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Corporate governance, external financing, and earnings management: new evidence from an emerging market

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Abstract

This study investigates the relationship between corporate governance, external financing, and earnings management in an emerging market. Using a sample of Vietnamese listed companies in the period of 2010–2020, the results indicate that corporate governance, which is measured by a principal component analysis (PCA) methodology, is a useful mechanism to control earnings management. However, when firms engage in external financing activities, corporate governance is not significantly associated with both accrual-based and real earnings management. In addition, the study also examines the role of corporate governance in moderating the effects of earnings management on firm value, and how it is encouraged by external financing needs. The study shows that while good corporate governance lessens the influence of earnings management on firm value, external financing needs only prompts earnings manipulation and have no effect on firm value, directly or indirectly. Therefore, the findings could provide implications for managers and regulators to enhance governance practice to alleviate firm devaluation caused by earnings management practice.

Keywords Corporate governance, External financing, Earnings management, Firm value

JEL Classification G32, G34

Introduction

Earnings management is not an unfamiliar practice for many managers across the globe. No matter what reason it is employed for, earnings management is found to possibly cause the deterioration of firm value. Ritter [64] concludes that investors might reevaluate the firm as lower future earnings performance might compensate for the former premature recognition of earnings. Moreover, conflicts between managers (agent) and shareholders (principal) might hinder the maximization of firm value (based on the agency theory introduced by [56]. However, these pernicious impacts can be alleviated through many tools, the most prominent of which is corporate governance as empirically tested by numerous researches [14, 21, 22, 37, 60]. Peasnell et al. [60] or Zalata et al. [84] prove that earnings management decreases with board independence and presence of female directors with financial background on corporate boards. Meanwhile, Dimitropoulos and Asteriou [21] find evidence that CEO duality (a dual role of being both CEO and board chairman simultaneously) may lead to higher earnings management. In contrast to corporate governance, external financing (consisting of equity and debt) is found to have a positive relationship with both accrual-based and real earnings management. The adverse impact of external financing on earnings management is recorded as early as two decades ago in such findings by Teoh et al. [70], Shivakumar [66], DuCharme et al. [23] and is confirmed by various recent researches [67, 82, 86]. Some reasons given include: Firstly, reliance on external financing (especially

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equity financing) easily leads to information asymmetry, which creates a motives for earnings management, secondly, the fact that managers manipulate earnings before implementing financial policies would make external investors believe that the business has good operating performance. In spite of the positive association between external financing and earnings management, external financing needs might turn into a driving force to help firms establish a good corporate governance system [11, 4]. Therefore, given the undeniable importance of corporate governance in mitigating earnings management, the question arises to whether other factors such as external financing are involved, can corporate governance continue to be an effective mechanism in reducing earnings management. Wang et al. [77] consider corporate governance as a moderating mechanism in the relationship between external financing activities and earnings management. The paper finds that weaker corporate governance systems increase the manipulation of earnings by accrual-based means. However, the results are made with data in Taiwan, where the corporate governance score belongs to the second group of 60–80 points according to SAHA Rating (2022). Meanwhile, this issue has not been analyzed in countries with weak corporate governance systems like an emerging market as Vietnam, whose corporate governance score is only close to 40 (SAHA Rating, 2022).

Vietnam is one of the fast-growing emerging markets, yet also one of the lowest-ranked countries in terms of corporate governance in Southest Asia [80]. In addition, Nguyen et al. [58] also prove that Vietnamese listed firms tend to report higher earnings by aggressive recognition of discretionary current accruals before and during the years of equity offering. In Vietnam, there has been a lot of external financing activities recently. Because the majority of Vietnamese enterprises are small and medium-sized, when businesses develop to a certain stage, they tend to mobilize and depend on external capital, instead of internal capital. Therefore, external financing is a matter of concern for many businesses with the goal of creating a beautiful financial report to attract investors. Prior studies conducted on data in the Vietnamese market on the influence of corporate governance on earnings management also prove the role of corporate governance in controlling earnings management, especially be state ownership, foreign ownership, managerial ownership, foreign members in the board of directors and audit committee [57, 71, 72]. However, the impact of corporate governance on earnings management when firms have external financing activities is still an issue that has not been addressed in the existing literature in Vietnam. Given the important role of external financing in Vietnam, the problem arises that in order to attract external funds, do companies need execute any profit manipulation activity or can corporate governance system restrict those activities but still support to mobilize capital? Therefore, this paper examines the relationship between corporate governance, external financing and earnings management, thereby answering the question when firms engaging external financing activities, how does corporate governance affect earnings management?

The study contributes to the extant literature in a number of ways. *First*, it provides new evidence for the relationship between corporate governance, external financing and earnings management. Our study differs from Wang et al. [77] investigating this relationship in a country with a relatively mature corporate governance system. While their results show that poor corporate governance will motivate managers to use accrual earnings management, we find evidence to prove that a firm with stronger corporate governance can mitigate accrual-based earnings management. However, when a firm engages in external financing or equity/debt financing, corporate governance is no longer an effective tool to reduce earnings management. This can be explained because in Vietnam there are still no specific regulations on external financing as well as the incomplete application of regulations on corporate governance. Hence, when firms have third factors such as external financing, corporate governance has not become an effective tool to help enterprises prevent financial frauds such as earnings management. Nevertheless, when we use the accrual quality variable instead of the earnings management variable, it indicates that good corporate governance can reduce accrual quality when a firm involves in external financing. *Second*, in our study, all factors consisting of corporate governance, external financing and earnings management are evaluated from two different approaches. Corporate governance is approached from two ways: one is to calculate the corporate governance score by the principal component analysis (PCA), the other is to separately evaluate components in corporate governance including institutional ownership, managerial ownership and executive directors. Likewise, external financing is considered in both aspects: external equity/debt financing activities and external financing needs. Meanwhile, we also adopt both accrual-based and real-activities earnings management. The results show that the higher corporate governance score, the better corporate governance, which leads to decreased earnings management. In addition, the study also examines the role of corporate governance in moderating the effects of earnings management on firm value and how it is encouraged by external financing needs. The findings indicate that while good corporate governance lessens the influence of earnings management on firm value, external financing

needs only prompts earnings manipulation and have no effect on firm value, directly or indirectly. *Finally*, the findings could provide implications for managers and regulators to enhance governance practice to alleviate firm devaluation caused by earnings management practice. Managers should build a corporate governance system according to international practices, with adjustments to suit the Vietnamese context. Managers should also be highly aware of the impact brought about by earning management practices. Doing these two things would encourage businesses attract more capital from outside. In addition, the paper suggests the authorities to improve the regulatory power of rules and regulations and other accounting-and-audit-related legal documents.

The remainder of this paper proceeds as follows: "Literature review and hypotheses development" section discusses literature review and development of hypotheses. "Data and methodology" section describes the research design including data collection, variable definitions, and empirical models. "Empirical results and discussion" section presents the empirical results and supplementary analysis. Finally, "Conclusions and recommendations" section provides the conclusions and recommendations.

Literature review and hypotheses development

Relationship between corporate governance and earnings management

The association between corporate governance and earnings management has been prominently discussed and analyzed through many theories, namely agency theory and signaling theory. As discussed above, agency theory poses a problem of managers making decisions solely for the sake of their benefit rather than focusing on shareholders' wealth. A weak corporate governance system can facilitate the act of managing reported earnings in order to meet earnings targets and receive payment, which are determined by the firm's performance. Regarding signaling theory, it is based on asymmetric information, which means that when there is information asymmetry, the holder of the information must send a signal to the party that requires the information to achieve a specific goal. Thus, according to signaling theory, companies must signal to stakeholders to minimize information asymmetry. Nevertheless, if companies fail to set up a good corporate governance system, managers would probably opt to signal in favor of themselves through the assistance of earning manipulation.

A myriad of empirical studies have been carried out to examine the relationship between corporate governance and earnings management, yet the results have been mixed. The inconsistent findings would be explained by the fact that almost all research studying this problem has a tendency to break down corporate governance into other representative characteristics of this factor including ownership structure and broad composition. When Al-Haddad and Whittington [3] investigate this relationship, their approach is to measure corporate governance by board independence, board size, CEO duality and ownership structures. Similarly, firm size and ownership structure are also employed in the models of Tran and Dang [71] and Nguyen et al. [57] to examine the association between corporate governance and earning management in Vietnamese listed firms. Due to the inclusion of different variables, different models and methods, each component of corporate governance is reported positively or negatively linked with earning management in one specific research, yet could be proved to have an adverse relationship in other studies. For example, institutional investors, with greater resources and access to information compared to other individual investors, can monitor managers better and hence impede them from adjusting earnings opportunistically [8, 12, 14]. Nevertheless, other studies argued that these investors are solely interested in short-term financial benefits rather than monitoring managers, pressuring them to meet earnings expectations, and as a result, this provides incentives for earnings management [2, 10].

Regarding board composition, prior work studying its effect on engagement in earnings management focuses on some key dimensions: board size, board independence, CEO duality, and the female's presence. Larger boards are often associated with lower levels of earnings management as larger boards are argued to be more effective at monitoring directors [6, 24, 81]. Whereas other studies find opposite results, arguing that too many board members can lead to lack of communication and coordination and consequently, monitor managers less effectively and keeping board small might do a better job [12, 44]. Meanwhile, previous researchers also find the association between board dependence and earnings management to be positive [15, 26, 81]. They argue that more independent outside directors in the board can boost its monitoring function and hence limit earnings management. CEO – chairman duality has also been a subject of interest when it comes to the incentives for earnings management. Dechow et al. [16] find that the duality of CEO is positively associated with earnings manipulation, followed by empirical studies [32, 36, 81]. The number of women on board (a prevalent choice of corporate governance measurement) is indicated to be negatively correlated in Arun et al. [5], supporting the notion that women could alleviate earning manipulation. However, when dividing sample companies into complex (high debt) and simple (low debt) companies, the outcomes of Arun et al. [5] reveal that female directors have

a positive effect on earnings management in simple companies. Zalata et al. [84] extend this literature by documenting that earnings management can be lessened if female directors have financial background. In order to address this existing issue, the application of the PCA approach, which comprises institutional ownership, managerial ownership, board meeting, board size, executive directors, women size and CEO duality, to calculate corporate governance score is proposed. Larcker et al. [49] adopt this calculation technique, applying PCA to assess corporate governance score from 14 dimensions, followed by Wang et al. [77], Yuan et al. [83]. The higher the corporate governance score, the better corporate governance quality. However, little is known about the use of PCA to check the connection between corporate governance and earning management.

