

# THE IMPACT OF EARNING MANAGEMENT AND CORPORATE GOVERNANCE ON CORPORATE INVESTMENT EFFICIENCY: EVIDENCE FROM PAKISTAN STOCK EXCHANGE

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Received: 19 April 2026

Revised: 22 June 2026

Accepted: 23 July 2026

Published: 13 August

2026

## ABSTRACT

**Purpose:** This study examines the association between earnings management, corporate governance mechanisms, and investment efficiency in the context of industrial firms listed on the Pakistan Stock Exchange (PSX).

**Design/Methodology:** Using a panel dataset of 1,086 firm-year observations from 171 companies spanning 2012–2019, the study applies FGLS regression to examine both direct and combined effects of CG features with earnings management on investment efficiency. Key CG attributes analyzed include CEO duality, gender diversity, board meeting frequency, audit committee size, and audit committee independence.

**Findings:** The results revealed that earnings management alone does not significantly affect investment efficiency. Gender diversity in the board is the strong corporate governance mechanism that significantly improves investment efficiency. Board meetings highlighted governance or operational issues rather than efficient investment decisions, while its interaction with earning management contributed to reducing managerial opportunism, strengthening corporate governance and improving efficient investment decisions. More independence of the audit committee and its interaction with earning management contribute to less efficient investment as more independence of the audit committees fail in effective monitoring of the firms due to some institutional factors. Other governance features and their interactions show no significant effects. Control variables indicate that firm size is positively associated with investment efficiency, while leverage has a negative impact. Overall, non-financial firms in Pakistan focus more on corporate governance factors rather than earning management in determining investment efficiency.

**Originality:** The findings offer valuable insights for stakeholders, regulators, and policymakers, particularly the Federal Board of Revenue, SECP, and non-financial firms, in shaping investment and governance policies. For effective governance in Pakistan's industrial sector, emphasis should be placed on female inclusion and strengthening corporate governance. Future research should further explore the full

NBR

NUST Business Review

ID: NBR260708

Vol. 08 (01)

07, 2026

pp. 175-200

DOI:

<https://10.37435/nbr.v8i1.174>

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corporate governance code's role in moderating earnings management's impact on investment efficiency.

**Keywords:** *Investment Efficiency, Earning Management, Corporate Governance, Financial Reporting Quality*

**Paper type:** Research Paper

## INTRODUCTION

This research examines the association between earnings management, corporate governance, and investment efficiency in developing economies, focusing on Pakistan's industrial sector. Earnings management has become a global challenge in today's world, prevalent not only in developed countries but also in emerging markets with weaker regulatory frameworks (Gokhale & Pillai, 2026). Top scandals such as WorldCom and Enron have intensified scrutiny of earnings quality, leading to extensive research on its causes and effects. Earnings management occurs mainly in two forms: accrual-based, which is easier for regulators to detect, and real-based, which is more subtle and harder to monitor (Graham et al., 2005). These manipulations distort financial information, impairing stakeholders' ability to make sound investment decisions and exacerbating agency problems between managers and shareholders (Jensen & Meckling, 1976). Consequently, firms may engage in inefficient investment behavior either underinvesting in profitable opportunities or overinvesting in unviable projects (Tan et al., 2026; Pogue, 2010; Kang et al., 2006).

Corporate governance mechanism has a key role in overseeing management, decreasing agency costs, and enhancing efficient investment decision (Nguyen et al., 2024; Yadav & Yadav, 2024; Kashani & Mousavi, 2022; Bimo et al., 2022). Features like board independence, gender diversity, CEO duality, and the effectiveness of audit committee help restrain managerial opportunism and align actions with shareholder interests (Andreoue et al., 2014; Mueller & Peev, 2007). While prior research in Pakistan has examined governance issues, gaps remain in understanding how these mechanisms influence investment efficiency through the lens of earnings management (Javid & Iqbal, 2010; Waheed & Malik, 2019). Earnings management is a growing concern that significantly affects key managerial decisions, especially investment choices. Shareholders and investors rely on earnings reports to guide their investments, but managers may decide in favor of themselves at shareholders' costs, leading to inefficient investments. This arises the necessity for strong corporate governance mechanisms to eliminate information asymmetry and level the interests of shareholders and managers, as emphasized by agency theory (Jensen & Meckling, 1976).

Although some studies in countries like France and Iran have explored the relationship between earnings management and investment efficiency through board characteristics, they have not examined a comprehensive corporate governance framework (Bzeouich et al., 2019; Karimi et al., 2019). Pakistan's developing industrial

sector seeks to enhance performance by pursuing profitable investment opportunities. However, there is limited research on how Pakistani firms manage earnings manipulation while implementing corporate governance to ensure efficient investments. To fill this gap, the study investigates the association between earnings management and investment efficiency within the context of Pakistan's corporate governance code. Using a panel dataset of 171 non-financial companies listed in the Pakistan Stock Exchange from 2012 to 2019, this study applies FGLS regression analysis to explore these dynamics. The results of the study indicate that earnings management alone does not significantly affect investment efficiency, while corporate governance characteristics such as gender diversity, board meetings, audit committee independence and interaction of earning management with board meetings and audit committee independence have significant impact on investment efficiency. These results suggest that non-financial firms in Pakistan focus more on corporate governance factors rather than earning management in determining investment efficiency.

