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Earnings management and financial distress or soundness determining CEOs' future over- and under-investment decisions

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This study investigates the association between CEOs' over-confidence in experiencing financial distress or soundness, future earnings management, and over and under-investment decisions. Specifically, it makes deeper the association between financial distress (soundness), requiring to increase (decrease) earnings management and over (under)-investment decisions. Methodologically, the authors demonstrate the CEOs' aggressive behaviour in managing their firms' earnings in developing countries. In other words, it shows a literature gap in some extant research that most CEOs in developing countries would intentionally manage future earnings for constructing future investment decisions. Then, it highlights that CEOs in developing countries tend to be over-confident because of cognitive distortion, assembling the earnings management to improve future performance. Finally, this study presents a newness with three critical reasoning arguments. First, this study uses the prospect theory, framing, conservatism and psychological projection to explain the CEOs' future investment decisions due to past earnings information, which causes their behaviour to be more optimistic. Second, this research considers that financial distress or soundness influences the association between earnings management and future over(under) investment decisions. Third, this study investigates CEOs' over-confidence using an international setting due to characteristic differentiation between advanced and developing countries, influencing this association.

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Introduction

This study investigates how CEOs' cognitive bias due to earnings management practices and financial distress affects their future investment decisions. It identifies earnings management as influencing investment decision-making. Furthermore, McNichols and Stubben (2008) explained that firms with high earnings management tend to increase investment excessively over the current period. Meanwhile, most previous studies have documented empirical evidence regarding the relationship between financial stress and future investment decisions. For example, Bassetto and Kalatzis (2011) have explained that financially depressed firms save more cash to avoid missing future investment opportunities. Meanwhile, López-Gutiérrez et al. (2015) found non-uniform investment behaviour by the CEOs of firms experiencing financial distress. Finally, this study examines the high level of earnings management, accompanied by financial distress, leading to the highest probability of CEOs deciding on excessive future investments.

This research offers newness to some critical reasoning as follows. First, this study uses sequentially blended logic based on the prospect theory, framing, conservatism and psychological projection to explain the CEOs' future investment decisions. This study then argues that firms' CEOs use past earnings information in their cognition, which causes their behaviour to be more optimistic (Bar-Gill and Bebchuk, 2002; McNichols and Stubben, 2008) in making future investment decisions. In other words, the CEOs experience the framing of past earnings management. The authors argue that CEOs have been bound to let go of the practice of ex-ante conservatism (García Lara et al., 2016; Laux and Ray, 2020) and then dare to invest in the future beyond the current period. CEOs have distorted their psychological projections (Kominis and Dudau, 2018; Rosner, 2003) because prospective earnings management could release former financial pressures. This study highlights that most CEOs considered their prospective behaviour (Biddle and Hilary, 2006; Kahneman and Tversky, 1979). The psychological projection ingrained in the CEOs' cognitions directs them to make investment decisions in the future.

Second, this study extends the research of McNichols and Stubben (2008) by investigating the association between earnings management and investment decisions. Meanwhile, Biddle et al. (2009) suggested that accounting quality negatively affects over-investment and underinvestment decisions. Furthermore, Biddle et al. (2009) found that firms' investment cash flows were related to their financial distress. This research considers that financial distress or soundness influences the association between earnings management and future investment decisions. From the literature gap perspective, it continues to mitigate further these extant research, associating earnings management and investment decision (Bar-Gill and Bebchuk, 2002; McNichols and Stubben, 2008), making deeper on (1) financial distress requiring CEOs to increase earnings, and (2) financial soundness requiring CEOs to decrease earnings. Thus, it deepens the extant research by showing that the continuum points of firms with increasing earnings management and financial distress decide to increase their future investments abnormally. Contrarily, firms with decreasing earnings management and a financial soundness state choose to make regular future investments. In other words, this research correctly accentuates the association between earnings management and future investment decisions anchored on firms with high earnings management and financial distress.

Third, this research would differentiate between developed and developing countries on past earnings management, financial distress, and the CEOs' future investment decisions. In other words, this study is designed to investigate this in an international setting. Some extant research examined the relationship between earnings management practices and CEOs' behaviour in investment

decisions (AlNajjar and Riahi-Belkaoui, 2001; Liu et al., 2021; Vorst, 2016). The authors argue that characteristic differentiation between advanced and developing countries influences this association. Moreover, this study would demonstrate that the CEOs' behaviour would probably be different because of leniencies in economic rents, environmental uncertainties, highly regulated firms (or not), etc.

Accomplishing this study's goal, the authors utilise two clustered theories and concepts to mitigate the past earnings management and financial distress that constructed the CEOs' future investment decisions. The first cluster is the intersection of earnings management and financial distress. This intersection noted that CEOs note the usefulness of these past financial performances in determining their behaviour (Du and Lai, 2018; Lee et al., 2006). This study explains that CEOs are escalating commitment due to a lost position. In other words, these CEOs have a framing effect because of historical financial performance. The second cluster is in the continuance of the first one. CEOs who commit an escalation (Festinger, 1957; Haselton et al., 2015) and framed cognition (Johnson et al., 2013; McNichols and Stubben, 2008) continue to engineer future financial performance with excessive future investments. In addition, CEOs get a second cognitive bias in engineering their future investment decisions, such as a psychological projection (Kominis and Dudau, 2018; Yolles, 2009). Finally, this study argues that CEOs release their ex-ante conservatism by achieving better accounting information. As a result, these CEOs conduct defence mechanisms by developing their prospective investment decisions from another perspective.

This study explains the association between earnings management, financial distress, and CEOs' future investment decisions. Firstly, This explanation demonstrates the sequential logic of commitment escalation on the prospect theory (Dhami and al-Nowaihi, 2007; Kahneman and Tversky, 1979), the framing effect (Chong and Druckman, 2007), and psychological projection (Kominis and Dudau, 2018; Yolles, 2009). These three theories constructed the CEOs' behaviour in their decisions about future investment abnormalities. Therefore, the authors argue that earnings management and financial distress produce CEOs' behaviour through commitment escalation in the prospect theory and the framing effect. Another explanation is that the CEOs' behavioural bias is due to capturing the usefulness of past earnings management, and financial pressures distorted their cognition of the psychological projection. Secondly, whether the association between earnings management, financial distress and future investment decisions would be evidenced or not, the examination results had consequences on the capital resources' allocation for investors (Biddle and Hilary, 2006; Healy and Wahlen, 1999; Baker et al., 2016). Therefore, investors could consider this phenomenon a warning for their investment decisions in the capital markets. The authors also raise problematic issues: CEOs who decide on an abnormal future investment work for high-risk firms.