In the Vietnamese context, the corporate governance activities of listed firms have made remarkable progress in the period 2007–2013. Legally, with the advent of the stock market, Vietnam has begun to pay attention to corporate governance, reflected in the issuance of Decision 12/2007/QD-BTC on Corporate Governance Regulations applicable to companies listed on the Stock Exchange. Since then, Vietnam has continuously improved the legal framework on corporate governance such as the issuance of Circular 52/2012/TT-BTC on Disclosure of Information on the Stock Market, Circular No. 121/2012/TT-BTC on corporate governance regulations applicable to public companies. The introduction of these documents has enhanced the compliance and implementation of corporate governance in Vietnamese firms and is considered a step forward in completing the legal framework for corporate governance activities in Vietnam. Besides, the quality of corporate governance practice is also getting better, as shown by the corporate governance score of Vietnam according to ASEAN Capital Markets Forum's report, which has increased in the period 2012–2013, from 28.42 points in 2012 to 33.87 points in 2013. However, Vietnamese listed companies have the lowest average governance score among the six surveyed ASEAN member states, reflecting that corporate governance activities in Vietnamese listed companies are still limited. It is undoubtedly true that Vietnamese stocks are potentially expected to attract significant foreign portfolio investment in the coming years. Therefore, in order to take advantage of these upcoming opportunities, besides enormous effort from the Government, it is of paramount importance that companies should set up and maintain a good corporate governance system to identify and alleviate any fraudulent acts.

Following the aforementioned argument, we propose the following hypothesis:

H1 A firm with high corporate governance score can mitigate earnings management.

Relationship between corporate governance, external financing activities, and earnings management

Association between external financing activities and earnings management can be explained from the view of external financing anomalies. Papanastasopoulos et al. [59] have proposed two hypotheses, which can be used to explain the external financing-induced motives behind earnings management. The earnings management hypothesis, aligning with the signaling theory, suggests that to optimize the offering proceeds, managers may exploit accruals accounting to overstate earnings during fund-raising period. Prior studies on the abnormally high accruals around offerings argue that the rationale behind this is to deceive investors into buying stocks with higher price [23, 31, 63, 67, 70]. However, Shivakumar [66] argues that the motive behind manipulating accruals is not to mislead investors, but to compensate for the discount in stock prices caused by investors' rational anticipation of earnings management in all firms. The other hypothesis, which can be considered a real-activities-earnings-management version of the bonus plan hypothesis, is the overinvestment hypothesis, suggesting that managers might use the net cash flows from external financing activities to invest into zero or negative-net-value plans for personal interests.

In addition, from a debt covenant perspective, earnings reports are recorded to be manipulated to avoid any debt covenants set by creditors [18, 20, 69]. These researches focus exclusively on accrual-based earning management. The use of real-activities earnings management is included by following studies [30, 65, 85], and it is confirmed that closeness to debt covenant violation is correlated with engagement in earnings manipulation. When it comes to equity financing, the motive is not to avoid covenants but to meet earnings targets set by boards of directors or to beat analysts' forecasts [1]. Van and Hung [75] also find that the higher the debt ratio of the firm is, the more likely it is to engage in earnings management.

In addition to confirm the association between earnings management and external financing activities, Wang et al. [77] find that managers are likely to reduce earnings management when switching from equity to debt financing, for which he argues is due to the influence of firm attributes. Zhang et al. [86] also document that equity financing motivates managers more to engage in earnings management, explaining that debt issuers are less motivated to manage earnings because debt financing is less sensitive to information asymmetry and the importance

of accounting information is undermined by the provision of collateral.

In Vietnam, the level of information asymmetry is still high, along with the incomplete and low-efficient securities market, increases investors and debt holders' reliance on financial statements when considering to finance a firm [28]. Therefore, managers tend to manipulate earnings information more, especially when firms engage in external financing activities. However, as discussed above, corporate governance is not only an effective control mechanism between principals and agents and has been introduced in Vietnam with the expectation of reducing information asymmetry, but also a useful tool to mitigate earnings management.

Therefore, we reckon that corporate governance can potentially affect earnings management during external financing activities. Based on the above discussion, we propose the following hypothesis:

H2 Corporate governance and external financing affect a firm manager's choice between real-activities and accrual-based earnings management methods.

Relationship between corporate governance, earnings management and firm value

The agency theory highlights the information asymmetry between managers and shareholders, which means managers have more information of the firm and thus can conduct some malpractices. One among these practices is the manipulation of income, which undermines owners' interest by eroding firm value but benefit managers with higher compensation as a result of misleadingly good performance. This reality puts emphasis on the need for tools which align managers' and shareholders benefit with one another or reduce the asymmetry of information. Previous research indicates that features of effective corporate governance can serve these purposes in order to moderate the detrimental impact of earning management. However, the findings are mixed. In this hypothesis, we care about the separate moderating effects of several factors rather than effect of a consolidated proxy. The unification of interests has long been proposed as a remedy. Once the manager is aware that falling firm value is synonymous with his eroded benefit, he would spare himself from engaging in actions that might take damage on the company. Jensen and Meckling [42] theorized that if managerial shareholding is enlarged, earnings adjustment are less likely to be harm firm value.

Another aspect of firm ownership is institutional shareholding. Since institutional investors are believed to be capable of imposing better monitoring mechanism on firm's activities, they are proposed by many studies to be a factor in combating earning management. Wiralestari and Fitriyani [79] find that institutional ownership can moderate the impact of earning management on firm value. However, on the other side of the argument, Filandari and Suhendra [27] and Latifah and Novitasari [50], both studying the case of Indonesian firms, found that this does not hold true and institutional shareholding has no significant effect. In Viet Nam, Vietnamese authorities encourage the application of G20/OECD Corporate Governance Principles, but to some extent institutional shareholders in Viet Nam fail to live up to this standard. This proposes enough reason the suspect the moderating effect of this factor. Filandari and Suhendra [27] also include audit quality, in particular, whether a firm is audited by a Big-Four auditor, as a moderator and found a significant impact. An intuition is that expert auditors can easily detect earning manipulation, thereby demotivating any deceptive actions. But the findings here are also contradictory. Piot and Janin [62] argue against the effectiveness of Big Five auditors, while Khanh and Khuong [45] also find audit quality in Vietnam fail to depress earning management. In Viet Nam, the securities markets are still fledging, which means that competent authorities may fail to enforce a strong enough regime to impose litigation risk on auditors. This tips our expectation towards an ineffective moderating role of Big-Four auditors.

Regarding the flow of information in the company, the failure of which can pave the way for earning management, it may be sensible to pay attention to the role of inside directors. They are supposed to be "an important link in the flow of information between top management and non-executive directors" [74]. Inside directors have close access to internal information. As a result, they may be more capable of lowering the possibility of missing out on any information, especially that concerning earning management. This provoke us to plug this variable into the model and test its effect.

To summarize, we propose the following hypothesis:

H3 Corporate governance, namely managerial shareholding, institutional shareholding, audit quality and executive directors, can moderate the effect of earnings management on firm value.

Relationship between corporate governance, external financing needs and firm value

There have been a body of preceding studies discussing the relationship between corporate governance, firm value and external financing needs. Practicing more effective corporate governance can improve firms' performance, which in turn benefits firms in valuation, as a

result found by Javid and Iqbal [41] for the case of Pakistani firms or Chen et al [11] for the case of US firms. Corporate governance can be seen as a factor mitigating information asymmetry, which in turns contribute to higher firm values. Also, Al-Najjar and Al-Najjar [4] discovered that in case of UK SMEs, better firm valuation comes as a result of firm's need for outside financing. Therefore, corporate governance and external financing needs have important roles to play in determining firm's value. Gompers et al. [33] and Klapper and Love [46] found that firms faced with external financing needs—a feature during firms' growing phase—encourage firms to practice better corporate governance, which allows them to benefit from lower capital cost. Meanwhile, firm's values also improve during this phase.

On the other hand, other studies blame external financing needs as the roots for earning manipulation. Papanastasopoulos et al. [59] summarized that during external financing phase, managers tend to employ accrual earning management to increase their earning as a vehicle to deceive investors. This will then cause investors to revalue the firm lower upon their recognition of earning management [39, 63, 70]. Also, earning management is also found during external equity financing [13, 23] and external debt financing [53]. Earning management, in turn, has a harmful impact on firm value. As an implication from the pecking order theory, when a firm resorts to external financing, there are cases when its shortage of funding results from a bad performance. Consequentially, managers are provoked to manipulate their earning upwards, when outsiders have less information about the companies situation than they do. As a result, loopholes in the organization's governance are deployed and the management would be less effective.

After all, we suppose our hypotheses:

H4 The relationship between corporate governance and firm value will be weakened by the effects of external financing needs.

Data and methodology

Data and sample selection

All Vietnamese firms listed on the Hanoi Stock Exchange (HNX) and Ho Chi Minh Stock Exchange (HOSE) between 2010 and 2020 are included in our initial sample to investigate the relationship between corporate governance, external financing, and earnings management. However, in order to maintain consistency with the research objectives, methods, and models outlined below, we have established some exclusion criteria as follows: (1) Firms in the finance, banking and insurance industry because of their distinctive nature; (2) Firms do not have enough data in the research process and lack full-set data in all periods for calculating corporate governance score by PCA. To reduce the influence of outliers, we winsorize the variables at the 1 and 99 percentiles. We end up with a final sample of 2604 observations representing 488 firms (Table 1).

Table 1 Sample selection. *Source*: Authors' own compilation from FiinPro Platform

	Number of firms	Number of observations
Initial sample (2010–2020)	761	8371
(1) Less banks, financial or insurance companies	61	671
(2) Less missing or invalid values	212	5096
Final sample	488	2604

Table 2 Breakdown of firms by industry. *Source*: Authors' own compilation from FiinPro Platform

Industry	Number of firms	Number of observations
Technology	15	84
Industrials	208	1118
Oil and gas	5	30
Consumer services	46	232
Consumer goods	80	416
Health care	19	112
Basic materials	75	375
Utilities	40	237
Final sample	488	2604

Then, based on the Industry Classification Benchmark with a slight modification to fit Vietnam's economic scenario, the breakdown of our final sample is obtained in terms of industries as stated in Table 2.

