

Chair–CEO age dissimilarity and firms’ annual report tone – evidence from China

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Abstract

Purpose – This study examines how age dissimilarity between the Chair and the chief executive officer (CEO) impacts the tone of firms’ annual reports.

Design/methodology/approach – Using a sample of 26,876 firm-year observations from listed Chinese firms between 2010 and 2023, this study empirically tests the hypothesis using ordinary least squares, two-stage least squares test, Heckman two-step selection model, entropy balancing analysis, mediation tests (Baron and Kenny’s (1986) causal-step approach and the bootstrap approach) and mechanism analysis.

Findings – The results reveal a significant negative association between Chair–CEO age dissimilarity and the positive tone of annual reports. Specifically, a one-standard-deviation increase in Chair–CEO age dissimilarity corresponds to a 0.48% decline in the positive tone. The negative impact is more pronounced in firms with less concentrated controlling rights, stronger external monitoring pressures, higher information asymmetry, higher agency conflicts and family-owned and non-state-owned firms. There are four mediating channels: internal monitoring intensity, tenure overlap, free cash flow and earnings management. This situation reflects the “curbing aggressive reporting” mechanism. Our findings are consistent and robust across alternative measures and endogeneity tests.

Research limitations/implications – The study’s results imply the need to account for Chair–CEO age dissimilarity in board design and succession planning to improve communication, coordination, cooperation and disclosure quality, especially in Chinese listed firms.

Originality/value – This is the first empirical study to examine the effect of Chair–CEO age dissimilarity on the tone of annual reports. It contributes to the corporate governance and disclosure tone literature by introducing Chair–CEO age dissimilarity as a critical but underexplored factor and contextualises its influence within China’s distinct cultural and institutional environment, offering new insights into communication dynamics in top management teams.

Keywords Age dissimilarity, Annual report tone, FinBERT, Agency problem, SOE, China

Paper type Research article

1. Introduction

This study empirically investigates how the age dissimilarity between a Chair and a CEO impacts the tone of the firm’s annual report. Prior research has established that top management team (TMT) diversity spans multiple dimensions, including age (Rabl & Triana, 2014), tenure (Keck, 1997), gender (Tonoyan & Olson-Buchanan, 2023) and educational background (Heenipellage, Fernando, & Gibbons, 2022). These dimensions affect various corporate outcomes, such as firm performance, information disclosure, financial reporting quality, corporate social responsibility and risk-taking tendencies (Komal *et al.*, 2023). Empirical findings suggest that diversity yields advantages, such as enhanced innovation, improved decision-making and greater organisational adaptability (Wang, Duan, & Liu,



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2021). Accordingly, Goergen, Limbach, and Scholz (2015) show that Chair–CEO age dissimilarity may increase firm value, while Trinh, Kara, and Elnahass (2022) report its potential to improve bank performance. Conversely, Zhou, Kara, and Molyneux (2019) document a decline in bank risk-taking behaviour, and Zhu, Gao, and Tan (2021) link greater age dissimilarity to heightened pay inequality. Hu, Bhuiyan, and Houqe (2025) examined the effect of Chair–CEO age dissimilarity on firm value. However, the effect of this dissimilarity on annual report tone (ART) remains largely unexplored, underscoring the significance of this study for corporate governance research.

The Chair–CEO relationship is crucial in organisational dynamics, as the Chair oversees long-term strategy and board governance (Parker, 1990), while the CEO implements this strategic vision through operational execution (Roberts & Stiles, 1999). The nature of these two roles is therefore intrinsically interdependent and complementary. The quality of their relationship can significantly influence organisational dynamics, generating positive or negative effects across the firm (Roberts & Stiles, 1999). Similarity-attraction theory suggests that individuals naturally gravitate toward those with similar characteristics, fostering greater interaction and communication (Byrne, 1997). Consequently, age dissimilarity between the Chair–CEO may produce both task and relationship conflicts within the TMT (Amason, 1996). Both types of conflict are destructive to firm performance (De Dreu & Weingart, 2003). When considered alongside Chair–CEO age dissimilarity, a strong working relationship may foster a positive internal business environment and a more favourable disclosure tone, whereas conflict or communication breakdown may harm firm performance and result in less positive reporting. Accordingly, the Chair–CEO dynamic is vital to enhancing the readability and tone of corporate disclosure.

Empirical research highlights that China's unique cultural context significantly shapes organisational behaviour, corporate policies, and firm outcomes, suggesting that the influence of Chair–CEO age dissimilarity may differ from that observed in other nations. Unlike Western cultures, which often adopt a direct approach to conflict resolution, Chinese cultural norms tend to favour conflict avoidance as a primary strategy (Tse, Francis, & Walls, 1994). Therefore, while Western research suggests that avoiding conflict may hinder innovation, many Chinese TMTs strongly favour this approach (Chen, Liu, & Tjosvold, 2005). This preference can be attributed to the collectivistic values that are deeply embedded in Chinese and broader Asian cultures, which emphasise interpersonal harmony and social cohesion (Morris *et al.*, 1998). As a result, Chinese managers tend to avoid conflict more frequently than their Western counterparts (Fu, Yan, Li, Wang, & Peng, 2008). However, prolonged conflict avoidance could lead to the accumulation of latent tensions, which can eventually trigger the escalation of internal organisational conflicts.