Thirdly, the evidence from the international setting would support the idiosyncratic conclusion about the CEOs' behaviour with future investments from many countries. Whether (or not) the CEOs had opportunities to manage earnings management (Biddle and Hilary, 2006; Biddle et al., 2009), they would choose an adverse selection for maximising their firms' future investments and somehow ignore the risks. The authors also suggest that the CEOs' behaviour made future investment decisions universal due to capturing past performance through earnings management and financial pressure. On the other hand, earnings management and financial pressures could distort the CEOs' behaviour through a psychological projection in which abnormal future investment decisions could cause the firm's going concerns.

This study furtherly discusses these problems in the following order. Section 'Literature reviews and hypotheses development'

deals with the literature review and hypotheses development. Section 'Research methods' presents the research methods and hypotheses testing. Section 'Statistical results' has the statistical results, a discussion, and the research findings. Finally, section 'Conclusion and limitations' discusses the study's conclusions, limitations, and implications.

Literature reviews and hypotheses development

The intersection of earnings management and financial distress. Lee et al. (2006) suggested that financial health and firm opportunities for growth are closely related to management decision-making tendencies. This study considers financial distress a complex condition that adversely impacts the firm and its CEO, including investors and creditors (Charitou et al., 2007). Several extant studies have tested earnings management practices for firms in financial distress. For example, Rosner (2003) found that firms increased profits to avoid the probability of bankruptcy and fulfil debt covenants. Meanwhile, Saleh and Ahmed (2005) found that firms in Malaysia reduced their accrued earnings when they were under financial pressure. This study highlights that financial difficulty influenced managers' choice to decrease or increase earnings (Jaggi and Lee, 2002).

This study posits Habib et al. (2013) and Rosner (2003), who suggested that financial conditions incentivise managers to manipulate earnings. Therefore, this study argues that managers are motivated to manage earnings when they maintain their current positions and face financial problems (Du and Lai, 2018). Furthermore, this study infers that earnings management drives increased profits the following year, even though a firm's financial distress is probably temporary. Likewise, it argues that financial distress and earnings management intersect, and chief executive officers utilise them to revive firms' conditions and performance.

CEOs' cognitive bias and future investment decisions. This study argues that humans can experience cognitive bias as their systematically distorted cognition and hence do not provide an objective representation of their natural aspects (Johnson et al., 2013; Marshall et al., 2013). Haselton et al. (2015) explained that cognitive bias occurs for three reasons. First, cognitive bias occurs when an individual uses shortcuts in most circumstances (heuristics). Second, cognitive bias happens if the individual's work is not a task designed for the mind (artefact). Third, cognitive bias occurs because an individual's response patterns have lower managerial errors than unbiased cognition. This study argues that earnings management and the firm's financial condition cause managers' cognitive bias. This study explains that earnings management creates intra-conflicting CEOs' cognitions, making them uncomfortable and suffering cognitive dissonance. Then, CEOs want to resolve these conditions by changing the most likely cognitions (Festinger, 1957). The first cognition is an objective view that earnings management could reduce the financial reporting quality and harm a firm's stakeholders. Meanwhile, the second cognition is the CEOs' belief to manage future earnings in financial statements to maintain their reputation (Jiraporn et al., 2008). Therefore, these CEOs' cognition bias causes them to use earnings management for making investment decisions.

On the other hand, the firms' financial conditions are either distressed or sound, creating risk aversion in the CEOs' decision-making (Kahneman and Tversky, 1979). Financial distress usually forms a negative framing for these CEOs to maximise profits. In contrast, financial sound creates a positive framing for these CEOs to avoid losses. Therefore, this study infers that the firms' financial conditions support negative and positive framings in which the CEOs' cognitive bias affects their preference for taking

risks and investment decision-making. The CEOs' experiential values, caused by their financial conditions and earnings management practices, trigger psychological projections as their self-defence mechanism. Psychological projection refers to CEOs' self-defence, making their behaviours unpleasant and denying (Kominis and Duda, 2018). In this study, the authors argue that CEOs' self-defence cognitive bias is due to the financial conditions and earnings management, so they choose to conduct abnormal investments. Thus, we propose that the abnormal investments are the psychological projections experienced by these CEOs due to the financial pressures and their earnings management practices.

Hypotheses development. This study posits Healy and Wahlen (1999) by suggesting that the quality of accounting information affects a firm's investment efficiency. McNichols and Stubben (2008) found that firms that perform earnings management invest excessively in their future fixed assets. They also found that distorted information due to earnings management practices encourages overinvestment through increased income. Meanwhile, Biddle et al. (2009) and Lenard and Yu (2012) found that the quality of accruals, a proxy for financial statements, harm firms' under and over-investment. This study specifically explores the relationship between earnings management practices and abnormal firm investments. It demonstrates that earnings management could distort the CEOs' cognitive biases related to their growth expectations and inefficient investment decisions (DeFond and Park, 2001). Moreover, the authors argue that past earnings performance triggers CEOs to perceive high free cashflows. Consequently, this high free cashflows support CEOs as if to carry out future investments, including refinancing with new debts. Meanwhile, we show that firms could gain increased earnings. On the other hand, most CEOs, probably using discretionary policies, manipulate past earnings performance to likely increase. In the shortened words, firms apply strategies to acquire additional debts to maintain their financial performances, implying further on their discredited authorisation to enlarge business. Thus, we argue that firms with discretionary accruals decrease the firms' cost of capital, and leverage it to overinvest. Conversely, reversed arguments explain the past earnings decreased. Therefore, this study constructs the first hypotheses below.

H1a: When past income increases, earnings management positively affects future over-investment.

H1b: When past income decreases, earnings management positively affects future under-investment.

This study posits Bassetto and Kalatzis (2011) and Maripuu and Männasoo (2014) by suggesting that firms with liquidity and funding problems have higher cash flow sensitivity for investment activities. Furthermore, this study argues that the firms' financial difficulties positively relate to CEOs' investment intensity (Männasoo et al., 2018) and investment behaviour (Bassetto and Kalatzis, 2011). Therefore, this study infers the importance of making the right investment decisions to maintain the firms' financial conditions. Furthermore, the authors argue that distressed firms motivate to create new other investments, evacuating from the negative pressures. In other words, CEOs take strategic actions to cover past financial distress with future other investments, accelerating to make up for poor past performances. From prospect theory perspective, CEOs with loss positions are tendentously heuristic behaviours, conducting more investments through doing tactical actions and policies although carrying-on high risks. Therefore, it argues that financial distress affects the CEOs' cognitive distortions on deciding future overinvestment and otherwise. In addition, financial distress or

financial soundness could affect the CEOs' cognitive biases in the psychological projections of their firms' performances. Inversely, the authors explain all these arguments with reversed reasonings for firms with financial soundness. This study then formulates Hypothesis H2 below.

H2a: financial distress influences future overinvestment positively.

H2b: financial soundness influences future underinvestment positively.