Variables definitions

Measures of Corporate Governance

Our corporate governance score (*CGS*) is generated using principal component analysis (PCA) for index construction, following Mahida and Sendhil [54], which includes employing PCA to give weights to subindices as proxies for corporate governance quality. Corporate governance components include managerial ownership (*MNG*), institutional ownership (*INS*), the number of board meetings (*BMEETING*), the size of board of directors (*BSIZE*), The ratio of executive directors to the number of board members (*EDR*), the number of women in the board of directors (*WSIZE*) and CEO duality (*CEOD* equals to 1 if the

CEO is also the chairman of the board of directors, otherwise CEOD is 0). The higher the corporate governance score (*CGS*), the better the corporate governance performance is.

First, variables except board size (*BSIZE*) and CEO duality (*CEOD*) are normalized by the process of min–max feature normalization so that all values lie within the interval from 0 to 1.

$$I_{\text{normalized}} = \frac{I - I_{\min}}{I_{\max} - I_{\min}}$$

For *BSIZE* and *CEOD*, these subindices are indicated by preceding literature to be factors having negative effect on firm value. Lipton and Lorsch [52] and Guest [34] argued that board size can hinder the communication flow within the board. Our study including *CEOD* in this category is based on Vietnam's Decree 71 (2017) on corporate governance, which requires CEO and chairman of directors to be different people, and ASEAN Corporate Governance Scorecard 2019, in which CEO duality is a minus point. Therefore, it makes sense to reverse the formula of min–max normalization to ensure that the higher the composite index, the higher the quality of the firm's governance.

$$I_{\text{normalized}} = \frac{I_{\max} - I}{I_{\max} - I_{\min}}$$

PCA is used to calculate the eigenvalues and loading scores of each principal component. After following the rule proposed by Kaiser [43] to retain 3 components with eigenvalues greater than 1, in order to obtain the weight for indicator *i*, its loading scores' absolute values in each principal component are multiplied with the eigenvalues of each component to obtain the weight for that indicator.

$$W_k = \sum_{j=1}^{3} |L_{kj}| E_j$$

where w_i is the weight for subindex L_{kj} is the loading score of subindex k in component j, E_j is the eigenvalue of component j

The weighted average of all component indicators is the corporate governance score for each observation.

$$\text{CGS}_{it} = w_k I_{k,i,t}$$

where CGS_{it} is the corporate governance score for firm i in year t, $I_{k,i,t}$ is the subindex I_k for firm i in year t.

Eventually we arrive at the formula for a single index (after the coefficients are scaled so that their sum equals 1). The higher index value indicates stronger corporate governance performance.

$$\begin{aligned}\text{CGS}_{it} = {} & 0.1506 * \text{INS}_{it} + 0.1437 * \text{MNG}_{it} \\ & + 0.0933 * \text{BMEETING}_{it} \\ & + 0.1483 * \text{BSIZE}_{it} + 0.1514 * \text{EDR}_{it} \\ & + 0.1623 * \text{WSIZE}_{it} + 0.1505 * \text{CEOD}_{it}\end{aligned} \tag{1}$$

Measures of external financing

External financing activities Following the approach of Bradshaw et al. [7] and Wang et al. [77], we measure firm's external financing activities by using the net amount of cash flow received:

$$\text{XFIN} = \text{EQUIF} + \text{DEBF} \tag{2}$$

where EQUIF denotes net cash received from the sale (and/or purchase) of common and preferred stock less cash dividends paid then scaled by total assets; DEBF denotes net cash received from the issuance (and/or reduction) of debt then scaled by total assets.

External financing needs This is measured as a binary variable, following Demirgüç-Kunt and Maksimovic [19] and Chen et al [11]. In a year when firm's growth of total assets exceeds ROE/(1 − ROE), with ROE being the ratio of net income to book equity, EFN takes the value 1, otherwise it takes 0.

Measures of earnings management

Accrual-based earnings management (AEM) and real earnings management (REM) are the two types involved in the models.

Accrual-based earnings management (AEM) is measured based on the Modified Jones model by Kothari et al. [47], Harakeh et al. [35], Campa [9].

$$\begin{aligned}\frac{\text{TA}_{it}}{\text{Assets}_{i,t-1}} = {} & \alpha_1 \frac{1}{\text{Assets}_{i,t-1}} + \alpha_2 \frac{\Delta\text{SALES}_{it} - \Delta\text{AR}_{it}}{\text{Assets}_{i,t-1}} \\ & + \alpha_3 \frac{\text{PPE}_{it}}{\text{Assets}_{i,t-1}} + \alpha_4 \text{ROA}_{i,t-1} + e_{it}\end{aligned} \tag{3}$$

where subscripts i and t represent firm i and year t. Δ refers to the change from the previous year. TA_{it} is a firm's total accruals and is calculated as $\text{TA}_{it} = \Delta\text{CA}_{it} - \Delta CL_{it} - \Delta CASH_{it} + \Delta STDEBT_{it} - DEPR_{it}$ [61] where the variables are change in current assets, change in current liabilities, change in cash, change in short term debt, and depreciation in year t. $\text{Assets}_{i,t-1}$ = total assets at the end of year $t-1$. ΔSALES_{it} = the change in sales revenue in the year t. ΔAR_{it} = the change in account receivable in year t. PPE_{it} = total fixed assets in year t. $\text{ROA}_{i,t-1}$ = return on

assets in year $t-1$. Regression is conducted in Eq. (3) to calculate the residual, which represents discretionary accruals (AEM). The greater the value of AEM, the higher the degree of earnings management.

For the measurement of real earnings management (REM), we follow Roychowdhury [65] and Kuo et al. [48] to apply a cross-sectional regression analysis for each industry-year grouping to estimate the level of real earnings management by calculating abnormal level of production cost (*APROD*), abnormal level of discretionary cost (ADISX) and abnormal cash flow from operation (*ACFO*). After obtaining the results from three components, the level of real earnings management (*REM*) is computed as: REM = [(ACFO + ADISX)*(− 1)] + APROD. The higher the value is, the greater the degree of earnings management.

Abnormal level of production cost (APROD): the sum of the residuals in three Eqs. (4), (5) and (6):

$$\frac{\text{COGS}_{it}}{\text{Assets}_{i,t-1}} = \chi_1 \frac{1}{\text{Assets}_{i,t-1}} + \chi_2 \frac{\text{SALES}_{it}}{\text{Assets}_{i,t-1}} + e_{it} \tag{4}$$

$$\frac{\Delta\text{INV}_{it}}{\text{Assets}_{i,t-1}} = \chi_1 \frac{1}{\text{Assets}_{i,t-1}} + \chi_2 \frac{\Delta\text{SALES}_{it}}{\text{Assets}_{i,t-1}} + \chi_3 \frac{\Delta\text{SALES}_{i,t-1}}{\text{Assets}_{i,t-1}} + e_{it} \tag{5}$$

$$\frac{\text{PROD}_{it}}{\text{Assets}_{i,t-1}} = \chi_1 \frac{1}{\text{Assets}_{i,t-1}} + \chi_2 \frac{\text{SALES}_{it}}{\text{Assets}_{i,t-1}} + \chi_3 \frac{\Delta\text{SALES}_{it}}{\text{Assets}_{i,t-1}} + \chi_4 \frac{\Delta\text{SALES}_{i,t-1}}{\text{Assets}_{i,t-1}} + e_{it} \tag{6}$$

where COGS_{it} = cost of goods sold at the end of year t; ΔINV_{it} = the change in inventory in year t; PROD_{it} = the sum of cost of goods sold and the annual change in inventory; and other variables are as defined previously.

Abnormal level of discretionary cost (ADISX): the residual in Eq. (7):

$$\frac{\text{DISX}_{it}}{\text{Assets}_{i,t-1}} = \chi_1 \frac{1}{\text{Assets}_{i,t-1}} + \chi_2 \frac{\text{SALES}_{i,t-1}}{\text{Assets}_{i,t-1}} + e_{it} \tag{7}$$

where DISX_{it} represents the discretionary expense in year t, which is defined as the sum of selling expenses and administrative expenses, and other variables are as defined previously.

Abnormal cash flow from operation (*ACFO*): the error term of Eq. (8):

$$\frac{\text{CFO}_{it}}{\text{Assets}_{i,t-1}} = \chi_1 \frac{1}{\text{Assets}_{i,t-1}} + \chi_2 \frac{\text{SALES}_{it}}{\text{Assets}_{i,t-1}} + \chi_3 \frac{\Delta\text{SALES}_{it}}{\text{Assets}_{i,t-1}} + e_{it} \tag{8}$$

where CFO_{it} = cash flow from operating activities in year t, and other variables are as defined previously.

Empirical Model

Firstly, we focus on the effects of corporate governance score (*CGS*) on both accrual-based and real earnings management (H1). To test this linkage, we use OLS (ordinary least square), FEM (fixed effect model) and REM (random effect model) in Eq. (9) and apply Breusch–Pagan and Hausman test to select the most suitable model:

$$\begin{aligned}\text{AEM}_{it}/\text{REM}_{it} &= \alpha + \beta_1 \text{CGS}_{it} + \beta_2 \text{BIG4}_{it} \\ &\quad + \beta_3 \text{ROA}_{it} + \beta_4 \text{SIZE}_{it} \\ &\quad + \beta_5 \text{DEBR}_{it} + \beta_6 \text{SALESGR}_{it} + e_{it}\end{aligned} \tag{9}$$

where subscripts i and t represent firm i and year t. AEM_{it} = accrual-based earnings management; REM_{it} = real earnings management; CGS_{it} = PCA corporate governance score; BIG4_{it} = a dummy variable that equals 1 if the firm is audited by a Big4, otherwise 0; ROA_{it} = return on assets; SIZE_{it} is the natural logarithm of the total assets; DEBR_{it} is measured as total liabilities divided by total assets; SALESGR_{it} represents the annual growth of firms' net sales.

Secondly, we test our second hypothesis (H2) referring to the influence of corporate governance on earnings management when firms engage in external financing activities. We adopt the model proposed by Wang et al. [77], which employed the two-stage Heckman model [38]. The first stage is a selection model, comprising factors that affect managers' decision to engage in earnings management. The second stage will analyze the impact of corporate governance and external financing activities on the level of earnings management method.

