitigates this tendency. Theoretically, our findings demonstrate that the ESG social dimension functions as an effective mitigating mechanism that curbs agency problems in takeover situations. Furthermore, in line with stakeholder and legitimacy theories, our findings indicate that socially responsible takeover targets would be less inclined to manage their earnings prior

to an acquisition to maintain their legitimacy. Taken together, these findings demonstrate that ESG performance is not merely symbolic but functions as an effective constraint on opportunistic earnings management in high-incentive takeover settings.

The main findings of this study also carry important practical and theoretical implications. ESG performance can serve as an ethical and governance-related mechanism that enhances financial reporting quality during critical corporate events. For practitioners, the results highlight the importance of incorporating ESG assessments into due diligence and valuation processes. For regulators, the evidence underscores the relevance of sustainability reporting in promoting transparency.

This study has limitations, which also serve as avenues for future research. The study is limited to publicly listed UK takeover targets and focuses solely on accrual-based earnings management. Future research may extend this analysis to private firms, cross-country comparisons, or other forms of manipulation such as real activities management. Exploring post-acquisition outcomes could also provide insight into how pre-acquisition ESG and reporting behavior influence long-term integration and performance.

AUTHOR CONTRIBUTIONS

Conceptualization: Tariq Elrazaz, Elsayed Belal.

Data curation: Ahmed Samaan, Tariq Elrazaz, Daa Metwally, Elsayed Belal.

Formal analysis: Ahmed Samaan, Tariq Elrazaz, Daa Metwally, Elsayed Belal.

Funding acquisition: Tariq Elrazaz.

Methodology: Tariq Elrazaz, Daa Metwally.

Project administration: Tariq Elrazaz.

Resources: Ahmed Samaan.

Software: Ahmed Samaan, Tariq Elrazaz, Daa Metwally, Elsayed Belal.

Supervision: Ahmed Samaan, Tariq Elrazaz.

Validation: Tariq Elrazaz.

Writing – original draft: Ahmed Samaan, Tariq Elrazaz, Daa Metwally, Elsayed Belal.

Writing – review & editing: Ahmed Samaan, Tariq Elrazaz, Daa Metwally, Elsayed Belal.

ACKNOWLEDGMENT

We would like to thank the United Arab Emirates University for funding this research with the research grant number CARP Grant 2023.

REFERENCES

- Adeneye, Y. B., Fasihi, S., Kam-moun, I., & Albitar, K. (2024). Does earnings management constrain ESG performance? The role of corporate governance. *International Journal of Disclosure and Governance*, 21(1), 69-92. Retrieved from https://econpapers.repec.org/scripts/redirector?u=https%3A%2F%2Fdoi.org%2F10.1057%252Fs41310-023-00181-9;h=repec:pal:ijodag:v:21:y:2024:i:1:d:10.1057_s41310-023-00181-9
- Aljifri, K., & Elrazaz, T. (2024). Effect of earnings management on earnings quality and sustainability: Evidence from Gulf Cooperation Council distressed and non-distressed companies. *Journal of Risk and Financial Management*, 17(8). <https://doi.org/10.3390/jrfm17080348>
- Almubarak, W. I., Chebbi, K., & Ammer, M. A. (2023). Unveiling the connection among ESG, earnings management, and financial distress: Insights from an emerging market. *Sustainability*, 15(16), Article 12348. <https://doi.org/10.3390/su151612348>
- Anagnostopoulou, S. C., & Tsekrekos, A. E. (2015). Earnings management in firms seeking to be acquired. *The British Accounting Review*, 47(4), 351-375. <https://doi.org/10.1016/j.bar.2014.07.001>
- Aouadi, A., & Marsat, S. (2018). Do ESG controversies matter for firm value? Evidence from international data. *Journal of Business Ethics*, 151(4), 1027-1047. Re-