This study refers to Kahneman and Tversky (1979), explaining that uncertainty and risk affect managerial decision-making through the prospect theory. Firms tend to avoid risk when they are in an advantageous position. If a firm is in an excellent financial position, its CEOs will be more careful when making investment decisions, encouraging underinvestment. Meanwhile, when the CEO faces adverse situations, they take more risks, enabling overinvestment. Therefore, the authors argue that the interaction between earnings management practices and the financial condition affects CEOs' future investment decisions. It explains this interaction with the CEOs' cognitive biases, framing and heuristic behaviour. On the other hand, Biddle and Hilary (2006) suggested that firms with excess cash flow and low leverage produce poor-quality reports and underinvest. For firms with limited cash flows and large debts, the accounting information quality supports CEOs in deciding on overinvestment. In this section, the authors explain the moderating effects of financial distress and soundness, affecting over- and under-investments. We argue that the distress strengthens CEOs' cognitive distortions on the financial distress side because they want to cover loss positions immediately. In addition, the strengthening process occurs due to making up CEOs' past performance relating to discrete earnings driftly. Therefore, this study combines the firm's financial distress and normative requirements of earnings management with past income-increasing measures, which encourage CEOs to overinvest in the future. From a behavioural perspective, this research demonstrates that the moderating process occurs when financial distress changes CEOs' beliefs and behaviours to search for new financial equilibrium, innovating some promised future investments. Hence, we argue the reversed arguments for financial soundness and past income-increasing encouraging CEOs to underinvestment in the future. This study then constructs Hypothesis H3 below.

H3a: financial distress strengthens the relationship between earnings management when past income increases and overinvestment decisions in the future.

H3b: financial soundness strengthens the relationship between earnings management when past income decreases and underinvestment decisions in the future.

This study rearranges the influence of financial distress on overinvestment decisions through earnings management using staged steps. Firstly, it states that financial distress pressures CEOs to manage firms' earnings. This distress uses the same reasoning as that in Hypothesis H2. Secondly, this study shows that earnings management and past income-increasing measures affect future overinvestment. Again, this development uses the critical reasoning behind Hypothesis H1. In other words, financial distress positively affects earnings management when past income increases and then influences future overinvestment decisions. Conversely, financial soundness positively affects earning management when past income decreases and influences underinvestment decisions. In these hypotheses development, the authors transform moderating effects into staging ones. Thus, we argue that staging effects explain what CEOs first carry out their activities to secure financial distresses. After that, they arranged methodologies to overcome distressing problems by

conducting new other future investments secondly. Meanwhile, in the psychological behaviours, the authors explain that CEOs were cognitively distorted because of financial distresses. Then, they want to evacuate from these distresses through the second cognitive distortion of psychological projections. Thus, we reveal the CEOs' twice distorted cognition due to financial distress. Furthermore, this study sequentially combines the ordered (staged) influences of financial distress on earnings management and overinvestment decisions. In other words, earnings management intervenes in the role of financial distress to cause future overinvestment. Therefore, this study formulates Hypothesis H4 below.

H4a: financial distress first intervenes in earnings management, when past income increases, affecting future overinvestment.

H4b: financial soundness first intervenes in earnings management, when past income decreases, affecting future underinvestment.

Research methods

Population and sampling. This study used a sampling method of all the manufacturing firms in developed and developing countries listed on the stock exchanges. This selection refers to the developing and developed countries classification by the United Nations. Moreover, this study selected 46 countries based on the Best Countries 2020 (World, 2020). In addition, it secondly filters that the countries have a stock exchange with 20 or more listed firms on it. The initial sample consisted of 240,624 firm-year observations or 21,461 firms for 2009–2019. This study collected information on earnings management, financial position, and abnormal investments through the Bureau Van Dijk and Refinitiv Thomson Reuters databases. Then, the authors calculated all these variables. In other words, this study used the purposive sampling method. The criteria for this sampling method were the selected firms categorised as manufacturing firms. In addition, they must have presented their financial positions and income statements.

Variable measurement. This research measured a firm's abnormal investment using the difference between actual and forecasted predictions. The notation 'i' was for each firm, and 't' was for each year. These notations 'i' and 't' were embedded in all the variables. The prediction method refers to Richardson (2006) and Baker et al. (2016), formulated in Eq. (1). The variable $INV_{i,t}$ was a firm's existing investment measured by fixed-assets payments, including tangible and intangible assets, divided by total assets. Otherwise, the variable $\widehat{INV}_{i,t}$ was the firm's predicted investment measured in Eq. (2). This Eq. (2) employs $AG_{i,t}$, which calculates a firm's growth by measuring its lagged revenue. $Lev_{i,t}$ measured the ratio of a firm's liabilities to total assets. $Cash_{i,t-1}$ was equal to the sum of the cash and transactional financial assets scaled by the average total assets. The variable $Age_{i,t}$ measured the firm's founding period. $Size_{i,t}$ was the firm's size measured by the natural logarithm of its total assets. Lastly, $Ret_{i,t}$ was the annual market-adjusted stock return.

$$ABI_{i,t} = INV_{i,t} - \widehat{INV}_{i,t} \quad (1)$$

$$\begin{aligned} \widehat{INV}_{i,t} = & \hat{\alpha}_0 + \hat{\alpha}_1 Growth_{i,t-1} + \hat{\alpha}_2 Lev_{i,t-1} + \hat{\alpha}_3 Cash_{i,t-1} \\ & + \hat{\alpha}_4 Age_{i,t-1} + \hat{\alpha}_5 Size_{i,t-1} + \hat{\alpha}_6 Ret_{i,t-1} + \hat{\alpha}_7 Inv_{i,t-1} \end{aligned} \quad (2)$$

This study measured a firm's earnings management using its discretionary accruals. It posits (Dechow and Dichev, 2002) by separating discretionary and non-discretionary accruals. This

measurement used the modified Jones model to calculate a firm’s discretionary accruals by a simple calculation (Guay et al., 1996). This study posits Kothari et al. (2005) by estimating the discretionary accruals for the ten years with the regression model in the equation below.

$$\frac{TA_{i,t}}{Asset_{i,t-1}} = \alpha_j + \beta_1 \frac{1}{Asset_{i,t-1}} + \beta_2 \frac{\Delta Sales_{i,t} - \Delta Receivable_{i,t}}{Asset_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{Asset_{i,t-1}} + ROA_{i,t-1} + \epsilon_{i,t} \tag{3}$$

These notations of ‘i’ and ‘t’ were the same in this Eq. (2). $TA_{i,t}$ was total accruals calculated with the pattern: $\Delta Current Assets - \Delta Cash - \Delta Current Liabilities + \Delta Current Portion of Long-Term Debt$. The $Asset_{i,t-1}$ were the firm’s total assets in a lagged period. The $\Delta sales_{i,t}$ was a differential calculation of a firm’s revenues. The repetitive measurements were $\Delta receivable_{i,t}$ (for receivables), $PPE_{i,t}$ (for plant, property, and equipment), and $ROA_{i,t-1}$ (for return on assets).