In the first stage, we employ a logistic model to extract inverse Mills ratio. The following model is constructed based on three earnings management hypotheses proposed by Watts and Zimmerman [78]:

$$\begin{aligned}TEMAR_{it} &= a_0 + a_1 ROA_{it} + a_2 DEBR_{it} \\ &\quad + a_3 SIZE_{it} + a_4 MBR_{it} + e_{it}\end{aligned} \tag{10}$$

where $TEMAR_{it}$ is a dummy variable for the use of earnings management in firm i in year t, which is equal to 1 if a firm's accrual-based or real-activities earnings management is above the annual median value in a given industry. ROA_{it} (return on assets): a proxy for the bonus plan hypothesis; $DEBR_{it}$ (the debt ratio): a proxy for the debt covenant hypothesis; $SIZE_{it}$ (the natural logarithm of total assets): a proxy for political cost hypothesis; and MBR_{it} (market-to-book ratio) is the control variable for growth prospects. In this model, we standardize both

accrual-based earnings management level and real activities earnings management level so that they contribute evenly when estimate the variable *TEMAR*.

In the second stage, we use regression to examine the effect of corporate governance and external financing activities on the level of each earnings management choice:

$$\begin{aligned} TEMA_{it}/TEMR_{it} &= \beta_0 + \beta_1 XFIN_{it} + \beta_2 CGS_{it} \\ &+ \beta_3 XFIN_{it} * CGS_{it} \\ &+ \beta_4 IMR_{it} + e_{it} \end{aligned} \tag{11}$$

where subscripts i and t represent firm i and year t. $TEMA_{it}$ is the level of accrual-based earnings management in firm i in year t, which is equal to 1 if greater than the annual median value in a given industry and 0 otherwise; $TEMR_{it}$ is the level of real-activities earnings management, which is equal to 1 if greater than the annual median value in a given industry and 0 otherwise; CGS_{it} is corporate governance score generated via PCA; and IMR_{it} is the inverse Mills ratio extracted from the first stage. Following Bradshaw et al. [7] and Wang et al. [77], we also disaggregate external financing (*XFIN*) into equity financing (*EQUIF*) and debt financing (*DEBF*) to examine the effect of each type of financing on earnings management decision.

Thirdly, we further examine the moderating effect of corporate governance on the relationship between accrual-based and real earnings management and firm value (H3) by employing the model proposed by Latifah and Novitasari [50] and using moderated regression analysis (MRA).

$$\begin{aligned} TQ_{it} = {} & \beta_0 + \beta_1 AEM_{it}/\beta_1 REM_{it} + \beta_2 INS_{it} \\ & + \beta_3 MNG_{it} + \beta_4 EDR_{it} + \beta_5 BIG4_{it} \\ & + \beta_6 \mathrm{INS}_{it} * AEM\text{-}_{it} + \beta_7 \mathrm{INS}_{it} * AEM_{-it} \\ & + \beta_8 MNG_{it} * AEM\text{-}_{it} \\ & + \beta_9 EDR_{it} * AEM\text{-}_{it} + \beta_9 BIG4_{it} * AEM\text{-}_{it} \\ & + \beta_{10} DEBR_{it} \\ & + \beta_{11} PROF_{it} + \beta_{12} SIZE_{it} + e_{it} \end{aligned} \tag{12}$$

where subscripts *i* and *t* represent firm *i* and year *t*. TQ_{it} denotes Tobin's Q which is measured as the ratio of firm's market value to the replacement cost of its assets. AEM/REM refers to accrual-based and real earnings management. INS_{it} represents the ratio of number of institutional shares to the number of outstanding shares. MNG_{it} is the ratio of number of managerial shares to the number of outstanding shares. EDR_{it} means the ratio of the number of executive director to the number of board members and $BIG4_{it}$ is a dummy variable which equals 1 if the firm is audited by a Big4, otherwise 0. The control variables include $DEBR_{it}$ (debt ratio); $SIZE_{it}$ (natural logarithm of firm's total assets) and $PROF_{it}$ which is calculated as net profit divided by net revenue.

Finally, based on Chen et al. [11], our model to test hypothesis 4 (H4) indicating the relationship between corporate governance, firm value and external financing needs is conducted by applying the following OLS model (13) with moderating variables since our corporate governance proxy is constructed from a set of corporate governance indicators.

$$\begin{aligned} TQ_{it} = {} & \beta_0 + \beta_1 CGS_{it} + \beta_2 EFN_{it} \\ & + \beta_3 EFN * CGS_{it} + \beta_4 SIZE_{it} \\ & + \beta_5 PROF_{it} + \beta_6 DEBR_{it} \\ & + \beta_7 BIG4_{it} + e_{it} \end{aligned} \tag{13}$$

where subscripts i and t represent firm i and year t. EFN_{it} is the external financing needs and all other variables are as defined previously. Based on Hayes (2013), the corporate governance score is then mean-centralized to give the moderating variables of external financing needs

Table 3 Descriptive statistics

Variable	N	Mean	Std.Dev	Min	Max
CGS	2,604	0.3778	0.0798	0.1202	0.6647
CGS (mean-centralized)	2,604	0	0.0798	−0.2576	0.2869
AEM	2,604	0.0240	0.1383	−0.6474	2.8503
REM	2,604	0.3804	1.6533	−16.9007	19.7313
EFN	2,604	0.2396	0.4269	0	1
TQ	2,604	1.1668	0.6810	0.2697	9.0450
BIG4	2,604	0.2642	0.4410	0	1
ROA	2,604	0.0635	0.0777	−0.9960	0.7837
SIZE	2,604	27.3648	1.5143	23.4406	32.5101
DEBR	2,604	0.4929	0.2173	0.0146	1.2944
SALESGR	2,604	0.1050	0.5014	−0.9686	9.2034
TEMAR	2,603	0.7457	0.4356	0	1
MBR	2,604	1.2343	1.0655	−3.2722	12.6826
TEMA	2,604	0.5069	0.5000	0	1
TEMR	2,604	0.5069	0.5000	0	1
XFIN	2,604	−0.0225	0.1281	−0.9857	0.6912
EQUIF	2,604	−0.0280	0.0732	−0.9306	0.6729
DEBF	2,604	0.0055	0.1024	−0.8615	0.6160
INS (mean-centralized)	2,604	0	0.2267	−0.4459	0.5013
MNG (mean-centralized)	2,604	0	0.1234	−0.0729	0.7815
INS	2,604	0.4959	0.2267	0.0500	0.9972
MNG	2,604	0.0729	0.1234	0	0.8544
EDR	2,604	0.4065	0.2063	0	1
PROF	2,604	0.0675	0.2966	−8.4947	2.7888

This table presents descriptive statistics for all variables used in the main analysis in Eqs. (9), (10), (11), (12) and (13). Our sample period is from 2010 to 2020

a significant coefficient in regression with moderation effect.

Empirical results and discussion

Descriptive statistics

Table 3 summarizes the sample descriptive statistics. For each mean-centralized variable, we include its initial value before mean-centralizing to give a closer look into reality.

The average score for *CGS* is relatively low, since, theoretically, the maximum score is 1, while the mean value is 0.3378 and the maximum is 0.6647. It also indicates that no firm is the absolute leader in terms of corporate governance merits. About earnings management, descriptive statistics show that 74.57% of Vietnamese listed firms have employed at one of the two earnings management methods. Great variation is observed in the statistics of *REM*, whose mean value, standard deviation, minimum, and maximum, respectively, equal 0.3804, 1.6653, -16.9007 and 19.7313. External financing needs as a binary variables average 0.2451 and the standard deviation of 0.245, which implies that there are more observed firms without external financing needs. When we turn to the second measurement of external financing, the means of *XFIN* and *EQUIF* are both negative, while that of *DEBF* is positive. This indicates on average, observed firms experience net cash outflows (inflows) when engaging in equity (debt) financing activities and the outflows tend to outweigh the inflows. Meanwhile, Tobin's Q receives the mean value of 1.1668, with the maximum amount to 9.045.

Observably, institutional investors own quite a large proportion of shares in Vietnam listed companies, averaging 49.59% and reaches a maximum of 99.72%, while, in stark contrast, the mean value of managerial holding of shares is only 7.29%. The mean value for *EDR* is 0.4065, meaning that on average, nearly a half of every board in Vietnamese listed firms is accounted for by inside directors. The mean value for *BIG4* is closer to 0.2642, meaning that the majority of observed Vietnamese listed firms are not audited by a Big-4 auditor.

The effects of corporate governance on earnings management

Table 4 reports the regression results for the effects of corporate governance score on earnings management. Models (1) and (2) adopt AEM and REM as proxies for accrual-based earnings management and real earnings management, respectively.

The empirical results in Table 4 support Hypothesis 1, suggesting that a firm with high corporate governance score can mitigate accrual-based earnings management since *CGS* has significant negative impacts on *AEM* at the 1% level. This finding consolidates the agent theory and the signaling theory, confirming that the act of earnings manipulation can be alleviated with the help of good corporate governance system. However, governance practices in Vietnam are still to be perfected. According to the ASEAN Corporate Governance Scorecard: Country Reports and Assessment 2019, although accredited efforts have been made to foster corporate governance in such matters as the issuance of English version of shareholder documents, better and more timely disclosures, there is still room for improvement. Moreover, the result also provides crucial implication for listed firms in Vietnam. Matters that need greater care are the company's commission and action to safeguard stakeholders' interest, and there is an emphasis on the roles and responsibilities undertaken by board members. To serve the purpose of protecting stakeholder's interest, it is recommended that codes of conducts and denunciation regimes should be built, widely and clearly publicized and thoroughly implemented. About BOD's roles and responsibilities, more independent directors should be named in charge of functional sub-committees, which in turn must also be assigned roles and responsibilities in a clearest manner. However, to fit for the specific situation of each individual firm, reference should be made to the ASEAN Corporate Governance Scorecard, as well as G20/OECD Principles of Corporate Governance, so that firms can figure out what criteria to follow with a view to better governance practice.

