ECONOMICS & Sociology

Hoang, T. M. C., Vu, T. K. A., Ha, T. T. V., & Nguyen, T. T. H. (2026). Does corporate governance affect the nexus between earning management and investment efficiency? Evidence from Vietnam. *Economics and Sociology*, *19*(1), 28-45. doi:10.14254/2071-789X.2026/19-1/2

DOES CORPORATE GOVERNANCE AFFECT THE NEXUS BETWEEN EARNING MANAGEMENT AND INVESTMENT EFFICIENCY? EVIDENCE FROM VIETNAM

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Received: March, 2025
1st Revision: January, 2026
Accepted: March, 2026

DOI: 10.14254/2071-789X.2026/19-1/2

ABSTRACT. This research explores how earnings management (EM) influences investment efficiency (IE) in Vietnamese non-financial companies from 2009 to 2022 while also examining the moderating effects of corporate governance (CG) mechanisms on this relationship. IE is measured based on the residual models of Richardson (2006) and Huang (2020), while EM is proxied by accrual-based and real earnings management measures following Kothari et al. (2005) and Roychowdhury (2006), this study indicates that EM negatively affects IE, however, CG mechanisms have mixed effects on this relationship. Particularly, larger and more independent boards tend to mitigate the effect of EM on IE, whereas CEO duality significantly amplifies this negative relationship. These findings highlight the critical role of CG in shaping how EM translates into real investment outcomes and offer important implications for governance reforms aimed at improving capital allocation efficiency in emerging markets.

JEL Classification: D02, O17, P31

Keywords: earnings management, investment efficiency, corporate governance, GMM, Vietnam.

Introduction

Efficient corporate investment is fundamental to firm value creation and sustainable economic growth. The primary objective of corporations is to maximize shareholder value through the implementation of projects with positive net present value, as suggested by neoclassical investment theory (Hayashi, 1982; Abel, 1983). In a frictionless market, firms are expected to undertake all projects with positive net present value in order to maximize shareholder wealth. However, in practice, information asymmetries between managers and external capital providers give rise to adverse selection and moral hazard problems, which may induce managers to pursue private benefits at the expense of shareholder wealth (Jensen & Meckling, 1976; Gomariz & Ballesta, 2014; Chen et al., 2017). As a consequence, firms frequently deviate from optimal investment behavior, leading to systematic overinvestment and underinvestment (Doan et al., 2025). Within this context, earnings management (EM) represents a critical mechanism through which agency conflicts translate into inefficient investment. EM involves the deliberate manipulation of financial statements to meet benchmarks or to obscure firms' true economic performance (Dokas, 2023; Al-Begali & Phua, 2023). By distorting reported earnings, managers may initiate projects based on misleading financial signals rather than genuine value-creating opportunities (Beatty et al., 2013; Wang et al., 2015). These distortions are exacerbated by managerial incentives tied to short-term financial performance, which strengthen the propensity to engage in EM and encourage opportunistic investment behavior aimed at enhancing managerial reputation, compensation, and control (Farooq et al., 2015; Lei et al., 2014; Sheng et al., 2022; García Osma et al., 2023). Low-quality financial reporting therefore reflects weak monitoring and governance structures, increases information asymmetry, and amplifies moral hazard and agency costs, thereby contributing directly to both overinvestment and underinvestment problems (Wang et al., 2015; Bzeouich et al., 2019). Linking this topic, recent theoretical and empirical studies increasingly emphasize the role of corporate governance (CG) mechanisms in shaping corporate behavior (Tran et al., 2023; Pareek et al., 2023; Kijkasiwat et al., 2022). Effective governance structures are expected to mitigate asymmetric information, align managerial incentives with shareholder interests, and constrain opportunistic managerial behavior (Jafeel et al., 2024; Bui & Krajcsák, 2024).

Vietnam provides a particularly relevant setting to examine the EM and investment efficiency (IE) nexus because its capital market is characterized by rapid growth, relatively weak investor protection, concentrated ownership structures, and uneven enforcement of corporate governance regulations (Nguyen et al., 2024; Ngo et al., 2018). Compared with developed markets, Vietnamese listed firms often exhibit formal compliance with governance requirements, while the substantive monitoring role of boards remains limited (To et al., 2020). Prior studies in emerging markets suggest that weak governance environments may amplify managerial discretion in both reporting and investment decisions (Ullah et al., 2020; Tran, 2019). Despite emerging evidence on EM and CG in Vietnam (Le et al., 2022; Hung et al., 2020), existing studies predominantly focus on the determinants of EM, business strategy, or financing structures (Thanh et al., 2020; Luu, 2023), and thus fail to offer a comprehensive understanding of the nexus between EM, investment efficiency (IE), and CG. This fragmented evidence leaves unresolved how governance mechanisms shape the investment consequences of EM behavior in the Vietnamese context. Hence, this study aims to fill these gaps by

systematically examining whether EM impairs corporate IE and whether CG mechanisms moderate this relationship among Vietnamese listed firms. By clarifying the interaction between EM, CG, and IE, the study aims to provide insights directly relevant to investors, corporate managers, and policymakers seeking to enhance transparency, accountability, and sustainable corporate growth in emerging markets.