This study measured the firm’s financial condition without considering the existing legal consequences (Pindado et al., 2008). This financial condition was not intended to predict the firm’s bankruptcy. Instead, this research focused on a firm’s financial distress due to its possibly failing to meet its financial obligations (Pindado et al., 2008; Sanz and Ayca, 2006). First, this study modified Altman’s Z-score calculation by considering the firm’s debt level in Eq. (4). Then, it compared the firm’s actual liabilities with its optimally predicted liabilities. That calculation is below.

$$\frac{Debt_{i,t}}{Equity_{i,t-1}} = \alpha_j + \beta_1 \frac{Net Profit_{i,t}}{Asset_{i,t-1}} + \beta_2 \frac{Sales_{i,t}}{Asset_{i,t-1}} + \beta_3 \frac{Retained Earnings_{i,t}}{Asset_{i,t-1}} + \frac{Working Capital_{i,t}}{Asset_{i,t-1}} + \frac{Market Capital_{i,t}}{Equity_{i,t-1}} + \epsilon_{i,t} \tag{4}$$

$$FC = \widehat{DER}_{it} - DER_{it} \tag{5}$$

This research determined a firm’s financial condition using Eq. (5). When the financial condition (Knechel et al., 2013) was positive, it indicated the optimum liability related to the firm’s performance which was higher than its actual liabilities. The higher the FC value, the better the firm’s financial condition. Conversely, the lower the FC value, the more the firm’s financial condition becomes distressed.

Hypotheses testing. This study sequentially examined the first method’s primary and moderating effect tests. First, it explored hypotheses H1 and H2 using Eq. (6). Then, Eq. (6) was used to examine the main effect between a firm’s discretionary accruals ($DA_{i,t-1}$) by classifying earnings management with increased and decreased income, and abnormal investments ($ABI_{i,t}$). Simultaneously, this equation split into underinvestment and overinvestment. Moreover, this research examined the other main effect of a firm’s financial condition ($FC_{i,t-1}$), differentiating between distressed and soundness firms, and abnormal investments ($ABI_{i,t}$). At the same equation, it split into underinvestment and overinvestment. Second, this study examined the moderating effect between the combination of a firm’s discretionary accrual ($DA_{i,t-1}$) and its financial condition ($FC_{i,t-1}$) and abnormal investments ($ABI_{i,t}$) in Eq. (7). Finally, this Eq. (7) tested hypotheses H4a and 4b, in which a firm’s financial distress or soundness moderated the relationship between discretionary accruals and investment decisions. The

authors developed Eqs. (6) and (7) below.

$$ABI_{i,t} = \alpha + \beta_1 DA_{i,t-1} + \beta_2 FC_{i,t-1} + \beta_4 ABI_{i,t-1} + \beta_5 Size_{i,t} + \beta_6 Lev_{i,t} + \beta_7 PG_{i,t} + \beta_8 AG_{i,t} + \beta_9 PM_{i,t} + \beta_{10} MTB_{i,t} + \beta_{11} CFO_{i,t} + \epsilon_{i,t} \tag{6}$$

$$ABI_{i,t} = \alpha + \beta_1 DA_{i,t-1} + \beta_2 FC_{i,t-1} + \beta_3 DA_{i,t-1} * FC_{i,t-1} + \beta_4 ABI_{i,t-1} + \beta_5 Size_{i,t} + \beta_6 Lev_{i,t} + \beta_7 PG_{i,t} + \beta_8 AG_{i,t} + \beta_9 PM_{i,t} + \beta_{10} MTB_{i,t} + \beta_{11} CFO_{i,t} + \epsilon_{i,t} \tag{7}$$

This study measured a firm’s abnormal investment using the difference between actual and forecasted predictions. The notation ‘i’ was for each firm, and ‘t’ was for each year. These notations ‘i’ and ‘t’ were embedded in all the variables. For example, the variable $ABI_{i,t}$ was a firm’s abnormal investment decisions. Next were $DA_{i,t-1}$ for a firm’s discretionary accruals, $FC_{i,t-1}$ (financial condition), $Size_{i,t-1}$ (total assets), $Lev_{i,t-1}$ (leverage), $AG_{i,t-1}$ (assets growth), and $MTB_{i,t-1}$ (market to book ratio). Finally, to test the moderating effect, the specific variable $DA_{i,t-1} * FC_{i,t-1}$ was the interaction between discretionary accruals and financial conditions.

This study employed a 2SLS regression in the second method to examine Hypothesis H4. Equation (9) was the first-stage associating the financial condition ($FC_{i,t-1}$) with discretionary accruals ($DA_{i,t-1}$). This first-stage meant that a firm’s financial condition affected its discretionary accruals practice but did not directly (lag-effect) affect investment decisions. In the second stage, these discretionary accruals ($\widehat{DA}_{i,t-1}$) then influenced (lead-effect) the future investment decisions ($ABI_{i,t}$), as stated in Eq. (8). The authors have shown that this second-stage used these predicted discretionary accruals ($\widehat{DA}_{i,t-1}$) due to controlling for the residual errors, there would be no co-variances among the equations. We have explained that a firm’s discretionary accruals manage earnings to avoid financial distress when making investment decisions. In other words, the discretionary accruals ($\widehat{DA}_{i,t-1}$) intervened in the relationship between the firm’s financial distress and the CEO’s investment decisions. Therefore, this study arranged the 2SLS regression model below.

$$ABI_{i,t} = \alpha + \beta_1 \widehat{DA}_{i,t-1} + \beta_2 Size_{i,t} + \beta_3 Lev_{i,t} + \beta_4 PG_{i,t} + \beta_5 AG_{i,t} + \beta_6 PM_{i,t} + \beta_7 MTB_{i,t} + \beta_8 CFO_{i,t} + \epsilon_{i,t} \tag{8}$$

$$DA_{i,t-1} = \alpha + \beta_1 FC_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Lev_{i,t-1} + \beta_4 PG_{i,t-1} + \beta_5 AG_{i,t-1} + \beta_6 PM_{i,t-1} + \beta_7 MTB_{i,t-1} + \beta_8 CFO_{i,t-1} + \epsilon_{i,t} \tag{9}$$

All these notations in this second method are the same as in the first one (Eqs. (6) and (7)). Therefore, this study did not repeat the explanation for these notations. Instead, it controlled the linearities of both equations so they would not be co-variances between the residual errors of Eqs. (6) and (7) and the other tests that 2SLS required. In addition, we employed several firm-level control variables drawn from the existing literature (Bar-Gill and Bebchuk, 2002; López-Gutiérrez et al., 2015; Maripuu and Männasoo, 2014; McNichols and Stubben, 2008). Moreover, this study comprehends these regressions by ascertaining the linearity for Eqs. (6)–(9). Finally, it added eight control variables to show the lag-effects. They were an abnormal investment ($ABI_{i,t-1}$), firm size ($SIZE_{i,t-1}$), firm leverage ($LEV_{i,t-1}$), the ratio of net profits growth ($PG_{i,t-1}$), the percentage of total assets growth ($AG_{i,t-1}$), the profit margin ($PM_{i,t-1}$), the market to book value ($MTB_{i,t-1}$) and the cash flow from operations ($CFO_{i,t-1}$).