For the purpose of discussion, some important components of corporate governance in PCA calculation

Table 4 Regression results of the effects of corporate governance on earnings management

Variables	AEM (1)		REM (2)	
	Coef	*t*-stat	Coef	*t*-stat
CGS	−0.1807***	−2.68	−0.0283	−0.04
BIG4	−0.0143	−0.89	0.1135	0.64
ROA	0.0227	0.39	0.5063	0.78
SIZE	−0.0407***	−4.23	−0.4032***	−3.81
DEBR	−0.0423	−1.11	0.9375**	2.24
SALESGR	0.0009	0.15	0.1837***	2.78
Constant	1.2276	4.84	10.8524	3.89
Year FE	Yes		Yes	
Industry FE	Yes		Yes	
N	2604	2604		
R-sq	0.101	0.140		

This table presents FEM regression results for the effects of corporate governance on earnings management of Eq. (9): $AEM_{it}/REM_{it} = \alpha + \beta_1 CGS_{it} + \beta_2 BIG4_{it} + \beta_3 ROA_{it} + \beta_4 SIZE_{it} + \beta_5 DEBR_{it} + \beta_6 SALESGR_{it} + e_{it}$. The definitions for the variables are provided previously. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively

technique would be separated. The negative link between CEO duality and earnings management is concluded by the empirical result. It is a common case in Vietnamese companies that a person is both chairman and chief executives. In this situation, there is a lack of clear division of responsibility at the head of the company, meaning unrestricted levels of power would converge to one person only. Consequently, it would create an abuse of power, making easy access to earnings management activities. Regarding the number of women on board, in line with our findings is the research conducted by Arun et al. [5], which argued that women are more risk-averse and have lower tendency to engage in earnings management. Consistently with our empirical results, the research carried out by Truc and Diem [73] to investigate factors influencing the earning management in Vietnam listed manufacturing companies also indicates that the more frequent the board meetings are, the more effectively the internal control operates. As a result, this would reduce the level of earning management.

Concerning control variables in model 1, firm size is proved to have a positive relationship with *AEM*. It can be easily explained that companies with larger size tend to have more complex operational activities and are also more required to meet higher investor expectations, leading to the practice of earnings management. Sales growth and *ROA*, an indication of a firm's profitability, are both significantly and positively correlated with earnings management at the 1% level of statistical significance. In order to maintain this upward trend, managers might be put under the pressure of achieving the best result of financial statements, explaining the greater reliance on earning management. Regarding *DEBR*, the positive coefficient suggests that firms relying more on external sources for funding activities are more likely to perform earnings manipulation in order to gain trust from the debtors.

As for the second model employing *REM*, it is noteworthy that corporate governance has no impact on real earnings management. Regarding other variables, in line with the findings in model 1, *DEBR* is, again, proved to have a positive relationship with earnings management. Notably, the coefficient of *BIG4* is positive, suggesting that firms audited by Big4 are more likely to engage in earnings management. It could be explained that the audit quality of an audit firm does not solely depend on the fact whether it belongs to Big4. In contrast to model 1 using AEM, SIZE and Sales growth are proved to have an inverse relationship with earning management. Companies with larger size have a tendency to establish and maintain an effective internal control system, thus reducing the level of earnings management.

The effects of corporate governance and external financing activities on earnings management

Univariate analysis

In Table 5, we conduct mean comparison of the explanatory variables using t-test on two sample groups sorted by the value of *TEMA* and *TEMR*. The group with *TEMA (TEMR)* value equal to 0 represents firms considered 'having little earnings management practices', whereas the other group represents firm with high level of earnings management. From the results, we can see that firms partaking in less external financing activities in general and less equity financing, less debt financing in particular tend to have lower level of accrual-based earnings management. As for real earnings management, firms with lower engagement tend to have the characteristics of higher equity financing and lower debt financing compared to those with higher engagement. Nonetheless, in

Table 5 Univariate comparisons

Variable	(1) TEMA = 0 (N = 1284)	(2) TEMA = 1 (N = 1320)	(5) Test of difference H0: (1)–(2) = 0	
	Mean	Mean	*t*-stat	*p*-value
XFIN	− 0.064	0.018	− 17.1537	0.0000
EQUIF	− 0.035	− 0.021	− 4.7478	0.0000
DEBF	− 0.029	0.039	− 17.9774	0.0000
CGS	0.379	0.377	0.806	0.4203
	(3) TEMR = 0 (N = 1284)	(4) TEMR = 1 (N = 1320)	(6) Test of difference H0: (3)–(4) = 0	
	Mean	Mean	*t*-stat	*p*-value
XFIN	− 0.025	− 0.020	− 1.1090	0.2675
EQUIF	− 0.020	− 0.036	5.6046	0.0000
DEBF	− 0.005	0.016	− 5.3828	0.0000
CGS	0.379	0.377	0.7088	0.4785

This table reports the univariate test results of two groups sorted by the value of accrual-based and real earnings management. The definitions for the variables are provided previously

Table 6 Two-stage regression results for the impact of corporate governance and external financing activities on earnings management

Panel A: First stage with dependent variable: TEMAR			
Variable	**Coef**	**z**	***P***
ROA	3.554	6.66	0.000
DEBR	0.256	1.74	0.001
SIZE	− 0.109	− 5.62	0.000
MBR	0.075	2.13	0.004
Constant	3.245	6.43	0.000
LR chi2	121.82		
Prob	0.0000		
Pseudo R2	0.0413		

Panel B: Second Stage—Corporate governance, external financing and earnings management

Variables	**TEMA(1)**				**TEMR (2)**			
	Coef	**Coef**	**Coef**	**Coef**	**Coef**	**Coef**	**Coef**	**Coef**
XFIN	1.682***				0.242			
	(4.33)				(0.33)			
CGS	0.021	− 0.231	− 0.044	− 0.094	− 0.069	− 0.080	− 0.077	0.049
	(0.17)	(− 1.60)	(− 0.50)	(− 0.68)	(− 0.29)	(− 0.30)	(− 0.32)	(0.05)
XFIN × CGS	− 1.742				− 0.492			
	(− 1.72)				(− 0.25)			
EQUIF		1.971*		1.781*		0.780		0.799
		(2.46)		(2.45)		(0.54)		(0.54)
EQUIF × CGS		− 3.887		− 3.433		− 1.219		− 1.216
		(− 1.89)		(− 1.84)		(− 0.32)		(− 0.32)
DEBF			1.430**	1.401**			0.469	0.493
			(2.58)	(2.89)			(0.05)	(0.05)
DEBF × CGS			− 0.329	− 0.271			− 0.336	− 0.352
			(− 0.23)	(− 0.21)			(− 0.14)	(− 0.14)
IMR	0.396	0.641	0.672	0.542	− 1.111	− 1.184	− 1.084	− 1.179
	(4.40)	(5.73)	(6.25)	(5.39)	(− 6.01)	(− 5.73)	(− 6,25)	(− 5.71)
Constant	0.518	0.516	0.394	0.480	1.163	1.207	1.156	1.205
	(8.68)	(7.20)	(5.45)	(7.24)	(9.87)	(9.12)	(9.90)	(8.96)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
chi2	154.30	13.71	128.59	182.41	0.31	1.32	0.32	1.51
Pro > chi2	0.000	0.0033	0.000	0.000	0.9575	0.7237	0.9570	0.9115

This table presents two-stage regression results for the impact of corporate governance and external financing activities on earnings management in Eq. (10): $TEMAR_{it} = a_0 + a_1 ROA_{it} + a_2 DEBR_{it} + a_3 SIZE_{it} + a_4 MBR_{it} + e_{it}$ and Eq. (11): $TEMA_{it}/TEMR_{it} = \beta_0 + \beta_1 XFIN_{it} + \beta_2 CGS_{it} + \beta_3 XFIN_{it} * CGS_{it} + \beta_4 IMR_{it} + e_{it}$. The definitions for the variables are provided previously. Values in parentheses are *z*-value. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively

both cases, conclusions cannot be drawn about the corporate governance variable.

Multivariate analysis

As explained above, we employ two-stage model following Wang et al. [77] to examine the relationship between corporate governance, external financing actitivies and earnings management. Table 6 shows the results from two-stage regression model, in which Panel A indicates the selection model between accrual-based or real earnings management and Panel B presents results referring to the impact of corporate governance on earnings management when engaging in external financing.

In Table 6, it is clear that all variables *ROA*, *DEBR* and *SIZE* are all significantly associated with managers' decision to adopt earnings management in their firms. The coefficients for *ROA* and *DEBR* are positive while that for *SIZE* is negative. This means the greater firms' bonus

plan and debt covenants are, the more likely managers are to prematurely recognize revenue whereas the opposite applies to the case of greater political costs, which completely aligns with three earnings management hypotheses drawn from the positive accounting theory.

For the second stage, we find that external financing activities are positively and significantly correlated with earnings manipulation based on accruals accounting, while real-activity method does not seem to associate with external financing. When we compartmentalize external financing into equity and debt financing, the positive association for accrual-based earnings management and statistical insignificance for real-activities earnings management remain unchanged. Specifically, the coefficients of *EQUIF* are higher than those of *DEBF*, indicating that managers in Vietnam will gravitate towards earnings management more when it comes to equity financing than debt financing. This discovery aligns with previous studies of Wang et al. [77] and Zhang et al. [86]. It can be explained that investors are more vulnerable to information asymmetry and have to rely heavily on financial statements to make decisions. Meanwhile, debt issuers, who are mostly banks in Vietnam, are more resourceful in credit rating and rely on other unmanageable factors such as collateral rather than accounting information solely. With regard to corporate governance, the result does not support that there is any correlation between corporate governance and earnings management when involved in external financing, in both accrual-based and real earnings management methods.

Collectively with the univariate comparison, the empirical results provide solid partial support for our hypothesis that firms' engagement in earnings management is incentivized by external financing activities while rejecting any influence corporate governance may have on earnings management. This result could provide implications for investors and commercial banks in Vietnam to refer to multiple sources of information when making investment decisions or lending loans and for shareholders to constantly update companies' financial situations to detect earnings management.

The moderating role of corporate governance and external financing needs

Table 7 reports the MRA results for the moderating role of corporate governance on the effects of both accrual-based and real earnings management on firm value.