This study contributes to many valuable dimensions. As per our knowledge, there is rare literature in this area, previous studies focused on the quality of financial reporting and firm investment efficiency, while this study focuses on the linkage between earning management, corporate governance, and firm investment efficiency in Pakistan's context. The study topic is new and unique in its nature from the research conducted previously on this topic (Bzeouich et al., 2019; Karimi et al., 2019). The study highlights the corporate governance mechanism for opportunistic managers to make efficient investment. It explains the monitoring role of corporate governance characteristics in earning management activities for creating firms' investment efficiency. This study is new in academia; it brings novelty in the knowledge of earning management, investment efficiency, and corporate governance.

Earnings management is prevalent in both developed and developing countries like Pakistan, where managers manipulate reports to mislead investors for personal gain (Elhaj & Mansor, 2019). Empirical evidence confirms this global challenge while revealing that managers in emerging markets face weaker legal systems and investor protection, heightening manipulation incentives (Hassan et al., 2024). Since investors rely on earnings for decision-making, understanding how such practices impact investment efficiency in Pakistan's industrial sector is essential. Corporate governance mechanisms serve as monitoring tools to curb managerial opportunism and protect shareholder interests (Mrabure & Abhulimhen-Iyoha, 2020). This study examines how earnings management and corporate governance features jointly affect firm investment efficiency, addressing three objectives: assessing earnings management's association with investment efficiency, determining governance's relationship with investment practices, and evaluating their interactive impact on investment decisions in Pakistani firms.

The paper is structured as theoretical and empirical literature review in second section, methodology in the third section, results and hypothesis testing in the fourth section, and conclusion at the last section.

## THEORY AND HYPOTHESES

This study focuses on how corporate governance mechanisms decline in agency problems and promote investment efficiency. Corporate governance theories provide the foundation for understanding to manage and control firms for aligning the interests of various stakeholders. Among them, the most relevant for this study is the Agency Theory. It highlights the conflict raised by the different interests of shareholders (principals) and managers (agents), caused by information asymmetry. Managers may act opportunistically, manipulating financial information and making inefficient investment decisions such as overinvestment or underinvestment for personal gain (Jensen & Meckling, 1976). However, Stewardship Theory assumes that managers are truthful and naturally inclined to make decisions considering shareholders' interests, prioritizing firm objectives and long-term value creation (Schoorman & Donaldson, 1997). This theory supports empowering managers with internal governance structures rather than strict monitoring.

In line with Stewardship Theory, Stakeholder Theory broadens the governance scope beyond shareholders, considering interests of all stakeholders such as employees, customers, suppliers, and regulators (Freeman, 1984). This theory is significant in promoting inclusive and sustainable corporate practices. While Transaction Cost Theory (Coase, 1937; Williamson, 1979) emphasizes designing governance structures that minimize the costs of coordinating transactions, especially when external market arrangements are inefficient. Similarly, Resource Dependence Theory (Pettigrew, 1992) underscores the board's role in accessing and managing critical external resources to enhance firm stability and performance.

These theories collectively explain how governance structures influence managerial behavior and decision-making. For this study, Agency Theory serves a basic role and directly involved in controlling earnings management and aligning investment decisions with shareholder interests, particularly in settings like Pakistan where weak governance can intensify agency conflicts.

### *Earning management and Investment efficiency*

Investment efficiency means effective allocation of capital by investing in projects with positive net present value (NPV) and avoiding unproductive investments. Earnings management undermines this efficiency by distorting the reliability of financial reports used in decision-making processes (Tan et al., 2026). While high quality and transparent financial information decrease information asymmetry and agency conflicts, enabling investors and stakeholders to make informed investment decisions (Hosseini et al., 2026; Biddle & Hilary, 2006; Li & Wang, 2010).

Manipulating earnings by managers often leads to overinvestment in unprofitable projects for personal gain or underinvestment due to misrepresented firm performance and increased perceived risk (McNichols & Stubben, 2008; Verdi, 2011; Damayanthi & Noviyari, 2019). Similarly, earning management negatively affects investment efficiency (Eissa et al. (2025) and significantly deviates from the optimal

one which increases the probability of both over-investment and under-investment (Tan et al., 2026). Same wise real earnings management reduced the investment efficiency and contributed to over-investment by the non-financial listed firms of Pakistan (Bhutta et al., 2022). The discussion builds the foundation for the first hypothesis:

***Hypothesis 1: Earnings management has a negative relationship with investment efficiency.***

#### *Earning Management, Corporate Governance and Investment Efficiency*

The separation of ownership and control lead to earning management, where managers use information asymmetry to manipulate financial reports for personal benefit (Jensen & Meckling, 1976). Such opportunistic behavior often leads to inefficient investment decisions, either overinvesting in unprofitable projects or underinvesting in valuable ones, reducing overall investment efficiency. Corporate governance tools are crucial in eliminating these agency problems (Nguyen et al., 2024). Elements like board independence, gender diversity, CEO duality, and strong audit committees serve as effective monitoring tools that align managerial actions with shareholder interests. Research shows that robust corporate governance reduces earnings manipulation, improves financial disclosure quality, and enhances investment efficiency (Yadav & Yadav, 2024; Kashani & Mousavi, 2022; Bimo et al., 2022; Karimi et al., 2019; Ayemere & Elijah, 2015). Consequently, while earnings management negatively impacts investment efficiency, effective corporate governance fosters transparency and accountability, improving investment decisions, particularly in developing markets.