Statistical results

Descriptive statistics. This study identified firms listed in 46 developed and developing countries based on the United Nations criteria, with a total initial observation of 240,624 firm years. First, this study eliminated firms without disclosing their investments, including 148,674 firm-year data. Second, it excluded 15,029 firm-year data due to incomplete earnings management items. Finally, it deleted 6334 firm-year data because it could not measure their financial conditions. Thus, the final sample in this study consisted of 70,587 (27.08%) firm-year observations.

Table 1 shows the descriptive statistics analysis for the 70,587 observations. This study divided the sample into two groups: developing and developed countries. It then winsorised the upper and lower percentiles to reduce the outliers with 1 and 99%. The descriptive analysis showed that most firms experienced underinvestment and made income-increasing discretionary accruals during the observation period. The abnormal investment and earnings management means are -0.00041 and 0.00124, respectively. These results also showed that most firms' samples were financially sound, with a mean value of 0.00413.

Table 1 Descriptive statistics (All: 70,587 firm-year).

Variable	Mean	Median	Std. Dev.	Min	Max
ABL _{i,t}	-0.0004	-0.0006	0.3009	-7.1547	61.1378
DA _{i,t}	0.0012	0.0007	0.2098	-10.2301	10.4395
FC _{i,t}	0.0041	-0.0025	0.3894	-13.4210	10.6828
INV _{i,t}	0.0001	-0.0005	0.2987	-7.1547	61.1378
Size _{i,t}	12.6219	12.5759	2.0173	3.4897	19.6720
Lev _{i,t}	0.5186	0.4876	0.5421	-0.1331	38.9933
PG _{i,t}	-0.2578	-0.0536	6.0294	-99.5744	99.7872
AG _{i,t}	0.0733	0.0291	0.4630	-0.9962	29.2109
PM _{i,t}	-0.0586	0.0353	1.5570	-98.6903	27.0224
MTB _{i,t}	1.9075	1.22900	4.3446	-96.1470	99.3500
CFO _{i,t}	0.0499	0.0593	0.2410	-44.2897	3.5479

DA discretionary accrual, FC firms' financial condition, ABL abnormal investment, Size firms' size, Lev leverage, PG profit growth, AG asset growth, PM profit margins, MTB market to book value, CFO cash flow from operation.

Statistical test results. Table 2 shows the hypotheses test results of H1a and H1b related to the effect of earnings management on abnormal investment. The regression analysis results showed that DA_{i,t-1} had a statistically significant effect on ABL_{i,t} for the relationships between past income-increasing and overinvestment and between income-decreasing and underinvestment. All these tests were significant at 0.01 for all the samples. This analysis obtained consistent results from the developing and developed countries showing they were statistically significant with *p*-values of 0.10 and 0.001, respectively. Therefore, this study supports hypotheses H1a and H1b. This study infers that earnings management (increasing and decreasing) constructs the CEOs' cognition to decide on abnormal investments (over and under).

Table 3 shows the statistical tests of hypotheses H2a and H2b related to the effect of financial conditions (distress or soundness) on abnormal investments. The regression results showed that FC_{i,t-1} had a statistically significant effect on ABL_{i,t} for all types of financial conditions and abnormal investments at 1%. Based on developing and developed countries, the sample's separation showed a statistically significant regression analysis of 0.001. Therefore, this study supports hypotheses H2a and H2b. The authors infer that a firm's financial distress affects its CEO's overinvestment decisions through earnings management when past income increases. Moreover, this study believes that a firm's financial soundness affects its CEO's underinvestment decisions through earnings management when past income decreases.

Table 4 shows the test results of hypotheses H3a and H3b related to the interaction effect of financial conditions and earnings management on abnormal investments. The regression results showed that DA_{i,t-1}*FC_{i,t-1} did not have a statistically significant effect on ABL_{i,t} for all financial conditions (distress and soundness) or affect earnings management (income-increasing and -decreasing). Therefore, this study does not support hypotheses H3a and H3b. These unsupported hypotheses weaken the association of financial conditions and abnormal investment, not strengthen it, hence the resulting opposite signs. However, this study was an advantage with the unsupported moderating hypotheses. Owing to unsupported hypotheses rearranged from mediating associations to intervening ones because

Table 2 Statistical results for hypotheses H1a and H1b.

Variables	Pred.	Income-increasing & overinvestment			Income-decreasing & underinvestment		
		All	Developing	Developed	All	Developing	Developed
DA _{i,t-1}	H1:+	0.019*** [4.04]	0.013* [1.66]	0.015*** [3.23]	0.014*** [3.76]	0.010* [1.70]	0.019*** [5.91]
FC _{i,t-1}	?	-0.007*** [-3.20]	-0.000 [0.14]	-0.010*** [-4.58]	0.006*** [3.09]	0.006* [1.90]	-0.006*** [-3.19]
ABL _{i,t-1}	+	0.094*** [8.27]	0.101*** [6.77]	0.090*** [8.20]	0.077*** [8.97]	0.092*** [8.60]	0.008 [0.60]
Size _{i,t}	+	0.003*** [13.40]	0.005*** [12.75]	0.005*** [19.44]	0.006*** [24.61]	0.009*** [24.94]	-0.006*** [27.87]
Lev _{i,t}	+	0.021*** [7.70]	0.019*** [4.22]	0.028*** [9.72]	0.020*** [8.13]	0.025*** [6.61]	-0.007*** [-3.40]
PG _{i,t}	+	0.000 [0.84]	0.000 [0.97]	0.000 [0.36]	-0.000 [-0.53]	0.000 [0.94]	0.000 [0.14]
AG _{i,t}	+	0.022*** [8.58]	0.028*** [5.51]	0.025*** [9.69]	0.003 [1.24]	0.003 [0.85]	-0.010 [-3.83]
PM _{i,t}	+	-0.000 [-2.43]	0.000 [0.66]	0.000 [0.38]	-0.007 [-2.33]	-0.001 [-3.94]	-0.005 [-1.69]
MTB _{i,t}	+	0.005** [1.67]	-0.001 [-1.01]	-0.001 [-4.80]	0.000*** [5.90]	-0.016 [-3.76]	-0.000 [-0.50]
CFO _{i,t}	+	0.000 [0.08]	0.045** [2.87]	0.014** [2.08]	-0.024 [-0.70]	-0.022 [-2.55]	-0.010 [-1.53]
Const.	?	-0.032*** [-9.39]	-0.088*** [-8.29]	-0.061*** [-14.90]	0.037*** [-17.03]	-0.090*** [-17.76]	0.072*** [-23.58]
Wald-Chi ²		918.63***	665.03***	911.27***	828.96***	721.55***	760.23
'Obs: n		6009	3796	5698	14,498	8431	6056

DA discretionary accrual, FC firms' financial condition, ABL abnormal investment, Size firms' size, Lev leverage, PG profit growth, AG asset growth, PM profit margins, MTB market to book value, CFO cash flow from operation.
 ***Significant at 1.00%, **5.00%, and *10.00%.