The primary function of corporate annual reports is to convey operational information to external stakeholders, particularly those who do not have direct knowledge of the company. Therefore, the tone of annual reports is crucial for both firms and investors. Research suggests that the managerial tone used in annual reports assists investors in interpreting accounting figures and market returns (Loughran & McDonald, 2011). Studies have found that a positive tone provides valuable incremental information, serving as a signalling mechanism to communicate firms' future performance expectations (Xie & Lin, 2015) and influencing stock market returns (Jiang, Lee, Martin, & Zhou, 2019). A positive tone can effectively mitigate information asymmetry between firms and investors, enabling investors to assess the company's financial position more accurately, thereby increasing investment confidence (Feldman, Govindaraj, Livnat, & Segal, 2010). However, some scholars argue that a positive tone may not always be reliable as managers might deliberately adopt an optimistic tone to mislead investors and obscure unfavourable environmental and social performance. Ultimately, the tone of annual reports is shaped by corporate executives, whose individual characteristics influence the writing and editing process, thereby affecting the overall linguistic tone of the reports (Shiller, 2017).

Using data from the China Stock Market & Accounting Research (CSMAR) database spanning the period between 2010 and 2023, this study analyses 26,876 firm-year observations to explore the relationship between Chair–CEO age dissimilarity and the tone of firms’ annual reports. The results indicate a significant negative association between Chair–CEO age dissimilarity and the positive tone of firm’s annual reports, highlighting its economic relevance. Specifically, a one-standard-deviation increase in Chair–CEO age dissimilarity (*GAPS*) is associated with a 0.48% decrease in the positive tone of the firms’ annual reports (*TONE*) relative to the sample mean. In addition, a one-standard-deviation increase in unsigned Chair–CEO age dissimilarity (*GAPU*) is associated with a 0.42% decrease in the positive tone of the firms’ annual reports (*TONE*) relative to the sample mean. Additionally, cross-sectional analyses were conducted to examine the contextual factors that could influence this relationship. The negative effect is particularly pronounced in firms characterised by a high presence of institutional investors, a low concentration of controlling rights, greater information asymmetry, heightened agency conflicts and family ownership structures. Furthermore, conflicts stemming from the Chair–CEO age dissimilarity are exacerbated under these conditions, becoming more pronounced and exerting a significant negative impact on the overall tone of the firms’ annual report.

This study makes several contributions. This study focuses on highlighting the critical role of the Chair–CEO age dissimilarity in influencing the tone of annual reports. As the leader of the board, the Chair plays a central role in engaging shareholders and fostering positive relationships among board members (Amran, Yusof, Ishak, & Aripin, 2014). Our findings show that a larger Chair–CEO age dissimilarity reduces the positive tone of firms’ annual reports. Additionally, the study offers valuable insights into how industry competitiveness, ownership structure and organisational ownership status moderate this relationship. Specifically, the link between the Chair–CEO age dissimilarity and ART is stronger in environments characterised by less concentrated controlling rights, stronger external monitoring pressures, higher information asymmetry, higher agency conflicts and family-owned and non-state-owned firms. These results highlight the complex nature of Chair–CEO age dynamics and their effects on the tone of firms’ annual reports across different organisational settings. Furthermore, the study found that Chair–CEO age dissimilarity influences the positive tone of annual reports through four different mediating channels: internal monitoring intensity, tenure overlap, free cash flow and earnings management. Our mechanism tests suggest that Chair–CEO age dissimilarity reduces the positive tone of annual reports, reflecting a disciplining effect on aggressive reporting behaviour.

This section has provided an introduction, and the remainder of the study is organised as follows. [Section 2](#) reviews the existing literature, discusses the theoretical framework and presents the research hypotheses. [Section 3](#) provides an overview of the data selection process, defines the variables and outlines the model construction. The results are then presented in [Section 4](#), followed by robustness checks, cross-sectional tests, endogeneity tests, mediation tests and mechanism tests. [Section 5](#) concludes the study with a summary of the findings.

2. Literature review and hypothesis development

Grounded in agency theory and Upper Echelon Theory (UET), this study examines how Chair–CEO age dissimilarity shapes disclosure outcomes. Agency theory highlights conflicts of interest and information asymmetry between shareholders and managers, suggesting that weak governance intensifies agency problems and leads to more cautious or conservative disclosure, reflected in fewer positive expressions and potentially negative signals in annual reports. Such disclosure may undermine investor confidence and firm performance, whereas strong governance mechanisms can mitigate agency conflicts and improve disclosure tone. UET posits that managerial characteristics influence cognition

and strategic decisions. Age, in particular, shapes risk preferences and behavioural tendencies, affecting disclosure choices. Moreover, the quality of the Chair–CEO relationship influences governance effectiveness and, in turn, the tone of annual reports.

2.1 TMT demography

Based on UET, demographic characteristics are key factors influencing managers' behaviour, decision-making styles and cognitive structures (Hambrick & Mason, 1984). Bamber, Jiang, and Wang (2010) emphasise that the personal characteristics of managers play a profound role in shaping corporate accounting behaviour. Within this framework, the composition of the TMT (including age, professional experience, education and tenure) significantly affects financial reporting quality (Habib & Hossain, 2013), strategic decision-making (Iaquinto & Fredrickson, 1997), overall firm performance and the tone of annual report expressions (Wang, Holmes, Oh, & Zhu, 2016). Age, as a core demographic variable, reflects the accumulated experience of individuals throughout their careers (Herrmann & Datta, 2005). With increasing age, changes in personality traits lead to significant adjustments in behaviour patterns, values and strategic decision-making preferences (Tanikawa, Kim, & Jung, 2017). As TMT age increases, the readability of the Management Discussion and Analysis (MD&A) and annual reports may improve (Xu, Fernando, & Tam, 2018).