- trieved from <https://link.springer.com/article/10.1007/s10551-016-3213-8>
6. Banerjee, A. K., Akhtaruzzaman, M., & Chatterjee, S. (2024). Earnings management: The influence of peer group and the corporate governance intervention. *Journal of Accounting Literature*, 48(1), 111-129. <https://doi.org/10.1108/JAL-06-2023-0102>
 7. Bansal, M. (2024). Earnings management: A three-decade analysis and future prospects. *Journal of Accounting Literature*, 46(4), 630-670. <https://doi.org/10.1108/JAL-10-2022-0107>
 8. Basmann, R. L. (1960). On finite sample distributions of generalized classical linear identifiability test statistics. *Journal of the American Statistical Association*, 55(292), 650-659. Retrieved from <https://www.tandfonline.com/doi/abs/10.1080/01621459.1960.10483365>
 9. Bassiouny, S. W. (2016). The impact of firm characteristics on earnings management: An empirical study on the listed firms in Egypt. *JBRMR*, 10(3). Retrieved from <https://jbrmr.com/details&cid=227>
 10. Ben-Amar, W., & Missonier-Piera, F. (2008). Earnings management by friendly takeover targets. *International Journal of Managerial Finance*, 4(3), 232-243. Retrieved from <https://ideas.repec.org/a/eme/ijmfpp/v4y2008i3p232-243.html>
 11. Botsari, A., & Meeks, G. (2018). Acquirers' earnings management ahead of stock-for-stock bids in 'hot' and 'cold' markets. *Journal of Accounting and Public Policy*, 37(5), 355-375. <https://doi.org/10.1016/j.jaccpubpol.2018.09.007>
 12. Botsari, A., & Meeks, G. (2008). Do acquirers manage earnings prior to a share for share bid? *Journal of Business, Finance, and Accounting*, 35, 633-670. <https://doi.org/10.1111/j.1468-5957.2008.02091.x>
 13. Burgstahler, D., & Dichev, I. (1997). Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics*, 24(1), 99-126. [https://doi.org/10.1016/S0165-4101\(97\)00017-7](https://doi.org/10.1016/S0165-4101(97)00017-7)
 14. Campa, D., & Hajbaba, A. (2016). Do targets grab the cash in takeovers: The role of earnings management. *International Review of Financial Analysis*, 44, 56-64. <https://doi.org/10.1016/j.irfa.2016.01.008>
 15. Chen, S., Cheng, M., Luo, Y., & Tsang, A. (2024). ESG performance and analyst recommendations: Evidence from sustainability analysts in the Chinese market. *Journal of Accounting Literature*, 48(2), 565-602. <https://doi.org/10.1108/JAL-04-2024-0063>
 16. Chen, X., Cheng, Q., & Wang, X. (2015). Does increased board independence reduce earnings management? Evidence from recent regulatory reforms. *Review of Accounting Studies*, 20(2), 899-933. Retrieved from https://ideas.repec.org/a/spr/reaccs/v20y2015i2d10.1007_s11142-015-9316-0.html
 17. Cho, C. H., Michelon, G., Patten, D. M., & Roberts, R. W. (2015). CSR disclosure: The more things change...? *Accounting, Auditing & Accountability Journal*, 28(1), 14-35. <https://doi.org/10.1108/AAAJ-12-2013-1549>