Table 3 Statistical results for hypotheses H2a and H2b.

Variables	Pred.	Financial distress & overinvestment			Financial soundness & underinvestment		
		All	Developing	Developed	All	Developing	Developed
FC _{i,t-1}	H2:+	0.017*** [6.64]	0.015*** [3.65]	0.010*** [6.36]	0.020*** [6.37]	0.020*** [4.26]	0.004** [1.98]
DA _{i,t-1}	?	0.007 [1.63]	-0.004 [-0.55]	0.010*** [3.46]	-0.011** [-2.49]	-0.003 [-0.42]	-0.000 [-0.20]
AB _{i,t-1}	+	0.146*** [12.47]	0.143*** [9.22]	0.202*** [14.05]	0.065*** [7.70]	0.078*** [7.31]	0.033** [2.85]
Size _{i,t}	+	0.005*** [17.00]	0.007*** [15.47]	0.004*** [22.47]	0.005*** [18.95]	0.009*** [20.80]	0.007*** [30.79]
Lev _{i,t}	+	0.037*** [13.74]	0.042*** [9.29]	0.008*** [5.30]	0.010** [3.12]	0.024*** [4.70]	0.000 [0.34]
PG _{i,t}	+	0.000 [1.53]	0.000* [1.72]	0.000 [0.44]	-0.000 [-2.19]	-0.000 [-0.86]	0.000 [0.03]
AG _{i,t}	+	0.021*** [9.17]	0.023*** [6.29]	-0.001 [-1.15]	0.011*** [3.14]	0.005 [1.13]	-0.011 [-3.34]
PM _{i,t}	+	-0.000 [1.13]	-0.002 [-0.67]	-0.001 [-1.69]	-0.006 [-1.30]	-0.002 [-0.30]	-0.018 [-3.95]
MTB _{i,t}	+	-0.000 [-3.31]	-0.001 [-2.99]	-0.001 [-0.35]	-0.001 [-5.19]	0.000* [1.75]	-0.000 [-2.07]
CFO _{i,t}	+	0.017** [2.81]	0.034*** [3.27]	0.003 [0.78]	-0.017 [-2.08]	0.034 [2.90]	-0.017 [-2.03]
Const.	?	-0.054*** [-14.16]	-0.074*** [-11.91]	-0.049*** [-19.53]	-0.047*** [-11.66]	-0.097*** [-15.17]	-0.088 *** [-24.80]
Wald-Chi ²		896.36***	591.45***	754.96***	591.06***	620.61	725.36
Obs: n		12,557	6800	5757	11,626	6599	5927

FC firms' financial condition, AB_{i,t-1} abnormal investment, Size firms' size, Lev leverage, PG profit growth, AG asset growth, PM profit margins, MTB market to book value, CFO cash flow from operation.
 ***Significant at 1.00%, **5.00%, and *10.00%.

Table 4 Statistical results for hypotheses H3a and H3b.

Variables	Pred.	Income-increasing; financial distress & overinvestment			Income-decreasing; financial soundness & underinvestment		
		All	Developing	Developed	All	Developing	Developed
DA _{i,t-1}	+	0.058*** [5.29]	0.026*** [3.32]	0.011*** [3.87]	0.057*** [4.31]	0.010 [0.50]	0.062*** [5.79]
FC _{i,t-1}	+	0.040*** [6.72]	0.036** [2.16]	0.032*** [5.39]	0.031*** [4.39]	0.018* [1.69]	0.011* [1.93]
DA _{i,t-1} *FC _{i,t-1}	H3:+	-0.083 [-3.00]	-0.094 [-2.04]	-0.012 [-0.73]	-0.129 [-3.60]	-0.025 [-0.43]	-0.106 [-3.69]
AB _{i,t-1}	+	-0.067 [-5.51]	0.101*** [5.22]	0.340*** [17.02]	0.100*** [9.57]	0.096*** [7.36]	0.135*** [8.72]
Size _{i,t}	+	-0.003 [-12.07]	0.006*** [9.63]	0.004*** [17.22]	0.010*** [20.74]	0.017*** [21.65]	0.009*** [20.33]
Lev _{i,t}	+	-0.031 [-11.71]	0.039*** [6.59]	0.011*** [5.02]	0.012** [2.46]	0.021** [2.91]	0.007* [1.65]
PG _{i,t}	+	-0.000 [-1.04]	0.000 [0.40]	-0.000 [-0.13]	-0.000 [-1.19]	0.000 [0.01]	0.000 [0.30]
AG _{i,t}	+	-0.014 [-5.81]	0.021*** [4.48]	-0.004 [-2.31]	0.002 [0.47]	0.006 [0.78]	-0.017 [-3.23]
PM _{i,t}	+	-0.010 [-4.10]	0.009** [2.02]	-0.002 [-1.97]	-0.021 [-4.13]	-0.028 [-3.71]	-0.009 [-1.77]
MTB _{i,t}	+	0.000** [2.33]	-0.001 [-1.90]	-0.000 [-0.90]	-0.002 [-5.48]	-0.001 [-3.03]	-0.000 [-1.64]
CFO _{i,t}	+	-0.001 [-0.31]	0.014 [1.05]	0.010** [2.33]	-0.009 [-0.70]	0.054** [2.75]	-0.023 [-1.56]
Const.	?	1.023*** [58.06]	-0.059*** [-7.19]	-0.052*** [-15.56]	-0.110*** [-15.00]	-0.184*** [-16.20]	-0.114*** [-17.06]
Wald-Chi ²		486.10***	259.03***	244.62***	622.89***	608.56***	523.12***
Obs: n		6646	3647	2533	7276	4233	3043

DA discretionary accrual, FC firms' financial condition, AB_{i,t-1} abnormal investment, Size firms' size, Lev leverage, PG profit growth, AG asset growth, PM profit margins, MTB market to book value, CFO cash flow from operation.
 ***Significant at 1.00%, **5.00%, and *10.00%.

of the probability nesting schema. Then, the authors transformed the statistical tests using the 2SLS approach.