Internal conflicts within TMTs are inevitable during strategic decision-making, primarily due to the complexity and high uncertainty of such decisions (Simons & Peterson, 2000). Consequently, internal coordination and collaboration become critical factors influencing the corporate strategy for information disclosure in annual reports. As the proportion of younger managers in TMTs continues to rise, the issue of age dissimilarity within teams has garnered increasing attention. Age differences among TMT members may lead to disparities in work values, cognitive approaches and communication styles, often manifesting as generational effects (Hambrick & Mason, 1984), thereby impacting team collaboration and decision-making efficiency.

Existing research suggests that age diversity within TMTs typically leads to two main types of core conflicts: task conflict and relationship conflict (Jehn, 1997). Task conflict primarily arises from friction caused by differences in opinions during the decision-making process. It can allow for the integration of diverse perspectives and optimise decision quality and drive improvements in organisational performance (Van de Vliert & De Dreu, 1994). However, De Wit, Greer, and Jehn (2012) indicated that the positive effects of task conflict may be limited and may negatively affect team performance. In contrast, relationship conflict is more associated with distrust and antagonism among team members, damaging organisational coordination, hindering information exchange and weakening corporate performance (Parayitam & Dooley, 2009). Chair–CEO age dissimilarity may hinder the development of a close collaborative relationship, limiting information-sharing and thereby exacerbating relationship conflicts (Hu, Bhuiyan, & Houqe, 2026). Additionally, due to Chair–CEO age dissimilarity, the Chair and CEO's cognitive approaches and values regarding corporate operations might diverge significantly, potentially intensifying internal conflicts, weakening strategic decision-making efficiency and ultimately resulting in a more negative tone in the annual reports.

Furthermore, research indicates that when both task and relationship conflicts are present within an organisation, the positive impact of task conflict on decision quality may be diminished or entirely neutralised (Korsgaard, Soyoung Jeong, Mahony, & Pitariu, 2008), while the negative effects of relationship conflict tend to dominate (De Dreu & Weingart, 2003). Therefore, implementing effective conflict management mechanisms can alleviate relationship conflicts and indirectly reduce the negative effects of task conflicts, thereby optimising the tone and readability of annual reports.

2.2 Information disclosure tone

Ross (1977) introduced the theory of signalling and information asymmetry, suggesting that firms use signals to communicate positive or negative information about the company to stakeholders. Unlike financial data, the language of textual information, particularly the positive or negative tone in which it is conveyed, plays a significant role in conveying emotions and expressing attitudes (Loughran & McDonald, 2011). Tucker (2015) highlights that the influence managers have on the tone of disclosures surpasses their impact on numerical reporting. Managers utilise the tone of disclosures to convey information more qualitatively or subtly (Rogers, Van Buskirk, & Zechman, 2011). Stakeholders tend to interpret the tone as an indicator of managerial performance (Balsam, Boone, Liu, & Yin, 2016). Research has shown a significant association between the tone of annual reports and factors such as a company's future financial performance, volatility, fraud allegations and significant internal control deficiencies (Aly, El-Halaby, & Hussainey, 2018). This suggests that the information contained in annual reports is more valuable than that conveyed in earnings announcements (Loughran & McDonald, 2011).

Existing literature on the intent and function of report tone is divided into two opposing views: the impression management view and the information increment view. The impression management view argues that when a company's performance is poor and there is a need to boost its stock price, managers are motivated to manipulate information asymmetry by altering the tone (i.e. providing misleading information) (Osma & Guillamón-Saorín, 2011), thereby misleading investors. In contrast, the information increment view posits that the tone of an annual report plays a crucial incremental role, with managers using a positive tone to signal and reduce information asymmetry, while conveying information about the firm's future performance (Xie & Lin, 2015), profitability (Prencipe, 2004), stock market returns (Jiang *et al.*, 2019), internal control quality (Loughran & McDonald, 2011), external financing needs (Lang & Lundholm, 1993) and the need to increase external investors' investment intensity (Feldman *et al.*, 2010) and address risk features such as bankruptcy, operational and systemic risks (Dobler, Lajili, & Zéghal, 2011; Linsley & Shrives, 2006; Miihkinen, 2012). According to the information increment view, the positive tone of an annual report generates a favourable information increment effect, attracts the attention of external investors (Zhong, Dong, & Chen, 2020) and increases corporate value and alleviate financial constraints (Wang, Zhou, & Gan, 2024). Furthermore, when facing challenging environments, managers tend to reduce the positive reporting tone (Mayew, Sethuraman, & Venkatachalam, 2015).

In general, senior executives play a crucial role in the preparation of annual reports. Within the fields of accounting and finance, the concept of "tone at the top" is particularly significant, indicating that managers adopt a unique style of disclosure and that their disclosure choices are interconnected with investor sentiment (Bamber *et al.*, 2010). Patelli and Pedrini (2015) assert that both the Chair and the CEO influence the tone of disclosures. Their empirical findings suggest that aggressive financial reporting is positively correlated with language that is assertive, syntactically complex and less engaging. Numerous studies have confirmed that board members' characteristics (such as gender, education, financial expertise and board turnover) are associated with more negative disclosure tones, while an older Chair is linked to fewer negative tones in disclosures (Martikainen, Miihkinen, & Watson, 2022).