#### *CEO Duality*

Both roles of CEO and chairperson by individual have been widely studied for its impact on corporate governance and investment efficiency. According to agency theory (Jensen & Meckling, 1976), CEO duality weakens board oversight, increases managerial power, and fosters opportunistic behavior, leading to reduced voluntary disclosure and ineffective decision-making (Med & Jouirou, 2024; Ho & Wong, 2001; Jensen, 1993). However, several studies propose that separate roles of CEO and chairperson enhance board independence, decrease agency costs, and increase firm performance and investment efficiency (Conheady et al., 2015; Azhar et al., 2019). While some findings (e.g., Tanveer & Ali, 2020) show no significant link, the consensus in literature leans toward a negative relationship between investment efficiency and CEO duality, especially when earnings are managed to mislead stakeholders. Based on these arguments the study proposes following hypotheses:

***Hypothesis 2: CEO Duality has a negative relationship with corporate investment efficiency (H2a) and Earnings management has a negative relationship with investment efficiency in the existence of CEO duality (H2b).***

Rooted in agency theory, women are often effective independent directors who strengthen board monitoring (Carter et al., 2003). Empirical evidence links the existence of female on boards to better financial reporting quality, lower earning management, and stronger firm performance (Pucheta-Martínez et al., 2018; Sial et al., 2019). Additionally, by mitigating information asymmetry, gender-diverse boards help align managerial decisions with shareholder interests, especially in environments with weak governance structures (Gul et al., 2008; Adams & Ferreira, 2009). Moreover, female members in board positively affect investment efficiency (Baik et al., 2024; Ali et al., 2024) by moderating the adverse effects of earnings management (Bzeouich et al., 2019). However, some findings indicate negative relationships that cultural and institutional contexts may affect this relationship (Med & Jouirou, 2024). Overall, gender diversity enhances board effectiveness, curbs earnings manipulation, and supports more efficient investment decisions. This helps to develop the following hypotheses:

***Hypothesis 3:*** *Gender diversity has a positive association with firm investment efficiency (H3a) and Earnings management has a negative relationship with investment efficiency in the existence of CEO duality (H3b).*

#### *Board Meeting Frequency*

The meeting frequency of the board is likely to solve problems effectively in the corporations (Lin & Hwang, 2010). In addition, Chen et al. (2006) found that the frequency of board meetings identifies and resolves the issues; it declines the possibility of fraud in operation. Sarkar et al. (2008) indicated that the meeting frequency of independent directors had a negative and significant connection with earning management activities in India. In contrast, Gulzar (2011) and Metawee (2013) find a positive link between the number of board meetings and earning management. Al-Hares et al. (2018) examined the effect of board meeting frequency on R&D investment strategy; they found that board meeting frequency negatively and significantly associated with investment strategy. However, Agyei-Mensah (2021), Kim et al., (2009), and Karamanou and Vafeas (2005) indicated that board meeting has insignificant association with investment decision. Regarding these conflicting arguments, there is need for investigating the relationship among board meetings, investment efficiency, and earning management. Hence, the study designs following hypothesis based on preceding arguments.

***Hypothesis 4:*** *The frequency of board of directors' meeting has a negative association with investment efficiency (H4a) and Earning management has a positive association with investment efficiency in the presence of high frequency of board meetings (H4b).*

#### *Audit Committee Size*

The audit committee size is imperative in improving the quality of financial reports and curbing earnings management. Empirical research consistently finds that audit committee size is negatively associated with earnings management, indicating that bigger committees better restrict managers' opportunistic behaviors (Piot & Janin, 2007; Xie et al., 2003; Ayemere & Elijah, 2015; García et al., 2010; Zgarni et al., 2016; Ho & Wong, 2001; Kelton & Yang, 2008; Alzoubi, 2019). Improved monitoring by a larger audit committee lead to enhance the reliability of financial reports and eliminate information asymmetry between investors and managers. This improved transparency facilitates more informed and efficient investment decisions (Cormier et al., 2010; Lin et al., 2006). However, some studies suggest a complex relationship where audit committee size might sometimes negatively affect investment efficiency, and earnings management could paradoxically relate positively to investment efficiency when audit committees are large, highlighting the need for further research into these dynamics.

***Hypothesis 5:*** *Audit committee size has a negative association with investment efficiency (H5a) and Earning management is associated positively with investment efficiency in the existence of the large size of audit committee (H5b).*

#### *Audit Committee Independent Directors*

The role of independent directors on audit committees in limiting earnings management and enhancing investment efficiency shows mixed but generally positive effects in literature. Many studies found that greater audit committee independence eliminates information asymmetry between managers and investors, which leads to improvement in financial disclosure quality, thus reducing earning manipulation (Akhtaruddin & Haron, 2010; Al-Rassas & Kamardin, 2015). Additionally, the existence of independent audit committees tends to higher earnings quality and lower levels of earnings manipulation (Bradbury et al., 2006; Mohd Saleh et al., 2007). Moreover, independent audit committees can strengthen corporate governance, leading to better investment decisions and reduced managerial opportunism (Nor et al., 2018; Al-Hadrami et al., 2020). However, many studies note that full independence of the board might reduce certain investments (Suman & Singh, 2020) or more independence of audit committee leads to failure in effective monitoring due to several institutional factors including family ownership, compensation package, and limited board expertise (Alhababsah, 2024). These contradictory arguments contribute to following hypothesis.