This study addresses two central research questions: (i) Does EM impair IE among Vietnamese listed firms? and (ii) In what way do CG mechanisms moderate this relationship? Using a balanced panel of 185 non-financial firms listed on the Vietnamese exchanges over the period 2009 - 2022, we examine both accrual-based earnings management (AEM) and real earnings management (REM) with their effects on investment inefficiency. We further investigate the moderating roles of board size, board independence, and chief executive officer (CEO) duality, and employ system-generalized method of moments (System-GMM) estimators to address endogeneity concerns. To strengthen robustness, we complement the baseline analysis with an alternative investment inefficiency proxy based on capital expenditures and research and development costs. This study makes three main contributions. First, it extends the literature by providing novel evidence from an emerging market on the investment consequences of EM. Second, it offers nuanced insights into how board-level governance mechanisms shape the EM-IE nexus, thereby illuminating the channels through which governance reforms may improve corporate outcomes. Third, by employing dynamic panel methods and alternative measures, it enhances the methodological rigor in this research stream. The remainder of this paper is organized as follows. Section 2 reviews the relevant literature and develops the hypotheses. Section 3 describes the data and methodology. Section 4 presents the empirical results, and Section 5 concludes.

1. Literature review

Related theories

In imperfect capital markets, information asymmetry between managers and external capital providers creates moral hazard and adverse selection problems that weaken external monitoring and allow managers to pursue private benefits (Jensen & Meckling, 1976; Myers & Majluf, 1984; Darrough & Stoughton, 1986). Within this environment, EM constitutes a primary channel through which managerial opportunism distorts the informational content of financial reports, weakens contracting efficiency, and impairs investment decision-making (Beatty et al., 2013; Wang et al., 2015). Distorted accounting information increases financing frictions and managerial discretion, thereby facilitating both overinvestment in value-destroying projects and underinvestment in profitable opportunities (Bzeouich et al., 2019; Nuroniyah & Basuki, 2020). However, the extent to which earnings manipulation translates into inefficient investment is not uniform across firms but depends critically on the strength of CG mechanisms. CG serves as an internal control system designed to mitigate information asymmetry, align managerial incentives with shareholder interests, and constrain opportunistic behavior (Tran et al., 2023; Kijkasiwat et al., 2022). Effective governance therefore conditions the transmission of distorted financial information into real investment outcomes.

Within this framework, three board-level governance mechanisms, board size, board independence, and CEO duality, are theorized to moderate the EM-IE nexus. Board size reflects the board's coordination efficiency and monitoring effectiveness; excessively large boards may suffer from coordination failures that dilute monitoring quality and intensify the adverse investment consequences of EM (Ullah et al., 2020; ; Chatjuthamard et al., 2024; Al-Hiyari et al., 2025). Board independence enhances objectivity and strengthens oversight, thereby mitigating earnings manipulation and attenuating its negative impact on IE (Bzeouich et al.,

2019; Bechir & Jouirou, 2021). In contrast, CEO duality concentrates power and weakens board monitoring, facilitating managerial discretion and amplifying the distortive investment effects of EM (Ullah et al., 2020; Bechir & Jouirou, 2021).

Hypothesis development

EM emerges as a critical mechanism through which agency conflicts translate into inefficient investment outcomes. EM involves the deliberate manipulation of financial statements to meet benchmarks or obscure true economic performance, known as accrual EM or real EM (Dokas, 2023; Al-Begali & Phua, 2023). Such manipulation distorts the informational content of accounting numbers and encourages managers to initiate projects based on misleading signals rather than genuine value-creating opportunities (Doan et al., 2025). These behaviors are intensified when managerial compensation and reputation are closely tied to short-term financial indicators, thereby strengthening incentives for opportunistic reporting (Sheng et al., 2022; García Osma et al., 2023). Hence, low-quality financial reporting reflects weak monitoring and control mechanisms and heightens information asymmetry, moral hazard, and agency costs, thereby exacerbating both underinvestment and overinvestment problems (Bzeouich et al., 2019). For example, this lack of transparency forces external creditors to either raise borrowing costs or reduce the capital available to mitigate these risks, compelling corporations to rely more on internal funding for their investment projects (Laghari et al., 2023; Jansen et al., 2023). Unfortunately, insufficient internal funds force corporations to abandon even highly profitable projects with positive NPV, resulting in underinvestment issues (Ben Mohamed, 2021; Du et al., 2016). Also, EM occurs when inadequate monitoring and control mechanisms enable managers to divert available cash into self-serving projects instead of distributing dividends to shareholders (Nuroniyah & Basuki, 2020; Armour et al., 2017). These projects may prove detrimental and fail to generate profits for the corporation, constituting overinvestment (Karimi et al., 2020). Empirical evidence further confirms that EM is negatively associated with IE, as distorted financial information increases financing frictions and enables managerial opportunism. For instance, Bzeouich et al. (2019) and Assad et al. (2023) both find a negative relationship between EM and IE by employing robust techniques like GMM, multinomial logit models, or panel data estimators addressing endogeneity concerns. Their results argue that EM leads to suboptimal investment decisions-either over or under-investment due to distorted financial information. Accordingly, we propose:

Hypothesis H1:Earnings management decreases corporate investment efficiency.

Previous studies indicated that effective governance structures, including optimal board size, can minimize inefficient investment and profoundly influence its ability to effectively oversee management and guide corporate strategy (Jafeel et al., 2024; Bui & Krajcsák, 2024). Drawing on the theories of asymmetric information and agency issues, smaller boards have been found to be more adept at controlling managerial decisions and enhancing firm performance because they face fewer hurdles in communication and coordination, which facilitates tighter control and more strategic decision-making, supporting efficient investments (Cho & Rui, 2009). Conversely, larger boards tend to struggle with these dynamics. The increased number of members often leads to conflicts that can distract from the board's primary governance functions, resulting in inefficiencies. Al-Hiyari et al. (2025) and Ullah et al. (2020) suggest that larger board sizes may be linked to suboptimal decision-making, such as overinvestment and underinvestment in labour, which could similarly affect capital investment decisions; these larger boards might also suffer from coordination difficulties and slower decision-making that hinder optimal IE, inadvertently fostering environments where oversight is diluted, and managers pursue less optimal investments. Hence, this study hypothesizes that larger board sizes compound the challenges posed by EM, further deteriorating IE, as follows:

Hypothesis H2: Board size increases the negative effect of earnings management on investment efficiency.