2.3 Chair–CEO age dissimilarity and annual report tone

Based on the previous discussion, team heterogeneity can generate both beneficial and detrimental effects (Milliken & Martins, 1996). Such heterogeneity may increase internal conflict during decision-making, lead to rejection among members, weaken board effectiveness and ultimately harm firm profitability (Abt & Knyphausen-Aufseß, 2017). Some studies report negative associations between age diversity and outcomes such as corporate social responsibility disclosure (Khan, Khan, & Senturk, 2019) and earnings management (Komal *et al.*, 2023). From an agency theory perspective, the relationship

between the Chair and the CEO is akin to a principal-agent dynamic, which in this case is influenced by differing risk preferences and time horizons due to their age gap (Hambrick & Mason, 1984). From a UET perspective, the Chair–CEO age dissimilarity can influence the decision-making process through cognitive and demographic factors (Zenger & Lawrence, 1989). A significant age difference may foster cognitive diversity and generational viewpoints (Wei & Wu, 2013). An older Chair nearing retirement may prioritise stability and short-term returns (Carmeli & Halevi, 2009), whereas a younger CEO may prefer higher-risk and growth-oriented strategies (McGuinness, 2021). Such differences in risk preferences and strategic horizons can increase disagreement regarding corporate communication and disclosure decisions. Consequently, greater Chair–CEO age dissimilarity may hinder consensus formation and reduce the positivity of ART.

From the perspective of the similarity-attraction theory, individuals tend to associate with others who are similar to themselves as this fosters stronger relationships, greater cohesion and improved team performance. Greater internal consistency within TMTs helps avoid internal disruptions and enables faster and more effective strategic decisions (Hambrick & Mason, 1984). Accordingly, similarity between the Chair and CEO may facilitate more favourable feedback and reduce communication disputes (Lee, Lee, & Nagarajan, 2014). In contrast, age dissimilarity may intensify cognitive disagreement and trigger relational conflict, thereby hindering collaboration among senior executives (Schmid & Mitterreiter, 2020). Consistent commitment to strategic decisions within TMTs is crucial for firm performance (Pitcher & Smith, 2001). Similarly, Hu *et al.* (2026) found that CEO age dissimilarity increases conflict and reduces coordination efficiency, which negatively affects firm value and investment efficiency. Consequently, greater Chair–CEO age dissimilarity may reduce communication quality, limit information sharing, increase communication errors and internal conflict, lead to differing interpretations of corporate performance and ultimately impair the tone of firms' annual reports.

Furthermore, in the Western cultural context, conflict arising from Chair–CEO age dissimilarity may stimulate the integration of strategic perspectives across generations, thereby positively promoting firm value (Goergen *et al.*, 2015). In the context of corporate disclosure, such dynamics may influence how firm performance and prospects are framed in narrative reporting, thereby shaping the tone of annual reports. However, in the Chinese institutional context, cultural norms rooted in collectivism shape how leadership differences influence firm operations and information disclosure. Although Chinese corporate culture emphasises interpersonal harmony and conflict avoidance, these norms do not necessarily eliminate the influence of Chair–CEO age dissimilarity; rather, they shape how such differences are expressed within organisational communication. Prior research shows that collectivist cultures place a strong emphasis on maintaining harmonious interpersonal relationships and avoiding open confrontation (Morris *et al.*, 1998). As a result, Chinese managers tend to adopt conflict-avoidance strategies more frequently than their Western counterparts (Fu *et al.*, 2008). However, such approaches may allow latent tensions to accumulate, potentially leading to relational conflicts that affect narrative disclosure and reduce the positive tone of annual reports. Therefore, given that the ART is a collective communication outcome requiring coordination between the Chair and CEO, we expect the negative effects of age dissimilarity to dominate.

Although UET suggests that age diversity may generate broader perspectives and improve decision quality, the similarity-attraction paradigm and agency theory imply that substantial age differences are more likely to create relational conflict and coordination difficulties.

Therefore, we propose the following hypothesis.

H1. Chair–CEO age dissimilarity is negatively associated with the positive tone of annual reports.

3. Research methodology

3.1 Sample selection and distribution

This study begins with an initial sample comprising 5,649 firms (127,524 firm-year observations) listed on the Shanghai and Shenzhen Stock Exchanges between 2000 and 2023, obtained from the CSMAR database. The sample selection procedure is detailed in Table 1, Panel A, following the criteria used in prior literature (Gomariz & Ballesta, 2014).

Firstly, 66,246 firm-year observations are excluded, including observations from firms outside the A-share stock market, those before 2010, firms with CEO duality, financial institutions and firms in the conglomerate industry, which could have skewed the results. Subsequently, 34,402 observations with missing values for key variables are removed. Ultimately, the final sample consists of 3,026 A-share listed firms, encompassing 26,876 firm-year observations over the period 2010–2023. To mitigate the influence of outliers, all continuous variables are winsorised at the 1st and 99th percentiles.