***Hypothesis 6:*** *Independent audit committee negatively affects investment efficiency (H6a) and Earning management is negatively connected with investment efficiency in the presence of audit committee independence (H6b).*

## METHODS

### *Context of Study, Procedure, and Sample*

The research study explained the relationship between earning management, corporate governance, and corporate investment efficiency for the Pakistani listed companies. The study employs an explanatory design for reaching its objectives. The sample size is from the population of non-financial sector of Pakistan stock exchange from 2012 to 2019, the financial sector is excluded due to its capital structures, accounting practices, and regulations differences. The data type is panel and collected manually from PSX listed companies audited annual reports, companies' websites, state bank of Pakistan and open-door website (Shah, 2019; PSX, 2019; SBP, 2019). The sample size is decided subjectively based on corporate governance data availability. Most of the companies' financial reports with corporate governance data are available for 2012 on companies' official websites, PSX, Opendoor, state bank of Pakistan and other databases, so the time frame from 2012 to 2019 is considered. Firms with insufficient data are also excluded from the sample. The final sample size of the study is 171 non-financial firms from automobiles, motors, sugars, textiles, telecommunication, mining, petroleum, service, foods, cement, gas, ceramics, paper & boards, and oil non-financial industries. Looking back, the years between 2012 and 2019 mark a turning point for corporate governance in Pakistan. It all started with the revised Code of Corporate Governance in 2012, which really pushed for stronger board independence and better protection for investors. Around the same time, the Special Economic Zones Act came into effect, aiming to give industrial growth a much-needed push. Then came 2017, bringing fresh regulations under the Listed Companies Code, including the requirement for female directors on boards. Choosing this window makes sense because it gives us a relatively steady period to study how firms responded to these changes, without the economic turbulence that hit after 2019. It also leaves room to compare with later years as more data becomes available.

The main variables are earning management, investment efficiency, and corporate governance attributes. Investment efficiency is the inverse value of investment inefficiency calculated as investment inefficiency value multiplied by minus one (Shahzad et al., 2019). Investment inefficiency is the absolute value of residuals from investment and sales growth equation (Chen et al., 2011). The study employed modified Jones (1995) model to estimate discretionary accruals as a proxy for measuring earning management variable. The corporate governance attributes include the code of corporate governance which consists of gender diversity, CEO duality, board meeting frequency, and the size and independence of audit committee. The control variables are firm size, firm performance and leverage.

The two important models for measuring investment efficiency developed by Richardson (2006) and Biddle et al. (2009) have been employed in hundreds of empirical studies. Shahzad et al. (2019) stated that previous research studies followed Biddle et al. (2009) for estimating investment efficiency (Wang et al., 2015; Linhares et al., 2018; Karimi et al., 2019; Anwar & Malik, 2020). Chen et al. (2011) followed the Biddle et al. (2009) model for measuring investment efficiency. Irfanullah et al. (2020)



used the Chen et al. (2011) model for estimating investment inefficiency of Pakistan listed firms. Hence, this study used Chen et al. (2011) model for measuring investment efficiency. The investment inefficiency variable is estimated as the residuals of a model that estimates the firm's investment as a function of its growth opportunities (Biddle et al., 2009). Positive residuals indicate that the firm has invested more than expected investment (overinvestment). On the other hand, negative residuals show that the firm has invested less than expected investment (underinvestment). According to McNichols and Stubben (2008), Increase and decrease in revenue can change the association between investment and revenue growth rate. Hence, this study used following regression model for the differential prediction of revenue enhances and reduces.

$$INV_{i,t} = \beta_0 + \beta_1 NEG_{i,t} + \beta_2 \%REV\text{Growth}_{i,t-1} + e_{i,t+1} \dots \dots \dots I$$

Investment (INV) is equal to the sum of capital expenditures and research and development (R&D) expenditures minus sale of property, plant and equipment (PPE) in the current year over total assets (Irfan Ullah et al., 2020). %RevGrowth<sub>i,t-1</sub> is the annual rate of revenue growth for firm i in year t-1. NEG<sub>i,t</sub> is dummy variable; it takes the value of 1 when the growth rate is negative, and 0 otherwise (Irfan Ullah et al., 2020). The study employed simple OLS regression and takes absolute value of residual which is investment inefficiency. The inverse value of investment inefficiency is investment efficiency calculated as investment inefficiency value multiplied by minus one (Shahzad et al., 2019; Irfan Ullah et al., 2020).

The independent variables are earning management and corporate governance variables. In line with previous research studies, this study measured earning management by discretionary accruals (Jones, 1991; Dechow et al., 1995; Shah et al., 2009; Rusmin, 2010; Marques et al., 2011; Nagata, 2013; Linhares et al., 2018; Bzeouich et al., 2019). The above studies also explained the deviation of total accruals into discretionary and non-discretionary accruals. The non-discretionary accruals arise from firm's level of activity, while discretionary accruals come from manager's subjective decisions of accounting. Thus, managers practice their discretion over accounting methods and adjust time for finding accruals. Hence, this study employed the discretionary part of total accruals as proxy for earning management.

$$\text{Discretionary Accruals} = \text{Total Accruals} - \text{Non Discretionary Accruals} \dots \dots \dots II$$

Regarding previous research studies, Jones (1991) and modified Jones model are the most employed models which divide total accruals into discretionary and non-discretionary accruals (Dechow et al., 1995). The modified Jones model is the most influential test for measuring earning management (Dechow et al., 1995). This model is used by previous researchers (Shah et al., 2009; Linhares et al., 2018; Bouaziz et al., 2020).