In Table 7, model (1) is aimed at analyzing the moderating impact of corporate governance, measured as a set of firm-specific features, on the relationship between accrual-based earnings management activities and firm value. As expected, *AEM* has a depressing impact on firm value. This is inconsistent with the finding of Filandari and Suhendra [27] and Latifah and Novitasari [50], who both studied the case of listed Indonesian firms and found no significant partial impact of accrual-based earnings management on firm value. For model (2) with real earnings management as the independent variable we focus on, it is noteworthy that we detect a significant relationship between real earnings management on firm value. Suffian and Sanusi [68] studying the case of Malaysian firms also indicate that real earnings management pushes up firm value. We suppose that this is because it is more difficult for auditors and the government to detect earnings management based on real activities [65].

Regarding the moderating impacts, we find that managerial holdings have no significant moderating impact. This is consistent with the finding of Filandari and Syhendra [27]. We can conclude that in Vietnam, managers are not active actors in fighting earnings management. This can be due to their humble ownership of the companies (only 7.29% on average) that fails to motivate them to align their interest with that of their firms. As pointed out by the ASEAN Corporate Governance Scorecard Country Reports and Assessment 2019, which breaks

Table 7 Moderated regression analysis (MRA) results for the moderating role of corporate governance on the effects of earnings management on firm value

AEM (1)			REM (2)		
Variables	**Coef**	***t*-stat**	**Variables**	**Coef**	***t*-stat**
AEM	−0.459*	−2.41	REM	0.0769**	3.15
INS	0.370***	6.99	INS	0.323***	5.71
MNG	−0.229**	−2.89	MNG	−0.230**	−2.94
EDR	−0.170***	−3.65	EDR	−0.117*	−2.55
BIG4	−0.0927**	−3.14	BIG4	−0.0866**	−3.05
DEBR	−0.824***	−9.57	DEBR	−0.810***	−9.39
SIZE	0.0869***	6.38	SIZE	0.0887***	6.35
PROF	0.228**	2.76	PROF	0.228**	2.71
AEM*INS	−0.735	−1.79	REM*INS	0.0745	1.49
AEM*MNG	0.178	0.34	REM*MNG	0.0138	0.18
AEM*EDR	0.656*	1.89	REM*EDR	−0.125**	−2.87
AEM*BIG4	0.162	0.95	REM*BIG4	0.0192	0.95
Constant	−0.725*	−2.10	Constant	−0.819*	−2.27
Year FE	Yes		Year FE	Yes	
Industry FE	Yes		Industry FE	Yes	
N	2604	N	2604		
R-sq	0.133	*R*-sq	0.139		

This table presents MRA results for the moderating role of corporate governance on the effects of earnings management on firm value of Eq. (12) in two earnings management method (AEM and REM): $TQ_{it} = \beta_0 + \beta_1 AEM_{it}/\beta_1 REM_{it} + \beta_2 INS_{it} + \beta_3 MNG_{it} + \beta_4 EDR_{it} + \beta_5 BIG4_{it} + \beta_6 INS_{it}{*}AEM_{it} + \beta_7 INS_{it}{*}AEM_{it} + \beta_8 MNG_{it}{*}AEM_{it} + \beta_9 EDR_{it}{*}AEM_{it} + \beta_9 BIG4_{it}{*}AEM_{it} + \beta_{10} DEBR_{it} + \beta_{11} PROF_{it} + \beta_{12} SIZE_{it} + e_{it}$. The definitions for the variables are provided previously. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively

down corporate governance into 5 aspects including Responsibility of the Board, in 2017 and 2019, this aspect received the lowest point (27.5% and 36.9%, respectively) among the 5 aspects of Vietnamese firms on average and from 2012 to 2019, in general, board responsibility of Vietnam also scores far below other ASEAN countries (14.75%, whereas the lowest of the remaining countries is Indonesia with 25.71%). Therefore, these evidences allow us to conclude that there is insufficient effort from board members to mitigate earnings management to raise firm value.

Another factor which we found consistent results for the interaction terms compared to previous studies, regardless whether *AEM* or *REM* is the independent variable of interest, is institutional shareholding. In Filandari and Syhendra [27] and Latifah and Novitasari [50], the number of shares owned by institutional investors is not an effective moderator, which is also what we find. This shall not be the same problem of separated interests as that with managerial shareholding because, as can be seen from the descriptive statistics, on average, institutional investors own a large proportion of a Vietnamese firm (mean value = 49.59%). Instead, in Vietnam, the explanation shall be that the monitoring mechanism imposed on a firm's activity has not been consolidated to such a level that can rule out opportunistic malpractices like earnings management. For instance, one requirement in the corporate governance instruction by OECD is the clarification by institutional investors of their policies of mitigating conflict of interest within the company. However, the 2017 ACGS Vietnam Country Report by IFC point out that many Vietnamese companies fail to state a clear policy of dealing with conflict of interest in transactions and protect the benefits of minor investors. As mentioned above, conflict of interest is among the roots of earning management. For this reason, institutional ownership in Viet Nam is an ineffective moderator.

About *BIG4*, both models indicate that there is no evidence that the appointment of a Big 4 auditor makes any difference to a firm's engagement in earnings manipulation. This is in contrast to Filandari and Syhendra [27], who find *BIG4* to be a reliable moderator in the model. Piot and Janin [62] found no impact of Big-Four auditors on earning management. In the case of Viet Nam, the stock market, despite rapid growth, is still at a comparatively low level of development [45]. In a "potentially" emerging market, weak enforcement of mechanism reduces the litigation risk for audit firms, therefore eroding their effectiveness in fighting earning manipulation. Vietnamese Standard on Auditing (VSA 240) is issued in 2001 based on the 1999 International Standard on Auditing (ISA), which lagged far behind the latest 2009 version. The current version lack the stipulation of auditors' responsibility in spotting financial frauds and notification to related parties. Since this reduces the risk of damaging Big-Four auditors' reputation capital as compared to the auditing environment of more developed countries, the interaction term of *BIG4* resultantly lose its significant.

The last moderator to be mentioned is the ratio of executive directors to the number of board members. The coefficient for interaction between *REM*EDR* and *TQ* is significantly negative at 5% level, however, for accrual-based earnings management, p-value is a bit less significant (p-value = 0.059). While *AEM* has a negative impact on *TQ*, the sign of the interaction term *AEM*EDR* is in the opposite direction. The contrary is observe for the case of *REM*, with a positive sign on *REM* and negative on *REM*EDR*. Our results indicate that the more executive directors there are, the more likely the effects of earnings management on firm value are depressed. It seems that Vietnamese executive directors fulfill their roles as "an important link in the information flow between top management and non-executive directors" [74].

The paper also investigates the moderating role of external financing needs on the relationship between corporate governance and firm value. The results analyzing the moderating role of external financing needs are presented in Table 8.

Table 8 shows that the period from 2010 to 2020 witnessed a positive partial impact of good corporate governance on firm value. This is consistent with Javid and Iqbal [41] and Gompers et al. [33], who indicated greater anti-takeover features, meaning greater chances for

Table 8 Moderated regression analysis (MRA) results for the moderating role of external financing needs on the relationship between corporate governance and firm value

Variable	Coef	*t*-stat
CGS	0.492**	2.82
EFN	−0.101***	−5.45
DEBR	−0.846***	−9.85
PROF	0.237**	2.72
SIZE	0.0913***	6.81
BIG4	−0.0873**	−3.05
EFN*CGS	−0.0847	−0.36
Constant	−0.883**	−2.63
Year FE	Yes	
Industry FE	Yes	
N	2604	
R-sq	0.120	

This table presents MRA results for the moderating role of external financing needs on the relationship between corporate governance and firm value in Eq. (13): $TQ_{it} = \beta_0 + \beta_1 CGS_{it} + \beta_2 EFN_{it} + \beta_3 EFN{*}CGS_{it} + \beta_4 SIZE_{it} + \beta_5 PROF_{it} + \beta_6 DEBR_{it} + \beta_7 BIG4_{it} + e_{it}$. The definitions for the variables are provided previously. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively

malpractices, was in a significant inverse relationship with firm value. In contrast, external financing need's partial impact on firm values is negative, with a statistically significant negative coefficient. In the context of a firm with average corporate governance score, external financing needs can motivate the practice of earning management, which decreases firm value. When we turn to the interaction term, the coefficient is negatively signed, although a bit less significant (p-value = 0.07). To some extent, we can conclude that external financing exacerbate the weakness of corporate governance of a company and reduce its effectiveness. We suppose this effect is due to the arising of accrual earnings management. When there are two types of this misconduct, this type of earning management is likely to be accrual-based. In the results of testing Hypothesis 3, we found that while *REM* increases *Q*, *AEM* exerts a depressing effect. This implies an inclination of listed firms in Vietnam towards adopting accrual-based approach. We find this supported by Hoang and Phung [40] that Vietnamese firms develop a preference for accrual-based earning management to real earning management. This is first because accrual-based earning management helps managers to avoid straying from their planned business decisions, which may otherwise follow if they employ real earning management. Furthermore, the Vietnamese Accounting Standards regulating financial reporting in Viet Nam was issued in 2005 and has become rather outdated compared to the IFRS. Therefore, firms also prefer AEM because they can easily exploit the loopholes of accounting standards. Our finding in testing Hypothesis 2 also indicates that *AEM* is more frequently used among Vietnamese firms when it comes to dealing with external financing. In short, in the context of external financing need, the involvement of accrual-based earning management contributes to undermine the effectiveness of corporate governance.

Supplementary analysis

To further solidify our findings, we conduct supplementary analysis by replicating our estimation with accruals quality (AQ) as an alternative proxy for earnings management in Hypotheses 1, 2 and 3. As accruals can be altered at managers' discretion, higher accruals quality, which implies lower earnings quality, can indicate signs of earnings management [17]. We also compartmentalize accruals into innate AQ (which is attributable to economic determinants) and discretionary AQ (which is attributable to management discretion) to examine closely the role of discretionary AQ, which has been believed to be a stronger indicator of earnings management than AQ itself.

For the calculation of AQ, we follow prior research [25, 29, 51] to estimate accruals quality based on accruals estimation error model, proposed by Dechow and Dichev (2002) and further developed by McNichols [55]. The estimation was conducted in two steps.