Table 5 shows the robustness test results of hypotheses H4a for the series of financial distress, past income-increasing and the lead-overinvestment. In addition, Table 6 explains the robustness test results of H4b for the series of financial soundness, past income-decreasing and the lead-underinvestment. Simultaneously, these tests split the data samples into developed and developing countries. These tests used the 2SLS method. The results of the first-stage analysis showed that FC_{i,t-1} had a statistically significant effect on DA_{i,t-1} with a p-value of less than 0.01 for all the samples. Moreover, the results of the second-stage analysis showed that DA_{i,t-1} had a statistically significant effect on AB_{i,t} with a p-value of less than 0.01. Therefore, this study supports hypotheses H4a and H4b. These statistical results were also consistent for developing and developed countries. This study inferred that a firm's financial distress affects its income-increasing earnings management, continuously influencing future abnormal overinvestment. It also demonstrated the financial soundness associated with earnings management when income decreased, which

sequentially affected future underinvestment. We infer that our statistical tests supported robust results, showing a transformed method of moderating effect tests with staging effect ones. Thus, this research reveals transformation test success results, especially in the staging effect tests, are statistically significant.

Discussion and findings

This study finds that earnings management with past income increases positively affects future overinvestment. Moreover, it also shows past income decreases positively affect future underinvestment (Bar-Gill and Bebchuk, 2002; Lenard and Yu, 2012; Liu et al., 2021; McNichols and Stubben, 2008). Likewise, firms' financial pressures positively affect future overinvestment and otherwise financial soundness (Bassetto and Kalatzis, 2011; Biddle et al., 2009; Du and Lai, 2018; Lee et al., 2006). Furthermore, this study did not find a moderating effect of financial pressures on the relationship between earnings management when past income increases and future overinvestment. However, this study indicates that the absence of a moderating effect is valid because it is not a concurrent effect. Instead, this study finds its conclusion valid in

Table 5 Statistical results for hypothesis H4a.

Variables	Pred.	All		Developing		Developed	
		1st	2nd	1st	2nd	1st	2nd
$\widehat{DA}_{i,t-1}$	H4a:+	0.116*** [6.61]		0.067** [2.54]		0.083*** [5.08]	
$FC_{i,t-1}$	H4a:+		0.107*** [26.44]		0.100*** [20.92]		0.108*** [14.86]
$Size_{i,t}$	+	0.007*** [22.87]	-0.006 [-3.33]	0.010*** [18.88]	-0.003 [-5.90]	0.007*** [26.26]	-0.010 [-11.64]
$Lev_{i,t}$	+	0.018*** [7.14]	0.063*** [13.77]	0.029*** [7.16]	0.046*** [8.51]	0.003 [1.42]	0.080*** [9.76]
$PG_{i,t}$	+	0.000 [0.89]	-0.000 [-0.36]	0.000 [1.53]	-0.000 [-0.09]	-0.000 [-1.25]	-0.000 [-0.23]
$AG_{i,t}$	+	0.029*** [10.99]	0.070*** [16.00]	0.031*** [7.93]	0.060*** [11.73]	0.002 [1.17]	0.077*** [9.82]
$PM_{i,t}$	+	0.006** [2.52]	0.009*** [4.02]	0.006 [1.49]	0.005 [1.29]	-0.003 [-1.58]	0.007** [2.08]
$MTB_{i,t}$	+	-0.001 [-4.34]	0.003*** [9.07]	-0.001 [-2.21]	0.004*** [8.29]	-0.000 [-0.69]	0.002*** [4.28]
$CFO_{i,t}$	+	0.003 [0.49]	-0.185 [-0.22]	0.025** [2.21]	-0.204 [-18.25]	-0.006 [-0.87]	-0.150 [-9.43]
Const.	?	-0.084*** [-17.71]	0.114*** [18.19]	-0.104*** [-13.95]	0.080*** [12.35]	-0.094*** [-21.95]	0.155*** [12.76]
Wald-Chi ²		982.91***	3093.47***	665.03***	1331.93***	911.27***	1659.23***
Obs: n		12,788	17,654	7090	10,395	5698	7259

FC firms' financial condition, *ABI* abnormal investment, *Size* firms' size, *Lev* leverage, *PG* profit growth, *AG* asset growth, *PM* profit margins, *MTB* market to book value, *CFO* cash flow from operation
 ***Significant at 1.00%, **5.00%, and *10.00%.

Table 6 Statistical results for hypothesis H4b.

Variables	Pred.	All		Developing		Developed	
		1st	2nd	1st	2nd	1st	2nd
$\widehat{DA}_{i,t-1}$	H4b:+	0.118*** [7.26]		0.118*** [7.26]		0.041** [2.78]	
$FC_{i,t-1}$	H4b:+		0.108*** [23.35]		0.050*** [8.61]		0.175*** [23.55]
$Size_{i,t}$	+	0.007*** [23.16]	-0.009*** [21.75]	0.007 *** [23.16]	-0.004*** [-8.60]	0.006*** [22.97]	-0.014*** [20.29]
$Lev_{i,t}$	+	0.023*** [9.29]	0.017*** [4.11]	0.023*** [9.29]	0.054*** [11.16]	0.005** [2.80]	-0.038*** [-5.27]
$PG_{i,t}$	+	-0.000 [-1.86]	-0.000 [-0.58]	-0.000 [-1.86]	-0.000 [-2.77]	-0.000 [-0.35]	0.000 [0.63]
$AG_{i,t}$	+	0.006** [2.06]	0.066*** [17.39]	0.006** [2.06]	0.109*** [22.96]	-0.007 [-3.02]	0.011* [1.89]
$PM_{i,t}$	+	-0.002 [-0.90]	-0.095 [-24.60]	-0.002 [-0.90]	-0.093 [-20.84]	-0.003 [-1.83]	-0.107 [-14.66]
$MTB_{i,t}$	+	-0.001 [-6.27]	0.000** [2.29]	-0.001 [-6.27]	0.002*** [6.65]	-0.000 [-1.78]	-0.001 [-2.42]
$CFO_{i,t}$	+	0.013* [1.94]	0.094*** [8.19]	0.013* [1.94]	0.103*** [7.97]	-0.012 [-1.82]	0.115*** [5.03]
Const.	?	-0.081*** [-18.09]	0.154*** [24.94]	-0.081*** [-18.09]	0.076*** [9.83]	-0.076*** [18.78]	0.250*** [23.60]
Wald-Chi ²		828.96***	3451.88***	721.55***	2046.95***	760.23***	1773.59***
Obs: n		14,498	16,474	8431	9711	6056	6763

DA discretionary accrual, *FC* firms' financial condition, *ABI* abnormal investment, *Size* firms' size, *Lev* leverage, *PG* profit growth, *AG* asset growth, *PM* profit margins, *MTB* market to book value, *CFO* cash flow from operation.
 ***Significant at 1.00%, **5.00%, and *10.00%.

staged associations. Then, this study shows its reasonable arguments of these staged associations that financial pressure affects earnings management and further increases future overinvestment (Biddle and Hilary, 2006; Biddle et al., 2009; McLean et al., 2012). Similarly, the opposite finding is for financial soundness, which negatively affects earnings management when past income decreases and further reduces future underinvestment.