Table 1. Sample selection and distribution

Panel A: Sample selection procedure				
Selection process			Number of observations	
Total observations produced from 2000 to 2023			127,524	
Drop: observations produced from the data outside the A-shares stock market, before 2010, CEO duality (the CEO also serves as Chair), SIC codes between S91 (Conglomerates), SIC codes between J66 to J69 (Financial institutes)			(66,246)	
Drop: observations with missing data on Variables (<i>TONE/GAPS/TENURE1/TENURE2/FIRMAGE/STDRET/SALEGR/CCS 50%/INSINVS 50%/INTANG_median/SALARY/BMEET/FCF/AQ</i>)			(34,402)	
<i>Total Sample (2010 to 2023)</i>			26,876	
Note(s): The initial sample selection period is from 2000 to 2023. The final datasets cover the period from 2010 to 2023				
Panel B: Industry distribution				
Group	SIC code	Industry	<i>N</i>	% of <i>N</i>
1	A01 to A05	Agriculture	335	1.25
2	B06 to B11	Mining	455	1.69
3	C14 to C15	Food manufacturing	1,061	3.94
4	C17 to C24	Machine manufacturing	1,183	4.40
5	C25 to C28	Chemical manufacturing	3,910	14.55
6	C29 to C43	Metal and non-metal	11,690	43.50
7	D44 to D46	Utility	848	3.16
8	E47 to E50	Construction	643	2.39
9	F51 to F52	Retailing	1,140	4.24
10	G53 to G60	Transport	573	2.13
11	I63 to I65	IT	2,327	8.66
12	K70; L71	Real estate	804	2.99
13	L72; M73 to M75	Business and research service	909	3.38
14	N76 to N79; O81; P82; R88 to R89	Other service	596	2.22
15	Q84	Health service	158	0.58
16	R86 to R87	Press	246	0.92
<i>Total</i>			26,876	100
Note(s): Following Hu et al. (2026) , the industry classification method adopted by this study for Chinese-listed firms (Including industry code from CSMAR: A01-A05, B06-B11, C13-C15, C17-43, D44-D46, E47 -E50, F51-F52, G53-G60, I63-I65, J66-J69, K70, L71-L72, M73-M75, N76-N79, O81, P83, Q84, R86-R89, S91)				
Source(s): Authors' calculations				

The industry distribution of the final sample is presented in Panel B of Table 1. Firms are classified into 16 industries according to the Standard Industrial Classification (SIC) codes provided by CSMAR. The sample exhibits a well-balanced distribution, with the manufacturing sector representing a significant proportion of firms in the Chinese market.

3.2 Variable definitions

(1) Proxy for ART

Following Loughran and McDonald (2011), sentiment analysis is conducted using the Bag-of-Words (BoW) methodology. Initially, we rely on the “Chinese Sentiment Analysis Dictionary” from China National Knowledge Infrastructure and the financial sentiment lexicon provided by Loughran and McDonald (2011). Subsequently, we translate the English terms from the L&M lexicon into Chinese using the Youdao and Kingsoft dictionaries. The words contained in the annual reports are matched with those in this custom-built Chinese sentiment lexicon, yielding a list of positive and negative sentiment words.

Drawing on existing literature, we define the tone index (*TONE*) as the density of positive tone words (Xu, Li, Hua, & Ren, 2024). *TONE* is calculated as the proportion of positive tone words per sentence in a firm’s annual report. A higher *TONE* value indicates a greater proportion of positive tone words, reflecting a more optimistic emotional tone in the report, whereas lower values indicate the opposite. Additionally, industry heterogeneity may lead to differences in corporate ethical awareness (Brammer *et al.*, 2006), thus significantly affecting the emotional tone of annual reports. Following Yuan, Shang, Ma, and Li (2022) and Qi, Chi, Yang, and Ouyang (2023), we introduce the tone peer index (*TONE_P*) as an alternative sentiment metric to evaluate the emotional tone of corporate annual reports. *TONE_P* is computed by subtracting the average *TONE* of firms within the same industry and year from the firm’s own *TONE*. A positive *TONE_P* value indicates that the firm’s proportion of positive tone words in its annual report exceeds the industry average, signalling a more positive tone. Conversely, a negative *TONE_P* value reflects a tone that is below the industry norm. Finally, inspired by prior research, we developed the tone standardised score index (*TONE_S*) (Mintzberg, 1978; Tang, Crossan, & Rowe, 2011; Ye, Shahab, Riaz, & Ntim, 2023), calculated by standardising each *TONE* index for industry and year ($TONE_{i,t}$; mean = 0, standard deviation = 1). A higher *TONE_S* value reflects a significant positive deviation from the industry norm, while a lower value indicates a negative deviation. In sum, this study utilises the *TONE*, *TONE_P* and *TONE_S* indices to assess the tone of annual reports.

(2) Proxy for Chair–CEO Age Dissimilarity (Chair–CEO Age Gap)

The measured approach to age dissimilarity has yet to reach a consensus in the existing literature. Building on the conceptual framework developed by Goergen *et al.* (2015), this study uses two variables to quantify Chair–CEO age dissimilarity: *GAPS* (signed age dissimilarity) and *GAPU* (unsigned age dissimilarity). *GAPS* is measured as the arithmetic difference between the Chair’s and the CEO’s ages, generating either positive or negative values to indicate whether the Chair is older or younger than the CEO. This measure provides insights into potential cognitive conflicts or experiential divergences arising from age differences between the two executives. Meanwhile, *GAPU* is defined as the absolute value of *GAPS*, quantifying the extent of the age dissimilarity regardless of which individual is older.

(3) Measurement of Control Variables

Consistent with prior studies, we control for various characteristics of the Chair, the CEO, the supervisory board and the firm that may influence the ART. Firstly, the Chair’s and the CEO’s characteristics are assessed by considering their respective power dynamics through variables such as replacement (*CHANGE1/CHANGE2*) and tenure (*TENURE1/TENURE2*) (Kaplan, Klebanov, & Sorensen, 2012). These variables are used to gauge the likelihood of either tacit

understanding or potential conflict between the Chair and the CEO. Secondly, the supervisory board's characteristics are represented by board size (*BODSIZE*), which refers to the total number of directors on the board. Additionally, firm characteristics include financial leverage (*LEVER*), the firm's listing age (*FIRMAGE*), the firm size (*FSIZE*), the standard deviation of monthly stock returns during the year (*STDRET*), the sales growth rate (*SALEGR*), the percentage of independent directors (*INDDIR%*), the return-on-assets ratio (*ROA*), the occurrence of losses (*LOSS*), financial distress risk, as measured by the *O-Score*, and compensation of the top executives (*SALARY*) (Davis, Ge, Matsumoto, & Zhang, 2015; Qi *et al.*, 2023; Xu *et al.*, 2024). Appendix A provides further details regarding the definition of variables and the sources used in this study.