For the first step, we perform an OLS regression for each industry-year in Eq. (14):

$$\begin{aligned}\frac{TCA_{it}}{Assets_{i,t-1}} &= \alpha_0 + \alpha_1 \frac{CFO_{i,t-1}}{Assets_{i,t-1}} \\ &+ \alpha_2 \frac{CFO_{it}}{Assets_{i,t-1}} \\ &+ \alpha_3 \frac{CFO_{i,t+1}}{Assets_{i,t-1}} + \alpha_4 \frac{\Delta SALES_{it}}{Assets_{i,t-1}} \\ &+ \alpha_4 \frac{PPE_{it}}{Assets_{i,t-1}} + e_{it}\end{aligned} \tag{14}$$

where subscripts i and t represent firm i and year t. Δ refers to the change from the previous year. TCA_{it} is a firm's total current accruals and is calculated as $TCA_{it} = TA_{it} + DEPR_{it}$ [61] where the variables are defined previously in computing Accrual Earnings Management.

For the second step, we extract the residual of Eq. (14) for each firm in year *t* and compute the standard deviation of that residual for each firm from year *t-4* to year *t* to obtain the final value of accruals quality.

For the calculation of the two components of AQ, we run a regression of the total AQ found above on five economic fundamentals of business model and operating environment that determine innate AQ. An industry dummy variable is also included for control effect. The model is as follows:

$$\begin{aligned}AQ_{it} &= \beta_0 + \beta_1 SIZE_{it} + \beta_2 \sigma(CFO)_{it} \\ &+ \beta_3 \sigma(Sales)_{it} + \beta_4 OpCycle_{it} \\ &+ \beta_5 NegEarn_{it} + \beta_6 Ind\_Dummy_{it} \\ &+ e_{it}\end{aligned} \tag{15}$$

where AQ_{it} represents total accruals quality of firm *i* in year *t*. $Size_{it}$ is the natural logarithm of total assets at the end of year *t*. $\sigma(CFO)_{it}$ denotes the standard deviation of the operating cash flows from year *t-4* to year *t*. $\sigma(Sales)_{it}$ is the standard deviation of sales revenues from year *t-4* to year *t*. $OpCycle_{it}$ is the natural logarithm of the operating cycle in year *t*. $NegEarn_{it}$ is the number of years with reported negative income before tax from year *t-4* to year *t*. Ind_Dummy_{it} represents dummy variables for the industry.

After identifying the coefficients, the residual of the model (15) for each firm-year observation is discretionary AQ (DAQ), while the predicted value from Eq. (15) is its innate AQ (IAQ).

Table 9 Supplementary test's results for Hypothesis 1, 2, 3 with AQ, IAQ, DAQ as proxy for earnings management

Variables	AQ (1)		IAQ (2)		DAQ (3)	
	Coef	*p*-value	Coef	*p*-value	Coef	*p*-value
Panel A: Hypothesis 1						
CGS	−0.227	0.032	−0.011	0.781	−0.216	0.070
DEBR	−0.032	0.456	0.380	0.156	−0.070	0.181
SIZE	0.052	0.190	−0.008	0.385	0.059	0.153
ROA	−0.114	0.016	−0.003	0.944	−0.111	0.076
Salesgr	−0.002	0.215	0.002	0.004	−0.003	0.038
BIG4	−0.007	0.546	−0.007	0.393	0.000	0.992
Constant	−1.156	0.257	0.361	0.132	−1.517	0.158
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2604		2604		2604	
R-sq	0.0424		0.0112		0.0413	
Pro > F	0.1027		0.0328		0.2834	
Panel B: Hypothesis 2						
XFIN	0.270	0.003	−0.014	0.780	0.284	0.006
CGS	−0.192	0.041	−0.137	0.721	−0.178	0.097
XFIN × CGS	−0.572	0.013	0.107	0.428	−0.680	0.009
Constant	0.216	0.000	0.168	0.000	0.483	0.234
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2604		2604		2604	
R-sq	0.0167		0.0036		0.0103	
Pro > F	0.0046		0.2035		0.0235	
Panel C: Hypothesis 3						
AQ	−0.016	−0.541				
IAQ			−0.013	0.803		
DAQ					0.001	0.973
INS	−0.008	−0.493	−0.003	0.801	−0.008	0.491
MNG	0.038	0.063	0.035	0.083	0.040	0.057
EDR	0.015	0.093	0.010	0.284	0.015	0.112
BIG4	−0.012	0.060	−0.010	0.144	−0.010	0.096
LEV	−0.137	0.000	−0.134	0.000	−0.137	0.000
SIZE	0.007	0.077	0.005	0.235	0.006	0.143
PROF	0.073	0.003	0.077	0.004	0.074	0.003
AQ*INS	0.089	0.010				
AQ*MNG	0.008	0.922				
AQ*EDR	0.017	0.724				
AQ*BIG4	−0.061	0.051				
IAQ*INS			0.037	0.699		
IAQ*MNG			0.453	0.104		
IAQ*EDR			0.077	0.546		
IAQ*BIG4			0.082	0.147		
DAQ*INS					0.082	0.030
DAQ*MNG					−0.143	0.193
DAQ*EDR					−0.023	0.627
DAQ*BIG4					−0.084	0.010
Constant	−0.076	0.486	−0.013	0.907	−0.038	0.717
Year FE	Ye	Yes	Yes	Yes	Yes	Yes

Table 9 (continued)

Variables	AQ (1)		IAQ (2)		DAQ (3)	
	Coef	*p*-value	Coef	*p*-value	Coef	*p*-value
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2604		2604		2604	
R-squared	0.2233		0.2268		0.2288	
Pro > F	0.0000		0.0000		0.0000	

This table presents supplement analysis results (with accruals quality as an alternative proxy for earnings management) for the effects of corporate governance on earnings management of Eq. (9) (Panel A); the impact of corporate governance and external financing activities on earnings management in Eq. (11) ($AQ_{it} = \beta_0 + \beta_1 XFIN_{it} + \beta_2 CGS_{it} + \beta_3 XFIN_{it} * CGS_{it} + e_{it}$ (Panel B); the moderating role of corporate governance on the effects of earnings management on firm value of Eq. (12) (Panel C). The definitions for the variables are provided previously. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively

Regression results for Hypotheses 1, 2 and 3 by applying AQ and its components as alternative proxies for earnings management are presented in Table 9. For hypothesis 1, Panel A in Table 9 shows that CGS negatively correlates with AQ and discretionary AQ with significance at 5% and 10%, respectively. This indicates that firms with poor corporate governance have high accruals quality, low earnings quality and therefore are more likely to have managed earnings. This discovery strengthens our main findings above. There is no evidence of any association between innate AQ and corporate governance.

Regression results of hypothesis 2 in panel B show that external financing activities are positively and significantly associated with AQ and discretionary AQ, which aligns with our initial findings. However, contrary to the initial findings, CGS is found to negatively correlate with AQ and discretionary AQ and insignificantly correlate with innate AQ when there is involvement of external financing. This supports the results in Panel A and especially, our originally proposed hypothesis 2, which was partially rejected during our primary test.

For hypothesis 3, the result indicates that there is similarity between the results of regression models with AQ and DAQ, which are different from that for IAQ. While the signs and significance of coefficients on moderation terms in models for AQ and DAQ are the same, all correspondent coefficients with IAQ are all non-significant. This difference may lie in the fact that AQ is mostly explained by DAQ rather than IAQ. In other words, managerial intention may play a major role in deviating a firm's reported earnings from its predicted levels. This is consistent with the features of an emerging securities market like Vietnam, where transparency and the information system are still at a low level [76], allowing for malpractice by managers.

In this test, institutional shareholding, with the proxy INS, have a significant positive coefficient implying that the greater the proportion of share held by institutional owners, the less severely deviation can reduce firm value. Meanwhile, MNG, a proxy for managerial ownership still has no moderating impact as in the main models for hypothesis 3 above. Inside directors is also another moderator that is also insignificant. About the moderator BIG4, there is a consistent exaggerating impact, whether AQ or DAQ is the independent variable subject to the effect of BIG4. The significant negative implies that firms with Big-4 auditors suffer more from any accrual deviation. This combines with the finding of insignificant moderating impact of BIG4 above to prove Big 4 auditors' inactiveness in preventing accounting errors and malpractices.

Conclusions and recommendations

The paper examines the association between corporate governance, external financing, and earnings management in the context of an emerging market. We use principal component analysis (PCA) to compute corporate governance score. The higher the score, the stronger corporate governance performance is. We also adopt both accrual-based and real earnings management as proxies to assess earnings management. The findings reflect that a firm with high corporate governance score can mitigate accrual-based earnings management. However, when a firm engages in external financing or equity/debt financing, corporate governance is no longer an effective tool to reduce earnings management except for robustness test.

Additionally, the study also explores the role of corporate governance in moderating the effects of earnings management on firm value and how it is encouraged by external financing needs. In line with various prior studies, our research implies that many components of corporate governance do alleviate the firm value's deterioration which earnings management causes as well as external financing activities do incentivize earnings management in Vietnamese listed firms, especially by exploiting accrual accounting features. Out of all the components of corporate governance we study, only institutional holdings and executive director ratio have a moderating role

in how earnings management contributes to firm devaluation. Our results also indicate that despite being argued to motivate firms to improve their corporate governance [11], external financing needs play a trivial role in good corporate governance improves firm value.

In supplemental analyses, we consider accruals quality as an alternative proxy as earnings management. The paper expectedly finds that stronger corporate governance system decrease the manipulation of earnings management which is represented by total accruals quality and discretionary AQ). Nonetheless, when firms are involved in external financing, corporate governance still remains an effective tool in decreasing accruals quality.

The study extends the current literature on emerging market finance by providing new evidence for the relationship between corporate governance, external financing and earnings management. Our findings have implications for managers and regulators to enhance governance practice to alleviate firm devaluation caused by earnings management practice. Therefore, some recommendations are made for the government and other authorities to amend and consolidate the legal system relating to accounting and auditing, creating a more and more reliable framework for companies' reference and implementation. *First,* Vietnamese authorities should take full advantage of the G20/OECD Principles of Corporate Governance, which is the most widely adopted and used set of principles in the world. *Second*, evidence from OECD pointed out that there are 19 in the sample of 27 countries that have established supervisory bodies over the matter of corporate governance. They are all developed countries like France, Hong Kong, China, Italy, the Netherlands, Singapore or the UK. This has an implication that Vietnam should enforce the adherence to corporate governance principles more strictly and on a wider scale. *Third*, strict penalties are recommended to enhance the ratio of disclosure in Viet Nam. *Fourth*, quickly adopting the international standards on accounting and auditing.