Meanwhile, board independence enhances board control and fosters shareholders, potentially curbing managerial discretion and opportunistic actions (Chatjuthamard et al., 2024; Kamarudin et al., 2024). Agency cost theory suggests that the effectiveness of the board of directors increases with the presence of independent members, who can limit managerial opportunism and prevent EM by identifying underinvestment and overinvestment situations (Richardson, 2006). Previous studies also indicate that independent board members positively impact firm performance (Lefort & Urzúa, 2008), correlating with effective monitoring of managerial decisions (Dahya et al., 2008). Then, the studies by Soliman (2020), Karimi et al. (2020), and Bzeouich et al. (2019) collectively illustrate the pivotal role of independent boards of directors in mitigating EM and enhancing IE. These studies emphasize that strong independence is crucial in creating a transparent environment. This environment reduces information asymmetries and limits managerial opportunism, thereby fostering more efficient investment decisions. Therefore, we assume that a highly independent board can act as a corrective mechanism, steering management towards more efficient and transparent investment practices, ultimately leading to improved IE, as follows:

Hypothesis H3: Board independence decreases the negative effect of earnings management on investment efficiency.

The agency cost theory posits concerns regarding CEO duality and its implications for the effectiveness of the director board. According to Jensen and Meckling (1976) and Jensen (1996), CEO duality, wherein the CEO also holds the position of chairman of the director board, can lead to conflicts of interest between managers and shareholders. This consolidation of power affords the CEO greater autonomy, potentially fostering opportunistic behaviour among management. Jensen (1996) advocates for separating the roles of CEO and chairman to mitigate managerial discretion and enhance board oversight, thereby reducing agency costs associated with inefficient investment decisions and enhancing operational efficiency. Rechner and Dalton (1991) support this notion, contending that role separation facilitates more effective monitoring by the board. Ho and Wong (2001) posit that CEO duality may facilitate the concealment of unfavourable corporate information. Forker (1992) asserts that CEO duality compromises the quality of control, resulting in suboptimal investment choices. As the findings of Ullah et al. (2020) through panel data analysis focusing on board diversity, and Bechir and Jouirou (2021) using various regression methods and robustness tests. While Ullah et al. do not directly discuss CEO duality, their findings on the positive aspects of board diversity can indirectly suggest that reducing the concentration of power (such as separating the CEO and chairman roles) might enhance governance outcomes, aligning with the findings from Bechir and Jouirou about the negative impacts of duality. Hence, we state that CEO duality significantly and negatively impacts IE, suggesting a potential way where EM could be more impactful due to weaker oversight, as follows:

Hypothesis H4: CEO dual increases the negative effect of earnings management on investment efficiency.

2. Methodological approach

Research data

We investigate non-financial firms listed on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) over 2009-20221, including the total of 1556 companies in different industries. This study excluded financial firms due to their distinct regulatory environment and accounting practices. To ensure comparability of governance disclosures and

to support dynamic specifications with lagged variables, this study retained firms with continuous listing and sufficient financial and corporate governance information over the sample period. The year 2008 was selected as the starting point because it marks the commencement of the comprehensive disclosure of CG characteristics by listed Vietnamese companies. All accounting and market variables were obtained from firms' audited financial statements and stock market data, while corporate governance variables are hand-collected from annual reports and governance disclosures. Observations with missing items required to compute the main variables were removed. To mitigate outlier influence, all continuous variables are winsorized at the 1st and 99th percentiles by year. Ultimately, the study compiled a robust sample of 185 companies meeting the selection criteria, accounting for a total of 2590 observations across various industries, as detailed in Table 1.

Table 1. Detailed industry of research sample

Industry	Number of Firms	Number of Observations
Construction and Real Estate	42	588
Information Technology	11	154
Manufacturing	78	1092
Mining	9	126
Transportation and Warehousing	15	210
Utilities	9	126
Wholesale	21	294
Total	185	2590

Source: HNX and HOSE

Measurement of EM

Following prior literature, this study applies two fundamental measures of EM, including accrual-based earnings management (AEM) and real earnings management (REM) approaches. Higher absolute values of AEM and REM indicate a higher level of EM. First, AEM approach involves managers employing accounting policies permitted by generally accepted accounting principles (GAAP) to obscure the true financial status and operations of firms (Dechow & Skinner, 2000). Authors claimed that managers might also exploit changes in accounting policies or select the most advantageous policy, impacting financial performance aspects such as asset depreciation, inventory valuation, and revenue recognition, reflecting the earnings management level. According to the Kothari et al. (2005), First, this study computes total accruals (TA) as.

$$TA_{i,t} = NI_{i,t} - CFO_{i,t} \quad (1)$$

where NI is net income and OCF is cash flow from operations. By regressing the following equation, we may obtain DA for each firm per year according to each industry:

$$\frac{TA_{it}}{AST_{it-1}} = \alpha_1 \frac{1}{AST_{it-1}} + \alpha_2 \frac{(REV_{it} - AR_{it})}{AST_{it-1}} + \alpha_3 \frac{PPE_{it}}{AST_{it-1}} + \alpha_4 \frac{NI_{it}}{AST_{it-1}} + \varepsilon_{it} \quad (2)$$

In Eq. (2), AST is beginning-of-year total assets, REV is the corporate revenue, AR is the account receivable, and PPE is property, plant, and equipment, and NI/AST controls for firm performance, t is year and i is firm's order. The fitted value from Eq. (2) represents non-discretionary accruals, and the residual represents discretionary accruals in Eq. (3).