 18. Choi, H., Choi, B., & Byun, J. (2018). The relationship between corporate social responsibility and earnings management: Accounting for endogeneity. *Investment Management and Financial Innovations*, 15(4), 69-84. [http://dx.doi.org/10.21511/imfi.15\(4\).2018.06](http://dx.doi.org/10.21511/imfi.15(4).2018.06)
 19. Chouaibi, Y., & Zouari, G. (2022). The effect of corporate social responsibility practices on real earnings management: Evidence from a European ESG data. *International Journal of Disclosure and Governance*, 19(1), 11-30. Retrieved from https://ideas.repec.org/a/pal/ijodag/v19y2022i1d10.1057_s41310-021-00125-1.html
 20. Davis, F., & Khadivar, H. (2024). Accrual and real earnings management by rumored takeover targets. *International Review of Financial Analysis*, 92, Article 103105. <https://doi.org/10.1016/j.irfa.2024.103105>
 21. Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting Earnings Management. *The Accounting Review*, 70(2), 193-225. Retrieved from <http://www.jstor.org/stable/248303>
 22. Dokas, I., Leontidis, C., & Zervoudi, E. K. (2025). Accrual-based earnings management in cross-border mergers and acquisitions: The role of institutional differences and geographic distance. *Journal of Risk and Financial Management*, 18(2). <https://doi.org/10.3390/jrfm18020050>
 23. Drepetic, S., Klein, C., & Zwergel, B. (2020). The influence of firm size on the ESG score: Corporate sustainability ratings under review. *Journal of Business Ethics*, 167(2), 333-360. Retrieved from <https://link.springer.com/article/10.1007/s10551-019-04164-1>
 24. Dutordoir, M., Schoubben, F., Struyfs, K., & Torsin, W. (2024). Environmental pressure and board gender diversity: Evidence from the European Union Emission Trading System. *Business Strategy and the Environment*, 33(5), 3911-3935. <https://doi.org/10.1002/bse.3686>
 25. Elrazaz, T. Z. (2018). *Do acquirers see through the numbers? Earnings management by UK takeover targets*. Loughborough University. <https://doi.org/10.26174/thesis.lboro.8132060.v1>
 26. Elrazaz, T. (2025). *Does ESG performance mitigate earnings management? Evidence from UK takeover targets M&A data* [Data set]. Zenodo. <https://doi.org/0.5281/zenodo.17877745>
 27. Elrazaz, T. Z., Elmassri, M., & Ahmed, Y. (2021). Real earnings manipulation surrounding mergers and acquisitions: The targets' perspective. *International Journal of Accounting & Information Management*, 29(3), 429-451. Retrieved from <https://ideas.repec.org/a/eme/ijaimp/ijaim-11-2020-0188.html>
 28. Faccio, M., & Masulis, R. W. (2005). The choice of payment method in European mergers and acquisitions. *The Journal of Finance*, 60(3), 1345-1388. <https://doi.org/10.1111/j.1540-6261.2005.00764.x>