3.3 Empirical model

Based on prior literature, H1 posits an association between Chair–CEO age dissimilarity and ART. The following regression model is specified to test this hypothesis empirically. Equation (1) is as follows:

$$\begin{aligned} ART_{i,t} = & \beta_0 + \beta_1 GAP_{i,t} + \beta_2 CHANGE1_{i,t} + \beta_3 CHANGE2_{i,t} + \beta_4 TENURE1_{i,t} \\ & + \beta_5 TENURE2_{i,t} + \beta_6 BODSIZE_{i,t} + \beta_7 LEVER_{i,t} + \beta_8 FIRMAGE_{i,t} + \beta_9 FSIZE_{i,t} \\ & + \beta_{10} STDRET_{i,t} + \beta_{11} SALEGR_{i,t} + \beta_{12} INDDIR\%_{i,t} + \beta_{13} ROA_{i,t} + \beta_{14} LOSS_{i,t} \\ & + \beta_{15} O-Score_{i,t} + \beta_{16} SALARY_{i,t} + INDUSTRY + YEAR + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Equation (1) adopts the ordinary least squares (OLS) regression method to test H1; industry (*INDUSTRY*) and year (*YEAR*) fixed effects are incorporated. The main variable of interest is $\beta_1 GAP_{i,t}$, where $GAP_{i,t}$ serves as an index for the Chair–CEO age dissimilarity. As outlined in Section 2.3.2, this study uses two measures of age dissimilarity: *GAPS* (signed age dissimilarity) and *GAPU* (unsigned age dissimilarity). The dependent variable uses three primary metrics: *TONE* (tone index) (Xu *et al.*, 2024), *TONE_P* (tone peer index) (Yuan *et al.*, 2022) and *TONE_S* (tone standardised score index) (Qi *et al.*, 2023). In equation (1), a positive (negative) coefficient of $\beta_1 GAP_{i,t}$ would suggest that age dissimilarity increases (decreases) the percentage of positive tone in the annual report.

4. Results

4.1 Descriptive statistics

Table 2 presents the descriptive statistics for the key variables utilised in this study. The average (median) of *TONE* is 3.41 (3.34), with a standard deviation of 0.74, indicating that each sentence in the annual reports of the sampled firms contains 3.41 positive-tone words on average, which is similar to that reported in existing research (Xu *et al.*, 2024; Yuan *et al.*, 2022). Within the sample, 49% of firm-year observations exhibit a more positive tone in their annual reports relative to their industry peers in the corresponding year. The average age difference between the Chair and the CEO (*GAPS*) is 3.45 years, while the absolute age difference (*GAPU* [1]) averages 5.68 years, which is close to the 5.93 years reported by Hu *et al.* (2025). The data further reveal that in 19% and 6% of observations, the Chair–CEO age dissimilarity exceeds 10 and 20 years, respectively, which is also similar to the 24% and 6% documented by Zhu *et al.* (2021). Observations involving a Chair (CEO) turnover during the year account for 18% (26%) of the sample. The average board size is 8.38 members. The average leverage ratio (*LEVER*) is 0.42, which is comparable to the 0.49 value reported by Zhu *et al.* (2021). The average firm listing age is 2.16 years, and the mean firm size is 22.08. The average sales growth rate is 17%, indicating that most firms are in an expansion phase with an