Total accruals are equal to net income minus operating cash flow:

$$\text{Total Accruals} = \text{Net Income} - \text{Cash Flow from Operation} \dots \dots \text{III}$$

Modified Jones model (1995):

$$TA_{i,t} = \alpha_0 + \alpha_1 1/TA_{i,t-1} + \alpha_1 (\Delta REV_{i,t} - \Delta REC_{i,t})/TA_{i,t-1} + \alpha_2 PPE_{i,t}/TA_{i,t-1} + e_{i,t} \dots \dots \text{IV}$$

TA = Total accruals of firm i in year t

A t-1 = total asset in year t - 1

ΔREV = Change in sales between year t and year t-1 of firm i

ΔREC = Change in receivables between year t and t-1 of firm i.

PPE = Gross value of fixed assets in year t of firm i.

ROA i, t-1 = Return on assets in year t-1

ε = residual from equation (DAC), The residuals from modified Jones (1995) model are discretionary accruals.

Table 1: Measurement of Variables

| Variable                              | Proxy                                                                                        | Model                      |
|---------------------------------------|----------------------------------------------------------------------------------------------|----------------------------|
| Earning Management (DAC)              | Discretionary Accruals                                                                       | (Dechow et al., 1995)      |
| CEO duality (CDUA)                    | Dummy variable 1 if CEO is also chairman, otherwise 0                                        | (Bzeouich et al., 2019)    |
| Gender Diversity (GEN)                | Ratio of women directors compare to total board members                                      | (Bzeouich et al., 2019)    |
| Board of Directors Meeting            | Total numbers of board meetings held during the year                                         | (Hashed & Almaqtari, 2021) |
| Audit Committee Size (AC_Size)        | Total numbers of audit committee members                                                     | (Hashed & Almaqtari, 2021) |
| Audit Committee Independence (AC_IND) | The ratio of independent directors on audit committee compared to total audit committee size | (Hashed & Almaqtari, 2021) |
| Dependent Variable                    |                                                                                              |                            |
| Investment Efficiency (EFF_INV)       | Residual from Chen et al. (2011) multiplied by (-1)                                          | (Chen et al., 2011)        |
| Control Variable                      |                                                                                              |                            |
| Firm Size                             | Natural log of sales                                                                         | (Bzeouich et al., 2019)    |
| Leverage                              | Total debt/Total assets                                                                      | (Bzeouich et al., 2019)    |
| Firm Performance (ROA)                | Net income/Total assets                                                                      | (Bzeouich et al., 2019)    |

### Model Specification

The study achieved its objectives through examining the impact of earnings management and corporate governance characteristics on corporate investment

efficiency in PSX listed companies. The study used a panel approach to establish the presence of this association. Primarily, the study investigated the link between earning management and investment efficiency, it further investigated the link between corporate governance features and firm investment efficiency, and finally it examined the moderating effect of corporate governance features on the link between earnings management and corporate investment efficiency. The specific model of the study is indicated as follows:

$$\begin{aligned}
 EFF\_INV_{i,t} = & \alpha_0 + \beta_1 DAC_{i,t} + \beta_2 CDUA_{i,t} + \beta_3 GDIV + \beta_4 BM + \beta_5 AC\_Size_{i,t} + \beta_6 AC\_IND_{i,t} + \beta_7 DAC_{i,t} \\
 & * CDUA_{i,t} + \beta_8 DAC_{i,t} * GDIV_{i,t} \\
 & + \beta_9 DAC_{i,t} * BM_{i,t} + \beta_{10} DAC_{i,t} * AC\_Size_{i,t} + \beta_{11} DAC_{i,t} * AC\_IND_{i,t} + \beta_{12} F\_Size_{i,t} \\
 & + \beta_{13} Leverage_{i,t} + \beta_{14} ROA_{i,t} + e_{i,t+1} \dots \dots V
 \end{aligned}$$

EFF\_INV = investment efficiency

DAC = discretionary accruals

CDUA = CEO duality

GDIV = gender diversity

BM = board of directors meeting frequency

AC\_Size = audit committee size

AC\_IND = audit committee independence

F Size = firm size

Leverage = leverage

ROA = firm performance

## DATA ANALYSIS AND RESULTS

### *Descriptive Analysis*

The study examines a panel dataset comprising 1,354 firm-year observations from non-financial firms listed on the Pakistan Stock Exchange (PSX) over an eight-year period (2012–2019). To ensure data robustness, several outlier treatment techniques were applied in the following steps:

Step 1 Winsorization: Continuous variables were winsorized at the 1st and 99th percentiles to mitigate the influence of extreme values.

Step 2 Studentized Residual Test: Outliers with residuals exceeding  $\pm 2$  was removed, resulting in the exclusion of 225 observations.

Step 3 Leverage Filtering: Firms with leverage ratios exceeding 1 (indicating potential bankruptcy) were excluded, eliminating 43 observations.

After data cleaning, the final sample consisted of 1086 firm-year observations.