29. Farooqi, J., Ngo, T., & Jory, S. (2017). Real activities manipulation by bidders prior to mergers and acquisitions. *Review of Accounting and Finance*, 16(3), 322-347. <https://doi.org/10.1108/RAF-12-2014-0132>
30. Gaio, C., Gonçalves, T., & Sousa, M. V. (2022). Does corporate social responsibility mitigate earnings management? *Management Decision*, 60(11), 2972-2989. <https://doi.org/10.1108/MD-05-2021-0719>
31. García-Sánchez, I., & García-Meca, E. (2017). CSR engagement and earnings quality in banks. The moderating role of institutional factors. *Corporate Social Responsibility and Environmental Management*, 24(2), 145-158. <https://doi.org/10.1002/csr.1405>
32. Gavana, G., Gottardo, P., & Moissello, A. M. (2024). The impact of board gender diversity on ESG disclosure. A contingency perspective. *Meditari Accountancy Research*, 33(7), 1-29. <https://doi.org/10.1108/ME-DAR-07-2024-2567>
33. Gokhale, M., & Pillai, D. (2024). Firm level and country level determinants of earnings management in emerging economies: A systematic framework-based review. *Future Business Journal*, 10(1). Retrieved from https://ideas.repec.org/a/spr/futbus/v10y2024i1d10.1186_s43093-024-00361-1.html
34. Gonçalves, T., Gaio, C., & Ferro, A. (2021). Corporate social responsibility and earnings management: Moderating impact of economic cycles and financial performance. *Sustainability*, 13(17), Article 9969. <https://doi.org/10.3390/su13179969>
35. Guerrero, S., & Viteri, J. P. (2025). What are environmental, social, and governance scores measuring? The role of outcome and impact indicators in ESG scores. *Finance Research Letters*, 72, Article 106529. <https://doi.org/10.1016/j.frl.2024.106529>
36. Gujarati, D., & Porter, D. (2009). *Basic econometrics* (5th ed). New York: McGraw-Hill/Irwin.
37. Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1251-1271. <https://doi.org/10.2307/1913827>
38. Jamadar, Y., Ong, T. S., Abdullah, A. A., & Kamarudin, F. (2022). Earnings and discretionary accruals. *Managerial and Decision Economics*, 43(2), 431-439. <https://doi.org/10.1002/mde.3391>
39. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
40. Jin, Y. (2025). Distinctive impacts of ESG pillars on corporate financial performance: A random forest analysis of Korean listed firms. *Finance Research Letters*, 71, Article 106395. <https://doi.org/10.1016/j.frl.2024.106395>
41. Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The Accounting Review*, 91(6), 1697-1724. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2575912
42. Kim, K. S., Lee, J. H., & Park, Y. W. (2022). Acquiring firms' earnings management in stock-for-stock mergers within Korean business groups. *Managerial Finance*, 48(1), 27-48. <https://doi.org/10.1108/MF-05-2020-0262>
43. Kolsi, M. C., Al-Hiyari, A., & Husainey, K. (2023). Does environmental, social, and governance performance mitigate earnings management practices? Evidence from US commercial banks. *Environmental Science and Pollution Research*, 30(8), 20386-20401. <https://doi.org/10.1007/s11356-022-23616-2>
44. Kothari, S. P., Mizik, N., & Roychowdhury, S. (2016). Managing for the moment: The role of earnings management via real activities versus accruals in SEO valuation. *The Accounting Review*, 91(2), 559-586. <https://doi.org/10.2308/accr-51153>
45. Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics*, 39(1), 163-197. <https://doi.org/10.1016/j.jaccoco.2004.11.002>
46. Kotzian, P. (2024). Firms' sustainability engagement and sustainability-related controversies. *Business Strategy and the Environment*, 33(3), 1610-1625. <https://doi.org/10.1002/bse.3562>
47. Lalwani, D., & Jain, S. (2025). Do M&As incentivize acquirers to engage in earnings management? Evidence from an emerging economy. *Journal of Accounting Literature*. <https://doi.org/10.1108/JAL-07-2024-0160>
48. Lestari, R., & Muthmainnah, D. R. (2025). The impact of earnings management on perceived quality of earnings: The moderating role of ESG. *Asian Journal of Accounting Research*, 10(3), 258-276. <https://doi.org/10.1108/AJAR-06-2024-0255>
49. Malikov, K. T., & Zalata, A. M. (2025). Earnings management by acquiring firms in cash mergers. *Accounting and Business Research*, 55(1), 39-68. <https://doi.org/10.1080/00014788.2023.2288567>
50. Missonier-Piera, F., & Spadetti, C. (2023). The consequences of earnings management for the acquisition premium in friendly takeovers. *Journal of Business Finance & Accounting*, 50(1-2), 308-334. <https://doi.org/10.1111/jbfa.12635>
51. Pasko, O., Chen, F., Birchenko, N., & Ryzhikova, N. (2021). Corporate governance attributes and accounting conservatism: Evidence from China. *Studies in Business and Economics*, 16(3), 173-189. Retrieved from <https://ideas.repec.org/a/blg/journl/v16y2021i3p173-189.html>
52. Peni, E., & Vähämaa, S. (2010). Female executives and earnings management. *Managerial Finance*, 36(7), 629-645. <https://doi.org/10.1108/03074351011050343>
53. Petersen, M. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies*, 22(1), 435-480. <https://doi.org/10.1093/rfs/hhn053>