$$DA_{i,t} = \hat{\varepsilon}_{i,t} \quad (3)$$

The study defines accrual-based earnings management intensity as the absolute value of discretionary accruals, as shown in Eq. (4). Higher AEM indicates greater accrual-based earnings manipulation

$$AEM_{it} = |DA_{it}| \quad (4)$$

Second, REM deliberately alters the timing or structure of activities, investments, or financial transactions to impact accounting outcomes. Common tactics include manipulating

revenue through pricing and credit policies, such as discounting prices or extending credit terms to boost sales nearing year-end targets. They may also pre-invoice sales or employ "sales with right of return" contracts to recognize revenue prematurely. Additionally, announcing price hikes for the next year can inflate current profits but may undermine future competitiveness (Roychowdhury, 2006). Hence, following Roychowdhury (2006), this paper calculates the abnormal cash flows from operations for each firm per year according to each industry by estimating the below equation:

$$\frac{CFO_{it}}{AST_{it-1}} = \beta_1 \frac{1}{AST_{it-1}} + \beta_2 \frac{SALES_{it}}{AST_{it-1}} + \beta_3 \frac{\Delta SALES_{it}}{AST_{it-1}} + u_{it} \quad (5)$$

In Eq. (5), CFO is the operating cash flow of corporations, ΔSALES reflects the change in corporations' sales between yearst and yeart-1. Like AEM, REM is calculated by comparing the absolute difference between actual and expected operating cash flow, as Eq. (6).

$$AB\_CFO_{i,t} = \hat{u}_{i,t} \quad (6)$$

In the main analysis, we measure real earnings management intensity as Eq. (7). A higher REM reflects a higher earnings management level.

$$REM_{i,t} = | AB\_CFO_{i,t} | \quad (7)$$

Measurement of IE

IE refers to a firm's ability to undertake value-maximizing investment projects (Ahmed et al., 2021). Because IE is not directly observable, this study proxies IE inversely by investment inefficiency (IEFF), following Richardson (2006) and Huang (2020). Higher values of IEFF therefore indicate lower investment efficiency. According to Richardson (2006), investment level is determined by subtracting fixed asset sales revenue from fixed asset purchase expenditure as well asresearch and development and acquisition expenditures, as shown in Eq. (8).

$$I_{TOTAL,t} = CAPEX_t + ACQ_t + R\&D_t - SalePPE_t \quad (8)$$

In Eq. (8), CAPEX stands for capital expenditure on fixed assets, ACQ stands for acquisition expenditure, R&D stands for research and development expenditure, and SalePPE stands for proceeds from the sale of fixed assets. Then, ITOTAL is divided into:

$$I_{TOTAL,t} = I_{MAINTENANCE,t} + I_{NEW,t} \quad (9)$$

In Eq. (9), IMAINTENANCE is the required investment to maintain existing assets, approximated by depreciation and amortization. INEW is the investment for new projects. Then, INEW is regressed on variables reflecting growth opportunities and financial conditions, in order to forecast the "reasonable" level of investment that a business should make under normal conditions:

$$I_{NEW\,it} = \gamma_0 + \gamma_1 MTB_{it-1} + \gamma_2 LEV_{it-1} + \gamma_3 CASH_{it-1} + \gamma_4 AGE_{it-1} + \gamma_5 SIZE_{it-1} + \gamma_6 ROA_{it-1} + \gamma_7 INEW_{it-1} + \delta_{it} \quad (10)$$

In Eq. (10), INEW represents the difference between ITOTAL and IMAINTENANCE in the Eq. (9). MTB is the market value over the book value of assets. LEV is the ratio of total debt to total assets. CASH is the ratio of cash and cash equivalents to total assets. AGE is the age of the corporation since its listing year. SIZE is the natural logarithm of total assets. ROA is the ratio of after-tax profit to total assets, and i and t indicate the firm i at year t. The study obtains the residual component from Richardson (2006) model, then according to Wang et al. (2015), Chen et al. (2017), Bzeouich et al. (2019), and Ullah et al. (2020), the study calculates the value of the residual to represent the inefficient investment (IEFF1).

$$IEFF1_t = I_{NEW,t} - \hat{I}_{NEW,t} = \hat{\delta}_t \quad (11)$$

To validate robustness, this study constructs an alternative inefficiency proxy (IEFF2) using an expected investment model focusing on core capital expenditures and R&D. According to Huang (2020), this proxy is estimated:

$$INVEST_{(CAPX,R\&D)_{it}} = \lambda_0 + \lambda_1 MTB_{it-1} + \lambda_2 \Delta SALES_{it-1} + \lambda_3 ROA_{it} + \lambda_4 LEV_{it-1} + \lambda_5 LOGSALE_{it-1} + \tau_{it} \quad (12)$$

In Eq. (12) INVEST(CAPX,R&D) is the sum of capital expenditures and R&D expenditures when disclosed (R&D expenditure is assumed as zero when its is missing), scaled by AST. Similarly to Eq. (10), ΔSALES is sales growth, and LOGSALE is the natural logarithm of sales. This study estimate Eq. (12) by industry-year, then alternative investment inefficiency (IEFF2) is then defined as

$$IEFF2_{it} = \hat{\tau}_{it} \quad (13)$$

so that higher IEFF2 indicates lower IE.

Empirical models

To test whether earnings management reduces IE (H1), we estimate a dynamic panel model:

$$IEFF_{it} = \theta_0 + \theta_1 EM_{it} + \theta' \mathrm{X}_{it} + \eta_{it} \quad (14)$$

In Eq. (14) IEFF reflects the inefficiency in investme nt decisions, measured by IEFF1 and IEFF2, with a higher value of IEFF implying lower IE. EM is alternatively AEM or REM measurements, and X denotes control variables (LOGTA represents to firm size, PPE is property, plant, and equipments, NCF is net total cash flow of firm to total assets, and STDEBT is short-financial leverage calculated as the short-debt to total assets ratio), ϵ is error-terms.