Table 2: Descriptive Statistics

| Variables | Obs  | Mean  | Std. Dev. | Min   | Max    | p1    | p99    | Skew.  | Kurt.  |
|-----------|------|-------|-----------|-------|--------|-------|--------|--------|--------|
| EFF_INV   | 1086 | -.046 | .033      | -.215 | 0      | -.173 | 0      | -1.524 | 6.703  |
| DAC       | 1086 | -.02  | .119      | -.327 | .426   | -.311 | .426   | .924   | 5.682  |
| CDUA      | 1086 | .066  | .249      | 0     | 1      | 0     | 1      | 3.486  | 13.154 |
| GDIV      | 1086 | .095  | .132      | 0     | .571   | 0     | .571   | 1.465  | 4.709  |
| BM        | 1086 | 5.243 | 1.622     | 4     | 13     | 4     | 13     | 2.303  | 9.906  |
| AC_Size   | 1086 | 3.459 | .722      | 3     | 6      | 3     | 6      | 1.464  | 4.354  |
| AC_IND    | 1086 | .301  | .203      | 0     | 1      | 0     | 1      | .686   | 4.434  |
| F_Size    | 1086 | 8.799 | 1.664     | 2.399 | 12.192 | 3.615 | 12.192 | -.576  | 4.019  |
| LEV       | 1086 | .517  | .192      | .098  | .994   | .1    | .935   | -.111  | 2.404  |
| ROA       | 1086 | .062  | .093      | -.21  | .408   | -.185 | .408   | .685   | 5.043  |

EFF\_INV is Investment Efficiency absolute inverse value of investment inefficiency; DAC is Discretionary Accruals; CDUA is CEO Duality; GDIV is Gender Diversity; BM is Board Meeting; AC\_Size is Audit Committee Size; AC\_IND is Audit Committee Independence; F\_Size is Firm Size; LEV is leverage, and ROA is Firm Performance.

Table 2 gives us a snapshot of the key characteristics for non-financial firms listed on the Pakistan Stock Exchange over the 2012–2019 period, with 1,086 firm-year observations making up the final sample after cleaning for outliers. Starting with investment efficiency, the average lies at -0.046 with a standard deviation of 0.033, suggesting that most firms are not particularly efficient in their investment decisions, though the range from -0.215 to 0 shows some variation and a few firms manage to get it right. Moving to earnings management, measured through discretionary accruals, we see a mean of -0.02 and a standard deviation of 0.199, with values swinging between -0.327 and 0.426. This tells us that some firms inflate earnings while others deflate them, and there is considerable diversity in how managers approach this. Interestingly, board independence had to be dropped from the analysis because it correlated too strongly with audit committee independence. CEO duality is rare here, with only 6.6% of firms combining both roles, likely because governance reforms after 2017 pushed for separation. Gender diversity is even more disappointing, averaging just 9.5% female representation on boards nowhere near satisfactory. Board meetings happen about five times a year on average, and audit committees typically consist of three to four members, with about 30% being independent directors. Among control variables, firm size varies widely, leverage averages 51.7%, and return on assets sits at a modest 6.2%, indicating moderate debt levels and positive but not spectacular profitability across the sector.

### *Correlations Matrix*

Table 3 presents the correlation matrix for all variables in the study. Following Gujarati's (2004) guideline, correlations exceeding 0.80 signal severe multicollinearity, which is why board independence was dropped due to its strong association with audit committee independence. The results show that investment efficiency generally has weak correlations with most explanatory variables. Earnings management shows

a weak negative relationship, suggesting firms that manipulate earnings tend to invest less efficiently. CEO duality also has a very weak negative correlation, indicating little bivariate impact on investment decisions. Gender diversity, however, shows a positive association, hinting that boards with more female members may make better investment choices. Interestingly, board meetings are negatively correlated with efficiency, possibly because more meetings occur during troubled times rather than routine oversight. Audit committee's size and independence show weak and negative correlations respectively, suggesting limited direct influence. Importantly, no variable exceeds the 0.80 threshold, confirming that multicollinearity is not a serious concern in this analysis.

Table 2: Correlations' Matrix

| Variables | EFF_IN<br>V | DAC     | CDUA    | GDIV    | BM     | AC_Siz<br>e | AC_IN<br>D | F_Siz<br>e | LEV     | ROA   |
|-----------|-------------|---------|---------|---------|--------|-------------|------------|------------|---------|-------|
| EFF_INV   | 1.000       |         |         |         |        |             |            |            |         |       |
| DAC       | -0.025      | 1.000   |         |         |        |             |            |            |         |       |
| CDUA      | -0.008      | -0.037  | 1.000   |         |        |             |            |            |         |       |
| GDIV      | 0.018       | -0.081* | 0.185*  | 1.000   |        |             |            |            |         |       |
| BM        | -0.072*     | 0.006   | -0.024  | -0.003  | 1.000  |             |            |            |         |       |
| AC_Size   | 0.045       | -0.027  | -0.093* | -0.104* | 0.099* | 1.000       |            |            |         |       |
| AC_IND    | -0.016      | 0.020   | -0.172* | -0.066* | 0.135* | -0.036      | 1.000      |            |         |       |
| F_Size    | 0.115*      | -0.053  | -0.125* | -0.203* | 0.169* | 0.258*      | 0.158*     | 1.000      |         |       |
| LEV       | -0.077*     | -0.094* | 0.092*  | 0.020   | 0.045  | -0.081*     | -0.091*    | 0.075*     | 1.000   |       |
| ROA       | 0.070*      | 0.117*  | -0.118* | -0.109* | -0.026 | 0.226*      | 0.104*     | 0.327*     | -0.383* | 1.000 |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Diagnostic tests

The study uses the Multicollinearity, Heteroscedasticity and Autocorrelation tests to check the diagnostics of the panel data.