Table 2. Descriptive statistics

Variables	N	Mean	Std. Dev	Min	p25	Median	p75	Max
<i>Dependent variables (Annual Report Tone)</i>								
TONE	26,876	3.41	0.74	1.85	2.90	3.34	3.85	5.49
TONE_P	26,876	0.06	0.70	−1.89	−0.43	−0.01	0.48	2.65
TONE_S	26,876	0.09	1.01	−3.03	−0.62	−0.01	0.69	4.77
TONEF	26,876	5.32	1.06	2.80	4.58	5.20	5.94	9.03
TONEF_P	26,876	0.10	1.01	−2.70	−0.60	−0.02	0.69	4.49
TONEF_S	26,876	0.10	1.01	−2.63	−0.61	−0.02	0.70	5.63
<i>Independent variables (Chair–CEO Age Gap)</i>								
GAPS	26,876	3.45	8.23	−16.00	0.00	0.00	7.00	28.00
GAPU	26,876	5.68	7.10	0.00	0.00	3.00	9.00	29.00
GAP20	26,876	0.06	0.24	0.00	0.00	0.00	0.00	1.00
GAP15	26,876	0.10	0.30	0.00	0.00	0.00	0.00	1.00
GAP10	26,876	0.19	0.40	0.00	0.00	0.00	0.00	1.00
GAP5	26,876	0.37	0.48	0.00	0.00	0.00	1.00	1.00
<i>Control variables</i>								
CHANGE1	26,876	0.18	0.39	0.00	0.00	0.00	0.00	1.00
CHANGE2	26,876	0.26	0.44	0.00	0.00	0.00	1.00	1.00
TENURE1	26,876	5.62	3.89	0.12	2.50	4.67	8.00	16.42
TENURE2	26,876	4.38	3.33	0.08	1.83	3.42	6.08	14.75
BODSIZE	26,876	8.38	1.63	5.00	7.00	9.00	9.00	15.00
LEVER	26,876	0.42	0.22	0.05	0.25	0.41	0.57	1.10
FIRIMAGE	26,876	2.16	0.79	0.00	1.61	2.30	2.77	3.37
FSIZE	26,876	22.08	1.23	18.93	21.21	21.90	22.77	26.03
STDRET	26,876	0.13	0.06	0.04	0.09	0.12	0.15	0.42
SALEGR	26,876	0.17	0.46	−0.68	−0.04	0.01	0.27	3.16
INDDIR%	26,876	0.38	0.05	0.00	0.33	0.36	0.43	0.57
ROA	26,876	0.03	0.08	−0.37	0.01	0.03	0.06	0.21
LOSS	26,876	0.15	0.36	0.00	0.00	0.00	0.00	1.00
O-Score	26,876	−8.40	1.95	−13.57	−9.61	−8.36	−7.20	−1.81
SALARY	26,876	14.92	0.80	11.87	14.42	14.91	15.43	17.04
GAPQU	26,876	79.62	161.51	0.00	0.00	9.00	81.00	784.00
<i>Other variables</i>								
GAPS_median	26,876	0.47	0.50	0.00	0.00	0.00	1.00	1.00
GAPU_median	26,876	0.48	0.50	0.00	0.00	0.00	1.00	1.00
NTUPW	26,848	8.21	0.29	7.37	8.01	8.23	8.42	8.84
MDAPW	26,848	8.19	0.28	7.37	7.99	8.21	8.39	8.81
CEOLPW	437	3.79	0.41	2.64	3.53	3.83	4.08	4.68
ECCCCQASPW	13,631	4.96	0.79	2.08	4.49	5.01	5.49	6.66
NEG%	26,876	0.04	0.01	0.03	0.04	0.04	0.05	0.07
OTW%	26,876	39.29	7.56	23.71	34.06	38.42	43.63	61.67
FinBert_TONE	26,876	0.14	0.59	−1.00	−0.12	0.39	0.55	1.00
FinBert_TONE_P	26,876	−0.04	0.54	−1.54	−0.24	0.08	0.33	1.13
FinBert_TONE_S	26,876	−0.06	1.00	−10.74	−0.70	0.27	0.65	5.03
FinBert_NEGT	26,876	0.16	0.35	0.00	0.00	0.00	0.01	1.00
FinBert_NEGT_P	26,876	0.02	0.33	−0.34	−0.20	−0.06	0.00	0.99
FinBert_NEGT_S	26,876	0.05	1.06	−2.30	−0.53	−0.36	−0.06	29.45
FinBert_NEUTRAL	26,876	0.81	0.37	0.00	0.98	0.99	1.00	1.00
FinBert_NEUTRAL_P	26,876	−0.02	0.35	−0.99	0.00	0.08	0.22	0.43
FinBert_NEUTRAL_S	26,876	−0.05	1.05	−27.23	0.07	0.36	0.57	1.79
unrelated	26,876	0.00	0.00	0.00	0.00	0.00	0.00	0.00
uncertain	26,876	0.00	0.04	0.00	0.00	0.00	0.00	1.00
CCS 50%	26,876	0.24	0.43	0.00	0.00	0.00	0.00	1.00
INSINVS 50%	26,876	0.37	0.48	0.00	0.00	0.00	1.00	1.00

(continued)

Table 2. Continued

Variables	N	Mean	Std. Dev	Min	p25	Median	p75	Max
<i>INTANG_median</i>	26,876	0.58	0.49	0.00	0.00	1.00	1.00	1.00
<i>LARGEFIRM</i>	26,876	0.57	0.50	0.00	0.00	1.00	1.00	1.00
<i>FFIRM</i>	26,876	0.67	0.47	0.00	0.00	1.00	1.00	1.00
<i>SOE</i>	26,876	0.29	0.45	0.00	0.00	0.00	1.00	1.00
<i>ChairNCN</i>	26,876	0.98	0.15	0.00	1.00	1.00	1.00	1.00
<i>CEONCN</i>	26,876	0.97	0.16	0.00	1.00	1.00	1.00	1.00
<i>CRG</i>	26,876	0.29	0.45	0.00	0.00	0.00	1.00	1.00
<i>GAPD</i>	26,876	0.67	0.47	0.00	0.00	1.00	1.00	1.00
<i>MEETING</i>	26,876	1.10	0.53	0.00	0.69	1.10	1.39	2.20
<i>JONTENU</i>	26,876	3.47	0.92	0.00	2.89	3.53	4.14	5.10
<i>FCF</i>	26,876	0.02	0.09	−0.35	−0.01	0.03	0.06	0.23
<i>MJONES</i>	26,876	0.01	0.09	−0.31	−0.04	0.01	0.05	0.32
<i>ES</i>	5,584	−0.02	0.94	−16.83	−0.18	0.06	0.31	7.57
<i>CAR [-1:1]</i>	8,724	−0.01	0.05	−0.31	−0.03	−0.00	0.02	0.37
<i>CAR[2:60]</i>	19,162	0.00	0.01	0.00	0.00	0.00	0.00	0.01

Note(s): This table presents the descriptive statistics of the main variables for the sample of Chinese firms listed on the Shanghai and Shenzhen Stock Exchange in the sample. Variables are defined in [Appendix A](#)

Source(s): Authors' calculations

overall upward trend in revenue generation. Overall, the descriptive statistics are consistent with findings from existing research, particularly studies conducted in the Chinese market ([Goergen et al., 2015](#); [Zhu et al., 2021](#)).