The limitation of the study is that the observed sample fails to include 100% of the non-financial companies listed on the Vietnam stock market during the period between 2010 and 2020. The reason is partly due to the limitation in information disclosure of listed companies in Vietnam. Therefore, future researches may consider adding qualitative research methods such as in-depth interviews at enterprises to obtain additional results for qualitative research.

Appendix

Tables 10 and 11 present correlation matrix among variables and VIF test results in Eq. (9). As can be seen from Table 10, all correlations between variables are acceptably minor. VIF values for model 1 (AEM) and model 2 (REM) both vary from 1.01 to 1.39 with the mean value of 1.15, which indicates that our model does not suffer from the impact of multicollinearity.

Table 12 indicates that all correlations between variables are at an acceptable level with the exception of *XFIN-DEBF* relationship. This is understandable considering

Table 11 VIF test results in Eq. (9) with two dependent variables (AEM and REM)

Variables	AEM (1)		REM (2)	
	VIF	1/VIF	VIF	1/VIF
DEBR	1.39	0.7207	1.39	0.7207
ROA	1.27	0.7899	1.27	0.7899
SIZE	1.17	0.8559	1.17	0.8559
BIG4	1.05	0.9496	1.05	0.9496
CGS	1.02	0.9849	1.02	0.9849
SALESGR	1.01	0.9934	1.01	0.9934
Mean VIF	1.15		1.15	

This table presents VIF test results in Eq. (9) with two dependent variables AEM and REM as proxies for earnings management: $AEM_{it}/REM_{it} = \alpha + \beta_1 CGS_{it} + \beta_2 BIG4_{it} + \beta_3 ROA_{it} + \beta_4 SIZE_{it} + \beta_5 DEBR_{it} + \beta_6 SALESGR_{it} + e_{it}$

Table 10 Correlation matrix among variables in Eq. (9)

	CGS	AEM	REM	BIG4	ROA	SIZE	DEBR	SALESGR
CGS	1							
AEM	− 0.0789	1						
REM	− 0.0013	− 0.0552	1					
BIG4	0.0600	− 0.0180	− 0.0843	1				
ROA	0.0359	− 0.0474	0.0908	− 0.0228	1			
SIZE	0.0928	0.0394	− 0.1304	0.2064	− 0.0349	1		
DEBR	− 0.0201	0.0428	− 0.0941	0.0012	− 0.4452	0.2874	1	
SALESGR	− 0.0474	0.3998	− 0.0848	− 0.0167	− 0.0099	0.0278	0.0596	1

This table presents the pairwise correlation coefficients among variables in Eq. (9): $AEM_{it}/REM_{it} = \alpha + \beta_1 CGS_{it} + \beta_2 BIG4_{it} + \beta_3 ROA_{it} + \beta_4 SIZE_{it} + \beta_5 DEBR_{it} + \beta_6 SALESGR_{it} + e_{it}$

Table 12 Correlation matrix among variables in Eqs. (10) and (11)

	DEBF	EQUIF	XFIN	CG	SIZE	ROA	MBR	DEBR	TEMR	TEMA	TEMAR
DEBF	1.0000										
EQUIF	0.0385	1.0000									
XFIN	0.8210	0.6022	1.0000								
CG	− 0.0736	− 0.0965	− 0.1139	1.0000							
SIZE	0.0888	0.1223	0.1408	0.0928	1.0000						
ROA	− 0.0280	− 0.5254	− 0.3226	0.0359	− 0.0349	1.0000					
MBR	0.0355	− 0.3461	− 0.1694	0.0704	0.1626	0.5194	1.0000				
DEBR	0.1785	0.2779	0.3014	− 0.0201	0.2874	− 0.4452	− 0.2073	1.0000			
TEMR	0.1049	− 0.1087	0.0217	− 0.0139	− 0.2099	0.2316	0.1590	− 0.1375	1.0000		
TEMA	0.3326	0.0927	0.3187	− 0.0158	0.0386	− 0.0124	− 0.0394	0.0534	0.0444	1.0000	
TEMAR	0.2294	− 0.0556	0.1515	0.0012	− 0.1026	0.1741	0.1016	− 0.0802	0.5919	0.5919	1.0000

This table presents the pairwise correlation coefficients among variables in Eq. (10): $TEMAR_{it} = a_0 + a_1 ROA_{it} + a_2 DEBR_{it} + a_3 SIZE_{it} + a_4 MBR_{it} + e_{it}$ and Eq. (11): $TEMA_{it}/TEMR_{it} = \beta_0 + \beta_1 XFIN_{it} + \beta_2 CGS_{it} + \beta_3 XFIN_{it} * CGS_{it} + \beta_4 IMR_{it} + e_{it}$

Table 13 Correlation matrix among variables in Eq. (12)

	TQ	AEM	REM	INS	MNG	EDR	BIG4	DEBR	SIZE	PROF
TQ	1									
AEM	− 0.0307	1								
REM	0.0719	− 0.0552	1							
INS	0.1623	− 0.0591	− 0.0056	1						
MNG	− 0.0425	0.0454	− 0.0013	− 0.0651	1					
EDR	− 0.1251	0.0178	− 0.0265	− 0.054	0.0932	1				
BIG4	− 0.0137	− 0.018	− 0.0843	0.0375	− 0.0648	0.009	1			
DEBR	− 0.244	0.0428	− 0.0941	− 0.0869	− 0.0018	0.1855	0.0012	1		
SIZE	0.1212	0.0394	0.1304	0.0849	0.0372	− 0.0509	0.2064	0.2874	1	
PROF	0.1607	0.0918	− 0.0042	0.0246	− 0.0203	− 0.0838	− 0.0251	− 0.1687	0.0526	1

This table presents the pairwise correlation coefficients among variables in Eq. (12): $TQ_{it} = \beta_0 + \beta_1 AEM_{it}/\beta_1 REM_{it} + \beta_2 INS_{it} + \beta_3 MNG_{it} + \beta_4 EDR_{it} + \beta_5 BIG4_{it} + \beta_6 INS_{it} * AEM_{it} + \beta_7 INS_{it} * AEM_{it} + \beta_8 MNG_{it} * AEM_{it} + \beta_9 EDR_{it} * AEM_{it} + \beta_9 BIG4_{it} * AEM_{it} + \beta_{10} DEBR_{it} + \beta_{11} PROF_{it} + \beta_{12} SIZE_{it} + e_{it}$

Table 14 VIF test results in Eq. (12) in two different earnings management methods (AEM and REM)

(1) AEM			(2) REM		
Variables	**VIF**	**1/VIF**	**Variables**	**VIF**	**1/VIF**
DEBR	1.2	0.8311	DEBR	1.21	0.8296
SIZE	1.19	0.8379	SIZE	1.2	0.8315
EDR	1.06	0.9406	EDR	1.06	0.9404
BIG4	1.06	0.9440	BIG4	1.06	0.9405
PROF	1.06	0.9465	PROF	1.05	0.9556
INS	1.03	0.9709	INS	1.03	0.9739
MNG	1.03	0.9756	MNG	1.02	0.9772
AEM	1.02	0.9820	REM	1.03	0.9751
Mean VIF	1.08		Mean VIF	1.08	

This table presents VIF test results in Eq. (12) in two earnings management methods (AEM and REM): $TQ_{it} = \beta_0 + \beta_1 AEM_{it}/\beta_1 REM_{it} + \beta_2 INS_{it} + \beta_3 MNG_{it} + \beta_4 EDR_{it} + \beta_5 BIG4_{it} + \beta_6 INS_{it} * AEM_{it} + \beta_7 INS_{it} * AEM_{it} + \beta_8 MNG_{it} * AEM_{it} + \beta_9 EDR_{it} * AEM_{it} + \beta_9 BIG4_{it} * AEM_{it} + \beta_{10} DEBR_{it} + \beta_{11} PROF_{it} + \beta_{12} SIZE_{it} + e_{it}$

Table 15 Correlation matrix among variables in Eq. (13)

	TQ	CGS	EFN	DEBR	PROF	SIZE	BIG4
TQ	1						
CGS	0.0834	1					
EFN	−0.1161	−0.1185	1				
DEBR	−0.244	−0.0201	0.2178	1			
PROF	0.1607	0.0012	0.0037	−0.1687	1		
SIZE	0.1212	0.0928	0.0542	0.2874	0.0526	1	
BIG4	−0.0137	0.06	−0.0099	0.0012	−0.0251	0.2064	1

This table presents the pairwise correlation coefficients among variables in Eq. (13): $TQ_{it} = \beta_0 + \beta_1 CGS_{it} + \beta_2 EFN_{it} + \beta_3 EFN{*}CGS_{it} + \beta_4 SIZE_{it} + \beta_5 PROF_{it} + \beta_6 DEBR_{it} + \beta_7 BIG4_{it} + e_{it}$

Table 16 VIF test results in Eq. (13)

Variable	VIF	1/VIF
DEBR	1.19	0.8382
SIZE	1.17	0.8558
EFN	1.07	0.9379
BIG4	1.05	0.9500
PROF	1.05	0.9562
CGS	1.03	0.9741
Mean VIF	1.09	

This table presents VIF test results in Eq. (13): $TQ_{it} = \beta_0 + \beta_1 CGS_{it} + \beta_2 EFN_{it} + \beta_3 EFN{*}CGS_{it} + \beta_4 SIZE_{it} + \beta_5 PROF_{it} + \beta_6 DEBR_{it} + \beta_7 BIG4_{it} + e_{it}$. The interaction term *CG*EFN* is not included herein because of its measure as the product of two other variables

DEBF is a component of and is not included in the same model with *XFIN*.

Results from Tables 13 and 14 indicate that all correlation terms in Eq. (12) on the moderating role of corporate governance on the effects of earnings management on firm value are both negligible.

The results from Tables 15 and 16 imply that the correlation coefficients between all variables in Eq. (13) are insignificant and all VIF indicators are below 10, meaning that there is no multicollinearity in the model to analyzing the moderating role of external financing needs.

Abbreviations

AEM	Accrual-based earnings management
ASEAN	Association of Southeast Asian Nations
CEO	Chief executive officer
HNX	Hanoi stock exchange
HOSE	Ho Chi Minh stock exchange
OECD	Organization for Economic Co-operation and Development
PCA	Principal component analysis
REM	Real earnings management
SME	Small and medium enterprise

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