To test the moderating role of corporate governance (H2 to H4), this study estimates Eq. (15)

$$IEFF_{it} = \theta'_0 + \theta'_1 EM_{it} + \theta'_2 CG_{it} + \theta'_3 EM_{it} * CG_{it} + \theta'' \mathrm{X}_{it} + \eta'_{it} \quad (15)$$

In Eq. (15), CG is corporate governance, including board size (BS), board independence (BI), or CEO duality (CEOD). The marginal effect of earnings management on investment inefficiency as followed:

$$\frac{\partial IEFF_{it}}{\partial EM_{it}} = \theta'_1 + \theta'_3 CG_{it} \quad (16)$$

A negative θ'3 for BS or BI supports hypotheses 2 and 3 (mitigating effect), while a positive θ'3 for CEOD supports hypothesis 4 (amplifying effect).

Estimating method

To address endogeneity concerns arising from dependence, unobserved firm heterogeneity, and potential simultaneity between EM, CG, and IE, this study employs the dynamic System Generalized Method of Moments (System-GMM) estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). System-GMM combines equations in first differences with equations in levels, using appropriately lagged endogenous variables as internal instruments, thereby improving efficiency and reducing finite-sample bias relative to the difference-GMM estimator, particularly in panels with a large number of firms and relatively short time dimensions. The validity of the System-GMM specification is assessed through standard post-estimation diagnostics. Specifically, the Arellano-Bond tests for first- and second-order serial correlation in the differenced residuals are employed to verify the absence of second-order autocorrelation, which is required for instrument consistency. Additionally, the Hansen J-test of overidentifying restrictions is used to evaluate the overall validity of the instrument set. To mitigate potential instrument proliferation and ensure reliable inference, the instrument matrix is collapsed, and lag depth is restricted following Roodman (2009). In addition to the descriptions of variables in IE and EM models, Table 2 presents the descriptions of variables in the model.

Table 2. Descriptive variables

Variables	Symbol	Measurement	Sources
Investment inefficiency (IEEF)	IEFF1	Richardson (2006)'s model	Authors' calculations
	IEFF2	Huang (2020)'s model	
Earnings management (EM)	AEM	Kothari et al. (2005)'s model	
	REM	Roychowdhury (2006) 's model	
Corporate governance (CG)	BS	Total number of board of directors	Corporate governance reports
	BI	Ratio of independent board members to total board of directors	
	CEOD	Dummy variable equals to 01 when the firm has a CEO serving as chairman of the board of directors and vice versa	
Control varibales	NCF	Net cash flow to corporates' total assets	Financial statements
	LOGTA	Natural logarithm of the corporates' total assets	
	STDEBT	Short-debt to total assets ratio	
	PPE	Property, plant, and equipments to corporates' total assets	

Source: authors

3. Empirical findings and discussions

Table 3 presents descriptive statistics of the variables in the research model. The IE, according to the main measure IEFF1, has a mean value of 0.271 with a standard deviation of 2.662, indicating that the degree of deviation of investment decisions from the optimal level estimated by the Richardson model (2006) is quite large and highly dispersed among businesses. Conversely, the alternative measure IEFF2 has a mean value of approximately 0 (6.81E-12) and a standard deviation of 0.054, reflecting a significantly lower degree of deviation. This difference stems from the structural nature of the two measurement models. IEFF1 is constructed from Eq. (10)-(11), in which the optimal investment level is estimated based on a set of variables reflecting growth opportunities, financial conditions and investment motivation. The residuals therefore, aggregate many aspects of deviation and have a large dispersion. Meanwhile, IEFF2 is constructed from Eqs. (12) and (13) of Huang (2020), focusing only on core capital expenditure (CAPEX and R&D), so it has a narrower measurement range and lower variability. Regarding earnings management, AEM has an average value of 0.115 and REM reaches 0.141, indicating that Vietnamese listed companies have a significant level of earnings manipulation behaviors. For corporate governance mechanisms, the average BS is 1.704 (equivalent to about 5 members), the ratio of BI reaches 0.646 (equivalent to about 3 members), and the CEOD variable has an average value of 0.207, implying that about 20.7% of the companies in the sample hold both positions of CEO and Chairman.

Table 3. Descriptive statistics

Variable	Mean	SD	Min	Max	Obs
IEFF1	0.271	2.662	-6.481	42.731	2590
IEFF2	6.81E-12	0.054	-0.255	0.385	2590
AEM	0.115	0.160	0.000	3.003	2590
REM	0.141	0.570	0.000	19.559	2590
BS	1.704	0.219	1.099	2.398	2590
BI	0.646	0.184	0.000	1.000	2590
CEOD	0.207	0.405	0.000	1.000	2590
NCF	0.104	0.122	-0.319	4.102	2590
LOGTA	27.547	1.610	23.330	33.985	2590
STDEBT	0.173	0.158	0.000	0.736	2590
PPE	0.283	0.291	0.000	9.201	2590

Source: authors

In this section, this study examines the impact of EM (represented by AEM and REM) on enterprise IE (represented by IEFF1 and IEFF2) using the System-GMM method to address potential endogeneity issues (Eq. (14)). The validity of the System-GMM estimation results in the models presented in Tables 4 to 7 was evaluated through two sets of standard tests: the Arellano-Bond test for error series autocorrelation and the Hansen test for instrument validity. The results of the AR(2) second-order autocorrelation test were not statistically significant, indicating that the necessary condition for the System-GMM tool to be valid was satisfied. Furthermore, the Hansen test could not reject the null hypothesis H0 about the overidentifying restrictions, thereby confirming that the instruments are appropriate and not subject to overdeterminism.