### Multicollinearity

Table 4 shows the results for Multicollinearity test. To know whether it exists in the model, the study applies Variance Inflation Test (VIF). The Mean VIF is less than 10, there is no multi collinearity problem in the model, however multicollinearity on individual level exists due to interaction of the variables.

Table 3: Variance Inflation Factor

| VIF | 1/VIF |
|-----|-------|
|-----|-------|

|             |        |      |
|-------------|--------|------|
| DAC         | 41.321 | .024 |
| CDUA        | 1.202  | .832 |
| CDUA*DAC    | 1.295  | .772 |
| GDIV        | 1.259  | .794 |
| DAC*GDIV    | 1.716  | .583 |
| BM          | 1.131  | .884 |
| DAC*BM      | 14.793 | .068 |
| AC Size     | 1.168  | .856 |
| DAC*AC_Size | 27.025 | .037 |
| AC IND      | 1.1    | .909 |
| DAC*AC_IND  | 3.944  | .254 |
| F_Size      | 1.357  | .737 |
| LEV         | 1.259  | .794 |
| ROA         | 1.457  | .686 |
| Mean VIF    | 7.145  | .    |

### *Heteroscedasticity*

Our diagnostic examination of this issue, as presented in Table 5, demonstrates that the model exhibits significant heteroscedasticity concerns that may affect the validity of statistical inferences. The p-value is less than 5%, hence, the null hypothesis is rejected. Therefore, there is heteroscedasticity in the model. To address this issue, the FGLS model is employed.

*Table 4: Heteroscedasticity*

| Breusch-Pagan / Cook-Weisberg test for heteroskedasticity |                          |
|-----------------------------------------------------------|--------------------------|
| Ho: Constant variance                                     |                          |
| Variables:                                                | fitted values of EFF_INV |
| chi2(1)                                                   | 6.25                     |
| Prob > chi2                                               | 0.0124                   |

### *Regression Analysis*

Table 6 presents the relationship between earnings management measured by the modified Jones (1995) model, firm investment efficiency measured by Chen et al. (2011), and corporate governance variables. The Chi-square statistics of 174.508 indicate that independent and control variables explain a significant portion of variation in investment efficiency.

Table 6: Regression

| EFF_INV            | Coef.  | St. Err. | t-value          | p-value | [95% Conf | Interval] | Sig |
|--------------------|--------|----------|------------------|---------|-----------|-----------|-----|
| DAC                | -.008  | .033     | -0.23            | .821    | -.073     | .058      |     |
| CDUA               | -.001  | .003     | -0.23            | .817    | -.007     | .005      |     |
| DAC*CDUA           | -.017  | .028     | -0.62            | .537    | -.072     | .038      |     |
| GDIV               | .02    | .006     | 3.65             | 0       | .009      | .031      | *** |
| DAC*GDIV           | .029   | .043     | 0.67             | .5      | -.055     | .112      |     |
| BM                 | -.001  | 0        | -3.00            | .003    | -.002     | 0         | *** |
| DAC*BM             | .006   | .004     | 1.78             | .074    | -.001     | .013      | *   |
| AC_Size            | 0      | .001     | -0.17            | .865    | -.002     | .002      |     |
| DAC*AC_Size        | -.003  | .007     | -0.42            | .673    | -.017     | .011      |     |
| AC_IND             | -.005  | .003     | -1.76            | .079    | -.011     | .001      | *   |
| DAC*AC_IND         | -.058  | .034     | -1.71            | .088    | -.124     | .009      | *   |
| F_Size             | .004   | 0        | 11.23            | 0       | .004      | .005      | *** |
| LEV                | -.008  | .004     | -2.26            | .024    | -.015     | -.001     | **  |
| ROA                | .006   | .008     | 0.72             | .469    | -.01      | .021      |     |
| Constant           | -.074  | .005     | -15.78           | 0       | -.083     | -.065     | *** |
| Mean dependent var | -0.046 |          | SD dependent var |         | 0.033     |           |     |
| Number of obs      | 1086   |          | Chi-square       |         | 174.508   |           |     |

\*\*\* p<.01, \*\* p<.05, \* p<.1

## DISCUSSION

The results in table 6 show a negative but statistically insignificant relationship between earnings management and investment efficiency, failing to support hypothesis H1. This suggest that in emerging economics like Pakistan, earning management is less important and non-financial firms do not primarily make investment decisions based on it, other factors such as institutional and governance may be considered. However, in developed economics investment decisions are often taken based on financial reporting quality. These findings align with Bhutta et al. (2019), Aulia & Siregar (2018), Houcine & Kolsi (2017), Razzaq et al. (2016), Houcine (2013), and Saghafi & Arab Mazar (2011), who similarly found no significant association between financial reporting quality and investment efficiency. Specifically, Razzaq et al. (2016) and Houcine (2013) reported a positive but insignificant relationship between accounting conservatism and investment efficiency. Since earnings management inversely measures financial reporting quality, these results remain consistent. Bhutta et al. (2019) observed a positive but insignificant link between earnings management and underinvestment in Pakistan's textile sector, while Houcine & Kolsi (2017) found no association between financial reporting quality and overinvestment. Given that underinvestment and overinvestment inversely relate to investment efficiency, these findings further support the current results. However, the conclusions contradict Bzeouich et al.