Based on the findings of this staged association, this study concludes that CEOs who carry out future overinvestment proceed from a cognitive bias based on past performance. This study formulates the existence of negative framing that shapes their behaviour in heuristics (Ewert et al., 2012; Festinger, 1957; Kahneman and Tversky, 1979; Baker et al., 2016), self-defence mechanisms (Jiraporn et al., 2008; Kominis and Dudau, 2018), and especially psychological projections. The authors explain that financial pressures cause CEOs to internalise loss positions that construct their managerial thinking to heuristics. CEOs tend to release the financial tension from admitting past failures by developing their businesses to generate greater future profits. For this reason, a CEO would decide to make more significant investments than in previous years (Bar-Gill and Bebchuk, 2002;

McNichols and Stubben, 2008). This study suggests that these CEOs have been framed by the firm's past financial risk (Festinger, 1957; Kahneman and Tversky, 1979). Simultaneously, these CEOs experience self-defence because they want to show good performance and maintain their reputation by increasing their accounting profits (Biddle and Hilary, 2006; Kominis and Dudau, 2018). This study argues that the heuristics and self-defence adopted by CEOs are their attempts to release their firms from financial pressures and maintain their reputations.

On the other hand, this study finds that the CEOs' behaviour in developing and developed countries are the same when making future overinvestment decisions and vice versa (AlNajjar and Riahi-Belkaoui, 2001; Liu et al., 2021; Vorst, 2016). They perform the same based on the financial soundness that causes them to underinvest in the future (Bassetto and Kalatzis, 2011; Bhagat et al., 2005). This study suggests that the CEOs' actions leading to over-and under-investment are universalistic (Bassetto and Kalatzis, 2011; Bhagat et al., 2005; Biddle and Hilary, 2006). This study concludes that firms' past financial performance and pressures trap CEOs with heuristics and self-defence. Furthermore, the two framings cause the CEOs to act with their dominant future business formulations to

save their firms and jobs. Then, the actions and reasons of these CEOs are idiosyncratic in developing and developed countries.

This study presents the impact of the economic consequences of CEOs' under/overinvestment decisions. The consequences are the importance of protecting investors and creditors from being harmed by business risks that should appear due to the heuristic and self-defending CEOs' decisions (Ghosh and He, 2015; McLean et al., 2012). Even though investors and creditors are likely to calculate the listed firms' business and financial risk levels, CEOs must disclose the normality of future investments at the firm level. The normality level of future investments presents the fairness of the investment returns, which should be completed by the policy's impact (Sun, 2015; Zhong and Gao, 2017) at the firm-specific level. The investment fairness level benefits investors and creditors as it does not cause cognitive biases that can harm investments or loans (Bahaddin et al., 2019; Kumar and Goyal, 2015; Otuteye and Siddiquee, 2015). From another perspective, the firm's fairness level of its investments supports good corporate governance, especially the policy that leads to a protection model for investors and creditors.

Finally, this study presents the consequences for regulators and the capital market to disclose information about their over/under-investments. Disclosure of these over/underinvestments could still be voluntary and aimed at not misleading investors and creditors, further destroying them (Dutta and Nezlobin, 2017; Roychowdhury et al., 2019; Wen, 2013). This study argues that a firm's weighted average costs of capital (WACC) are dynamic when associated with future investments for its achievement or not. This dynamic WACC can have a fatal impact on investors and creditors because it affects the intrinsic value of accounting earnings, the free cash flows and other measures (Frank and Shen, 2016; Miller, 2009). Therefore, voluntary disclosure becomes a valuable tool for investors and creditors to recalculate the discounted future free cash flows for a firm and the equity, which measures their incremental welfare rights.

Conclusion and limitations

This study concludes that over and under-investment by CEOs occurs and exists. The mechanism for the occurrence and existence is earnings management with past income-increasing and financial distress, and vice versa. The reality of over and under-investment stems from the negative framing that shapes the CEOs' beliefs: the loss position that makes them heuristic and the self-defence mechanism that causes them to behave in psychological projections. Then, a firm's CEOs may decide on over-investment in the future because of earnings management when past income increases and under financial pressures. Conversely, they could select underinvestment when earnings management is undertaken with income-decreasing and financial soundness in the future. Finally, the occurrence and existence of this phenomenon are universal for both developing and developed countries. Hence, the CEOs' decisions on overinvestment or underinvestment did not consider the nations' high uncertainty.

Limitations. This study indicates that firms' past financial performance triggers CEOs' decisions on underinvestment or over-investment. This negative framing creates heuristical and self-defence mechanisms that cause future investment decisions to be more daring, take business risks, or vice versa, and be more relaxed. However, this study suggests that heuristical and self-defence mechanisms were not measured with clear instrumental variables. Furthermore, the authors have not found variable measurements representing either the heuristic or the self-defence mechanism. Therefore, future research can set variables that measure the heuristics or the self-defence mechanisms, especially the psychological projections. Hence, future experimental research design could answer these CEOs' behavioural tendency

to overinvest or underinvest. Moreover, this tendency is due to financial distress and vice versa.

The second limitation of this study also relates to the CEOs' over/underinvestment decisions and earnings acceleration. This study argues that the associated occurrence of the CEOs' decisions and earnings acceleration can closely determine future over/underinvestment. However, this study did not associate CEOs' over and underinvestment decisions with earnings acceleration and their impact on stock price or returns volatilities. Furthermore, this study recommends future research that examines this association with the 3SLS, which strings earnings management, over and underinvestment decisions, earnings acceleration, and price changes or stock returns sequentially. The 3SLS model expects that its comprehensive examination results would confirm the validity of the results regarding the CEOs' heuristics and self-defence mechanisms. The third limitation, the authors recognised that this research had been designed without considering CEO tenure. Meanwhile, CEO tenures probably affect the relationships between financial distress and over-investment and financial soundness and under-investment because of their experiences in managing financial accounting policies. Moreover, the reversed arguments are for the financial soundness affecting future under-investment. Consequently, future research would be fruitful when accommodating CEO tenures in the research designs and models.

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request.

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Additional information

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