Table 4. The effect of EM and CG on IEFF1

	AEM			REM		
	BS	BI	CEOD	BS	BI	CEOD
EM	0.856***	0.490***	0.420***	0.327***	0.408***	0.411***
	(17.24)	(21.21)	(12.47)	(13.97)	(11.93)	(11.88)
CG	-4.748***	0.403***	-0.121***	-3.687***	1.056***	-0.258***
	(-39.14)	(11.98)	(-5.88)	(-25.83)	(12.59)	(-4.58)
NCF	-5.225***	-2.391***	-2.296***	-6.035***	-5.850***	-6.035***
	(-25.69)	(-26.49)	(-19.08)	(-31.42)	(-25.56)	(-31.42)
LOGTA	0.537***	1.271***	1.327***	2.148***	2.058***	2.148***
	(26.70)	(59.86)	(34.95)	(48.05)	(33.05)	(48.05)
STDEBT	-2.060***	-1.922***	-1.899***	-3.916***	-4.058***	-3.918***
	(-26.17)	(-49.56)	(-31.70)	(-51.64)	(-42.70)	(-51.64)
PPE	1.187***	0.764***	1.070***	2.810***	2.361***	2.810***
	(12.95)	(16.84)	(13.86)	(23.16)	(16.38)	(23.16)
Constant	-5.984***	-34.687***	-36.056***	-6.524***	-59.076***	-55.754***
	(-12.97)	(-60.01)	(-34.37)	(-15.00)	(-47.17)	(-32.50)
Observations	2590	2590	2590	2590	2590	2590
P-value of AR(1) test	0.020	0.605	0.783	0.620	0.038	0.011
P-value of AR(2) test	0.148	0.231	0.308	0.188	0.805	0.945
P-value of Hansen test	0.343	0.394	0.345	0.202	0.344	0.380
Number of IV	172	183	172	163	178	175
Number of groups	185	185	185	185	185	185

*Note: *, **, *** represent statistical significance levels of 10%, 5%, and 1%, respectively. ( ) is the t-statistic*
Source: authors

The System-GMM estimation results in Table 4 (IEFF1) and Table 5 (IEFF2) show that the coefficients of AEM and REM are both positive and statistically significant at the 1% level in all models. This implies that as the level of earnings management increases, the level of investment inefficiency of the firm also increases correspondingly, thus confirming hypothesis H1. This finding is consistent with agency theory and information asymmetry theory (Jensen & Meckling, 1976; Darrough & Stoughton, 1986), which posits that accounting information distortion weakens external oversight, increases the opportunistic behavior of managers, and leads to suboptimal or overoptimal investment decisions. The consistent appearance of these results in both IEFF1 and IEFF2 suggests that the adverse impact of EM on IE is robust, regardless of the method used to measure the level of investment inefficiency. At the same time, this result is consistent with the empirical evidence of Bzeouich et al. (2019), Assad et al. (2023), and Ullah et al. (2020), which also indicated an inverse relationship between EM and IE.

Table 5. The effect of EM and CG on IEFF2 (robustness check)

	AEM			REM		
	BS	BI	CEOD	BS	BI	CEOD
EM	0.012***	0.008***	0.009***	0.003***	0.004***	0.003***
	(4.27)	(4.35)	(4.35)	(6.91)	(10.27)	(7.38)
CG	-0.018***	0.008***	-0.017***	-0.037***	0.013***	-0.007***
	(-4.71)	(4.80)	(-11.25)	(-11.20)	(5.03)	(-5.90)
NCF	-0.018***	-0.012***	-0.007	-0.055***	-0.060***	-0.018***
	(-2.67)	(-3.30)	(-1.28)	(-10.44)	(-12.08)	(-4.10)
LOGTA	0.001***	0.003***	0.003***	0.005***	0.004***	0.003***
	(3.27)	(12.33)	(9.00)	(11.76)	(15.29)	(4.24)
STDEBT	0.004	-0.017***	-0.020***	0.003	-0.001	-0.025***
	(0.94)	(-7.99)	(-6.06)	(1.02)	(-0.51)	(-10.00)
PPE	0.026***	0.020***	0.031***	0.065***	0.049***	0.077***
	(8.85)	(10.68)	(12.88)	(34.67)	(27.27)	(20.36)
Constant	-0.018	-0.086***	-0.085***	-0.084***	-0.114***	-0.105***
	(-1.54)	(-13.98)	(-9.48)	(-7.82)	(-16.68)	(-4.95)
Observations	2590	2590	2590	2590	2590	2590
P-value of AR(1) test	0.000	0.000	0.000	0.000	0.000	0.000
P-value of AR(2) test	0.511	0.461	0.498	0.533	0.477	0.479
P-value of Hansen test	0.661	0.659	0.682	0.455	0.468	0.313
Number of IV	158	180	172	177	180	175
Number of groups	185	185	185	185	185	185

*Note: *, **, *** represent statistical significance levels of 10%, 5%, and 1%, respectively. ( ) is the t-statistic*
Source: authors

Next, the coefficients of the variables representing CG mechanisms in Tables 4 and 5 show that they have a statistically significant relationship with the level of investment inefficiency. First, BS has a negative coefficient and is statistically significant at the 1% on both IEFF1 and IEFF2, implying that firms with larger boards of directors tend to achieve higher investment performance. This finding suggests that expanding the size of the board of directors significantly reduces the deviation of investment from the optimal level, consistent with agency theory arguments and empirical evidence from Bzeouich et al. (2019), Soliman (2020), and Jafeel et al. (2024). Their findings suggested that the increased size of the board of directors can enhance oversight capacity and governance resources, thereby limiting ineffective investment decisions. Second, CEOD has a negative and statistically significant coefficient on both IEFF1 and IEFF2, indicating that companies with CEOs who also hold the position of Chairman tend to achieve higher levels of optimal investment. This result is consistent with stewardship theory's argument that the concentration of managerial power can shorten the decision-making process and reduce supervisory costs, especially in the dynamic business environment of emerging economies. Nevertheless, BI had a positive and statistically significant impact on IEFF1 and IEFF2, implying that higher board independence is associated with higher levels of investment inefficiency. This finding contradicts the predictions of agency theory and previous studies that emphasized the positive role of independent members in curbing opportunistic behavior and improving investment efficiency (Chatjuthamard et al., 2024; Kamarudin et al., 2024). However, this result may reflect the specific context of Vietnam, where nominal "independence" may not equate to substantive oversight capacity, while a lack of insider information and high coordination costs can degrade the quality of investment decisions (Lien, 2012; To et al., 2020).