(2019), Karimi et al. (2019), Shahzad et al. (2019), Li & Wang (2010), Chen et al. (2011), and agency theory predictions, highlighting divergent empirical evidence in the literature. CEO duality has a negative but statistically insignificant impact on investment efficiency, indicating boards with the same person as CEO and Chair does not have meaningful impact on efficient investment practices in Pakistan. Hence, H2a is not supported, in line with Tanveer & Ali (2020) and Bzeouich et al. (2019), but contrary to Azhar et al. (2019), Aktas et al. (2018), and Servaes & Zingales (2000).

The interaction between CEO duality and earnings management shows a negative and insignificant relationship, indicating CEO duality moderation impact is not meaningful in efficient investment practices. Thus, H2b is not supported, in line with Karimi et al. (2019) and Bzeouich et al. (2019). This highlights that many non-financial firms in Pakistan have family-controlled ownerships. This ownership concentration contributes to corporate governance mechanism and makes the dual role of CEO less influential.

Board gender diversity shows a positive and significant impact on investment efficiency, accepting H3a. This highlights the reforms in corporate governance of Pakistan that gender inclusivity contributes to effective monitoring, change in opportunistic behaviors of managers, and efficient investment practices. This matches Ali et al. (2024), Daidai & Alami, (2024), Bzeouich et al. (2019), Post & Byron (2015), Terjesen et al. (2016), but contradicts Agyei-Mensah (2021). While its interaction with earnings management is insignificant, not supporting H3b.

Board meeting frequency shows a negative and significant relationship with investment efficiency, accepting H4a. This highlights that non-financial firms in Pakistan often conduct more meetings during facing difficulties including financial issues, agency conflicts, and for reforms in governance. The result is in line with Al-Hares et al., 2018; Lin & Hwang, 2010; Chen et al., 2006). These more meetings indicate poor performance and less efficient investment practices of firms. The results are contrary to Agyei-Mensah (2021), Kim et al. (2009), and Karamanou & Vafeas (2005) who found no significant association between board meetings and investment efficiency. The board meeting's interaction with earnings management is significant and positive with investment efficiency, supporting H4b. This suggests that more numbers of meetings and poor firm performance contribute to reducing managerial opportunism, strengthening corporate governance, and improving efficient investment decisions.

Table 6 indicates that audit committee size has no significant effect on investment efficiency, thus not supporting H5a and contradicting Zalaghi et al. (2019). Its interaction with earnings management also has insignificant relationship with investment efficiency, rejecting H5b. This suggests that considering audit committee size alone does not have any meaningful impact in improving corporate governance mechanism of non-financial firms in Pakistan. Audit committee independence has a



negative and significant relationship with investment efficiency, thus supporting H6a. This result aligns with Al-Hadrami et al. (2020) and Zalaghi et al. (2019) and contradicts with Nor et al. (2018). Similarly, the interaction between earnings management and audit committee independence is negatively and significantly associated with investment efficiency, supporting H6b. These highlight that firms with high earnings management and more independent audit committee members invest less efficiently as more independence of the audit committee contributes to failure in effective monitoring due to several institutional factors including family ownership, compensation package, and limited board expertise (Alhababsah, 2024).

Regarding control variables, firm size shows a positive and significant link with investment efficiency, indicating larger non-financial firms in Pakistan invest more efficiently due to strong corporate governance structure, access to external financing, hiring professional managers, and market visibility. Leverage has a negative and significant association with investment efficiency, suggesting that that debt limits managerial flexibility and decreases efficient investment practices. ROA shows an insignificant effect on investment efficiency suggesting that non-financial firms in Pakistan focus more on financial and governance structure rather than current profitability in making investment decision.

## CONCLUSION

This study aimed to examine the association between earnings management, corporate governance (CG) attributes, and investment efficiency, along with the interaction role of CG features and earnings management. Using 1,086 firm-year observations from 2012 to 2019, collected from audited annual reports, the PSX website, the State Bank of Pakistan, and other sources, the study employed FGLS regression analysis. The findings revealed that earnings management alone does not significantly affect investment efficiency as its influence is conditional on the strength of governance mechanisms. Gender diversity in the board is the strong corporate governance mechanism that significantly improves investment efficiency. Board meetings highlighted governance or operational issues rather than efficient investment decisions, while its interaction with earning management contributed to reducing managerial opportunism, strengthening corporate governance, and improving efficient investment decisions. More independence of the audit committee and its interaction with earning management contribute to less efficient investment as more independence of the audit committees fail in effective monitoring of the firms due to some institutional factors. In contrast, CEO duality, audit committees' size and the interaction of CEO duality, gender diversity, and audit committee size with earning management do not have significant association with investment efficiency.

Firm size positively affects investment efficiency, as larger firms are more visible to stakeholders and face greater scrutiny, while leverage negatively impacts efficiency, indicating that debt may not function as a disciplinary tool. Return on assets (ROA) is not significantly associated as firms focus more on financial and governance

structure rather than current profitability. Overall, non-financial firms in Pakistan focus more on corporate governance factors rather than earnings management in determining investment efficiency.

The findings offer valuable insights for stakeholders, regulators, and policymakers, particularly the Federal Board of Revenue, SECP, and non-financial firms of Pakistan, in shaping investment and governance policies. For effective governance in Pakistan's industrial sector, emphasis should be placed on female inclusion and the strengthening corporate governance. Future research should further explore the full corporate governance code's role in moderating earnings management's impact on investment efficiency.

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