54. Pham, H. Y., Chung, R. Y. M., Roca, E., & Bao, B. H. (2019). Discretionary accruals: signaling or earnings management in Australia? *Accounting & Finance*, 59(2), 1383-1413. <https://doi.org/10.1111/acfi.12275>
55. Rahman, A. F., Bintoro, N. S., Dewi, A. A., & Kholilah, K. (2024). The effect of ESG and earnings quality on the value relevance of earnings and book value. *Australasian Business, Accounting and Finance Journal*, 18(2), 133-157. <https://doi.org/10.14453/aabfj.v18i2.09>
56. Rezaee, Z., & Tuo, L. (2019). Are the quantity and quality of sustainability disclosures associated with the innate and discretionary earnings quality? *Journal of Business Ethics*, 155(3), 763-786. <https://link.springer.com/article/10.1007/s10551-017-3546-y>
57. Schiemann, F., & Tietmeyer, R. (2022). ESG controversies, ESG disclosure and analyst forecast accuracy. *International Review of Financial Analysis*, 84, Article 102373. <https://doi.org/10.1016/j.irfa.2022.102373>
58. Srinidhi, B., Gul, F. A., & Tsui, J. (2011). Female directors and earnings quality. *Contemporary Accounting Research*, 28(5), 1610-1644. <https://doi.org/10.1111/j.1911-3846.2011.01071.x>
59. Sun, W., Chen, S., Jiao, Y., & Feng, X. (2024). How does ESG constrain corporate earnings management? Evidence from China. *Finance Research Letters*, 61, Article 104983. <https://doi.org/10.1016/j.frl.2024.104983>
60. Taliento, M., Favino, C., & Netti, A. (2019). Impact of environmental, social, and governance information on economic performance: Evidence of a corporate 'sustainability advantage' from Europe. *Sustainability*, 11(6), Article 1738. <https://doi.org/10.3390/su11061738>
61. Talpur, S., Nadeem, M., & Roberts, H. (2024). Corporate social responsibility decoupling: A systematic literature review and future research agenda. *Journal of Applied Accounting Research*, 25(4), 878-909. <https://doi.org/10.1108/JAAR-08-2022-0223>
62. Tohang, V., Hutagaol-Martowidjo, Y., & Pirzada, K. (2024). The link between ESG performance and earnings quality. *Australasian Business, Accounting and Finance Journal*, 18(1), 187-204. <https://doi.org/10.14453/aabfj.v18i1.12>
63. Tunyi, A. A., Yang, J., Agyei-Boapeah, H., & Machokoto, M. (2024). Takeover vulnerability and pre-emptive earnings management. *European Accounting Review*, 33(2), 677-711. <https://doi.org/10.1080/09638180.2022.2116064>
64. Usman, M., Nwachukwu, J., & Ezeani, E. (2022). The impact of board characteristics on the extent of earnings management: Conditional evidence from quantile regressions. *International Journal of Accounting & Information Management*, 30(5), 600-616.
65. Vasilescu, C., & Millo, Y. (2016). Do industrial and geographic diversifications have different effects on earnings management? Evidence from UK mergers and acquisitions. *International Review of Financial Analysis*, 46, 33-45. <https://doi.org/10.1016/j.irfa.2016.04.009>
66. Vatis, S. E., Drogalas, G., Persakis, A., & Chytis, E. (2025). The impact of ESG on earnings quality and real earnings management: The role of firm size. *Sustainability*, 17(11), Article 5027. <https://doi.org/10.3390/su17115027>
67. Velte, P. (2019). The bidirectional relationship between ESG performance and earnings management – Empirical evidence from Germany. *Journal of Global Responsibility*, 10(4), 322-338. <https://doi.org/10.1108/JGR-01-2019-0001>
68. Yami, N., Poletti-Hughes, J., & Hussainey, K. (2023). The impact of female directors on earnings management and the moderating effect of board quality: Enabler or deterrent? *Journal of Financial Reporting and Accounting*, 23(5), 2142-2169. <https://doi.org/10.1108/JFRA-03-2023-0119>
69. Yin, J., & Xu, J. (2025). Exploring the impact of board size on ESG controversies: New evidence from China. *Sustainability*, 17(11), Article 4855. <https://doi.org/10.3390/su17114855>
70. Yoon, B., Lee, J. H., & Byun, R. (2018). Does ESG performance enhance firm value? Evidence from Korea. *Sustainability*, 10(10), Article 3635. <https://doi.org/10.3390/su10103635>
71. Yoon, B., Kim, B., & Lee, J. H. (2019). Is earnings quality associated with corporate social responsibility? Evidence from the Korean market. *Sustainability*, 11(15), Article 4116. <https://doi.org/10.3390/su11154116>
72. Zang, A. Y. (2012). Evidence on the trade-off between real activities manipulation and accrual-based earnings management. *The Accounting Review*, 87(2), 675-703. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1891759