In Table 6 and Table 7, the interactive role of CG mechanisms in the relationship between EM and IE is examined (Eq. (15)). The findings provide consistent evidence that CG mechanisms not only directly influence the level of IE but also conditionally regulate the relationship between EM and IE. According to the marginal analysis framework in Eq. (16), the impact of EM on IE representation (IEFF1 and IEFF2) is determined by $\frac{\partial INEFF_{it}}{\partial EM_{it}} = \theta'_1 + \theta'_3 CG_{it}$, where CG represents the BS, BI, and CEOD, respectively.

Table 6. The effect of EM, CG, and their interaction on IEFF1

	AEM			REM		
	BS	BI	CEOD	BS	BI	CEOD
EM	8.879***	6.364***	0.138***	0.855***	1.576***	0.419***
	(14.10)	(6.11)	(3.88)	(2.88)	(5.89)	(11.60)
CG	-4.127***	6.083***	-0.425***	-3.638***	1.197***	-1.289***
	(-31.12)	(14.53)	(-16.11)	(-25.67)	(7.77)	(-20.92)
EM*CG	-4.782***	-11.242***	2.426***	-0.338*	-1.489***	6.216***
	(-13.07)	(-7.47)	(14.17)	(-1.79)	(-4.29)	(16.71)
NCF	-5.446***	-7.621***	-2.154***	-3.205***	-6.153***	-6.796***
	(-25.95)	(-16.51)	(-17.35)	(-20.76)	(-31.05)	(-29.21)
LOGTA	0.555***	1.737***	1.327***	0.487***	2.156***	1.974***
	(26.74)	(21.62)	(28.74)	(31.02)	(52.97)	(25.65)
STDEBT	-2.083***	-8.083***	-1.858***	-0.967***	-3.911***	-3.934***
	(-28.61)	(-39.51)	(-27.94)	(-21.70)	(-53.84)	(-37.17)
PPE	1.273***	7.241***	0.846***	0.696***	2.841***	2.245***
	(18.02)	(19.08)	(12.49)	(9.88)	(25.85)	(12.91)
Constant	-7.538***	-51.233***	-35.999***	-6.696***	-59.397***	-53.348***
	(-15.24)	(-21.12)	(-28.35)	(-15.34)	(-51.16)	(-25.32)
Observations	2590	2590	2590	2590	2590	2590
Threshold of CG	1.856	0.566	0.138/2.564+	2.530	1.058	0.419/6.635+
P-value of AR(1) test	0.006	0.023	0.540	0.632	0.038	0.002
P-value of AR(2) test	0.142	0.933	0.198	0.188	0.932	0.437
P-value of Hansen test	0.244	0.314	0.424	0.204	0.335	0.599
Number of IV	172	169	172	163	178	175
Number of groups	185	185	185	185	185	185

*Note: +: value when CEOD receives 0/value when CEOD receives 1. *, **, *** represent statistical significance levels of 10%, 5%, and 1%, respectively. ( ) is the t-statistic*
Source: authors

First, the threshold results indicate that BS and BI serve as "conditional mitigation" mechanisms: they can only neutralize the adverse effects of EM on investment inefficiency when a certain minimum level is reached. With IEEF1 (Table 6), the threshold for BS is approximately 1.856 (AEM) and 2.530 (REM), corresponding to around 6-12 board members, where the adverse effect of AEM on investment inefficiency is almost eliminated. With IEEF2 (Table 7), the BS (AEM) and BS (REM) thresholds are around 1.597 and 1.991, respectively (approximately 5 - 7 members). Notably, the BI threshold for eliminating the effects of EM, especially with REM and the IEFF2 measure, is very high (approximately 0.566 to 0.940), implying that increasing formal independence may not be sufficient; the necessary condition is a sufficiently large level of independence actually to generate effective monitoring power. Second, a comparison of AEM and REM shows that REM is more difficult with IEFF1 because the thresholds for REM (according to BS) are outside the sample range or not feasible

(according to BI), while the thresholds remain very high (BS is 5 or 7 members; BI is around 94%) with IEFF2. This implies that the mechanism of REM's impact on investment decisions may be more persistent in the face of governance improvements, consistent with the argument that REM is tied to actual operational decisions and therefore more difficult to detect and control. However, the results showed that BS and BI weakened the adverse effects of EM on both IEFF measures, thus supporting H2 and H3 of the study.

Meanwhile, CEOD consistently amplifies the adverse impact of EM on both IEFF1 and IEFF2, favoring H4. With IEFF1 (Table 6), when CEOD takes a value of 0, the marginal impact of AEM is 0.138; and it jumps to 2.564 when CEOD takes a value of 1(0.138+2.426). Similarly, REM is greatly amplified with CEOD (from 0.419 to 6.635). With IEFF2 (Table 7), CEOD even reverses the sign of AEM's impact: from -0.0052 (not adverse) to 0.0569 (clearly adverse) when it switches to the dual role; REM also increases sharply (from 0.0033 to 0.0521). This indicates that CEODs weaken oversight and allow profit-distorting behavior to easily translate into investment decisions that are further from optimal levels. These results reinforce agency theory's argument about the risks of concentrated power, weakened oversight, and increased EM potential distorting capital allocation.

Table 7. The effect of EM, CG, and their interaction on IEFF2 (robustness check)

	AEM			REM		
	BS	BI	CEOD	BS	BI	CEOD
EM	0.058***	0.049***	-0.005**	0.045***	0.141***	0.003***
	(5.22)	(5.21)	(-2.26)	(6.85)	(6.27)	(8.39)
CG	-0.027***	0.011***	-0.019***	-0.028***	0.027***	-0.015***
	(-9.07)	(4.57)	(-20.08)	(-12.10)	(4.61)	(-7.73)
EM*CG	-0.036***	-0.062***	0.062***	-0.022***	-0.150***	0.049***
	(-5.56)	(-4.69)	(8.32)	(-5.23)	(-5.16)	(6.49)
NCF	-0.050***	-0.054***	-0.035***	-0.073***	-0.272***	-0.026***
	(-13.13)	(-9.46)	(-4.90)	(-16.97)	(-17.55)	(-5.68)
LOGTA	0.008***	0.005***	-0.003***	0.009***	0.009***	0.003***
	(12.92)	(14.11)	(-3.00)	(20.79)	(8.33)	(4.43)
STDEBT	-0.001	-0.004	-0.010***	0.002	0.002	-0.025***
	(-0.58)	(-1.41)	(-2.94)	(1.56)	(0.50)	(-10.63)
PPE	0.077***	0.052***	0.028***	0.099***	0.216***	0.076***
	(21.48)	(23.07)	(7.65)	(29.80)	(34.89)	(19.63)
Constant	-0.187***	-0.155***	0.087***	-0.215***	-0.298***	-0.105***
	(-12.68)	(-15.58)	(3.00)	(-19.16)	(-9.98)	(-5.12)
Observations	2590	2590	2590	2590	2590	2590
Threshold of CG	1.597	0.797	-0.005/0.057+	1.991	0.940	0.003/0.052+
P-value of AR(1) test	0.000	0.000	0.000	0.000	0.032	0.000
P-value of AR(2) test	0.545	0.484	0.481	0.506	0.706	0.465
P-value of Hansen test	0.446	0.351	0.631	0.440	0.167	0.340
Number of IV	178	178	172	178	157	175
Number of groups	185	185	185	185	185	185

*Note: +: value when CEOD receives 0/value when CEOD receives 1. *, **, *** represent statistical significance levels of 10%, 5%, and 1%, respectively. ( ) is the t-statistic*
Source: authors

The results in Tables 4-7 show that the control variables significantly influence the level of investment inefficiency of the firm. NCF has a statistically significant inverse relationship with both IEFF1 and IEFF2, suggesting that good internal financing enables the firm to make

investment decisions closer to optimal levels. STDEBT also has a statistically significant negative impact, reflecting the role of debt in limiting the tendency towards skewed investment. Conversely, LOGTA and PPE both have a statistically significant positive impact on IEFF1 and IEFF2, indicating that large firms with high tangible asset intensity tend to generate greater investment deviations than optimal levels. These results confirm that intrinsic financial characteristics can both act as disciplinary measures, but also increase agency costs and investment inflexibility, thereby shaping the quality of a firm's capital allocation.

Conclusion

This study examines the relationship between EM and IE in Vietnamese listed non-financial firms and investigates the moderating role of CG mechanisms. IE is measured using residual-based models following Richardson (2006) and Huang (2020), while EM is proxied by accrual-based and real activities manipulation measures proposed by Kothari et al. (2005) and Roychowdhury (2006). Using the System-GMM estimator to address endogeneity, the results consistently indicate that higher levels of EM significantly increase investment inefficiency, implying that distorted financial reporting undermines the quality of corporate investment decisions.

Beyond the direct effect, the findings highlight the crucial governance channel through which EM affects IE. Board size and board independence are found to mitigate the adverse impact of EM on IE once certain threshold levels are achieved, suggesting that stronger board monitoring capacity constrains managerial opportunism and improves capital allocation quality. In contrast, CEO duality significantly amplifies the negative effect of EM on IE, indicating that power concentration weakens internal control and facilitates inefficient investment behavior. Based on these empirical findings, several important policy implications can be drawn for Vietnamese corporations and regulators. First, firms should consider strengthening their boards by ensuring an adequate number of directors with strong professional competence and relevant expertise, thereby enhancing monitoring effectiveness and improving IE. For firms that already meet the regulatory ceiling on board size, greater emphasis should be placed on improving the quality, experience, and financial literacy of board members rather than merely expanding board numbers. Second, corporations should promote substantive board independence by appointing truly independent directors with sufficient expertise and authority, which can help reduce information asymmetry and constrain opportunistic managerial behavior that leads to inefficient investment. Third, separating the roles of CEO and board chair should be encouraged, as the evidence indicates that CEO duality significantly exacerbates the detrimental investment consequences of EM.

This study is subject to certain limitations. The focus on Vietnamese listed non-financial firms may restrict the generalizability of the findings to other institutional contexts. Future research could extend this analysis to other emerging and developed markets, incorporate additional governance mechanisms, and explore alternative methodological approaches to further clarify the CG-EM-IE nexus.

Acknowledgement

This research is funded by the Trade Union University, Thuongmai University, and Ho Chi Minh City University of Economics and Finance, Vietnam.

Footnotes

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[1] Hanoi Stock Exchange and Ho Chi Minh Stock Exchange are shown at websites: https://banggia.dag.vn/HNX-IDX?lang=vi and https://banggia.dag.vn/HOSE-IDX?lang=vi, respectively.

Availability of data and materials

The data supporting this study's findings are available upon reasonable request.

Competing interest statement

It is declared that there is no conflict of interest.

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