4.2 Mean difference test

[Table 3](#) presents the results of the mean difference test for key variables between two groups: those with a large age difference ($GAPU > \text{median}$) and those with a small age difference ($GAPU \leq \text{median}$) between the Chair and the CEO. For firms with greater Chair–CEO age dissimilarity ($GAPU > \text{median}$), the three primary tone indices ($TONE$, $TONE_P$, $TONE_S$) are lower and the alternative measures of the dependent variable ($TONEF$, $TONEF_P$, $TONEF_S$) exhibit similar results. Consistently, the frequency of Chair and CEO position changes ($CHANGE1$, $CHANGE2$), board size ($BODSIZE$), financial leverage ($LEVER$) and the incidence of losses ($LOSS$) are higher. The reported variables are statistically significant at the 1% level, indicating thereliability of these tests. These findings suggest that the age difference between the Chair and the CEO significantly influences the tone of the company's annual report. This result provides preliminary support for our hypothesis.

4.3 Correlation analysis

[Table 4](#) presents the pairwise correlations between the dependent and independent variables included in the baseline regression model. We observed a significant negative correlation between $TONE/TONE_P/TONE_S$ and $GAPU$ (correlation = -0.02 , $p < 0.01$; correlation = -0.01 , $p < 0.05$; correlation = -0.01 , $p < 0.05$). Furthermore, $TONEF/TONEF_P/TONEF_S$ also exhibited significant negative correlations with $GAPS$ (correlation = -0.02 , $p < 0.01$; correlation = -0.02 , $p < 0.01$; correlation = -0.02 , $p < 0.01$, respectively). Notably, both $GAPS$ and $GAPU$ show significant correlations with nearly all control variables, all statistically significant at the 1% level. Firms with larger board sizes ($BODSIZE$) or lower percentages of independent directors ($INDDIR\%$) tend to exhibit a lower positive tone in their annual reports.

Table 3. Mean difference test

Variables	GAPU > median Mean N = 12,820	GAPU ≤ median Mean N = 14,056	Mean Difference	t-statistics
<i>TONE</i>	3.38	3.43	−0.05	−5.55***
<i>TONE_P</i>	0.04	0.08	−0.04	−4.20***
<i>TONE_S</i>	0.06	0.11	−0.05	−4.25***
<i>TONEF</i>	5.30	5.34	−0.04	−3.25***
<i>TONEF_P</i>	0.08	0.11	−0.03	−2.30**
<i>TONEF_S</i>	0.08	0.11	−0.03	−2.30**
<i>CHANGE1</i>	0.21	0.17	0.04	8.80***
<i>CHANGE2</i>	0.32	0.22	0.10	18.70***
<i>TENURE1</i>	5.69	5.56	0.13	2.70**
<i>TENURE2</i>	3.86	4.85	−1.00	−24.85***
<i>BODSIZE</i>	8.57	8.21	0.37	18.55***
<i>LEVER</i>	0.44	0.41	0.03	9.85***
<i>FIRMAGE</i>	2.28	2.05	0.22	23.05***
<i>FSIZE</i>	22.18	21.98	0.20	13.35***
<i>STDRET</i>	0.13	0.13	0.00	−5.35***
<i>SALEGR</i>	0.15	0.18	−0.02	−3.90***
<i>INDDIR%</i>	0.37	0.38	−0.01	−17.50***
<i>ROA</i>	0.03	0.03	0.00	−3.80***
<i>LOSS</i>	0.15	0.15	0.01	1.90**
<i>O-Score</i>	−8.33	−8.47	0.14	6.00***
<i>SALARY</i>	14.92	14.92	0.00	0.00

Note(s): t-statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variables are defined in [Appendix A](#)

Source(s): Authors' calculations

Table 4. Correlation analysis (only dependent & independent variables)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
<i>TONE</i>	(1)	–											
<i>TONE_P</i>	(2)	<u>0.97</u>	–										
<i>TONE_S</i>	(3)	<u>0.97</u>	<u>1.00</u>	–									
<i>TONEF</i>	(4)	<u>0.89</u>	<u>0.87</u>	<u>0.87</u>	–								
<i>TONEF_P</i>	(5)	<u>0.87</u>	<u>0.90</u>	<u>0.89</u>	<u>0.97</u>	–							
<i>TONEF_S</i>	(6)	<u>0.87</u>	<u>0.89</u>	<u>0.90</u>	<u>0.96</u>	<u>0.99</u>	–						
<i>GAPS</i>	(7)	<u>–0.01</u>	<u>–0.01</u>	<u>–0.01</u>	<u>–0.02</u>	<u>–0.02</u>	<u>–0.02</u>	–					
<i>GAPU</i>	(8)	<u>–0.02</u>	<u>–0.01</u>	<u>–0.01</u>	<u>–0.00</u>	<u>–0.01</u>	<u>–0.01</u>	<u>0.68</u>	–				
<i>GAP20</i>	(9)	0.00	<u>–0.01</u>	<u>–0.01</u>	0.00	<u>–0.01</u>	<u>–0.01</u>	<u>0.58</u>	<u>0.72</u>	–			
<i>GAP15</i>	(10)	0.00	0.00	0.00	0.01	0.00	0.00	<u>0.59</u>	<u>0.80</u>	<u>0.77</u>	–		
<i>GAP10</i>	(11)	<u>–0.01</u>	<u>–0.01</u>	<u>–0.01</u>	0.00	0.00	0.00	<u>0.56</u>	<u>0.84</u>	<u>0.53</u>	<u>0.69</u>	–	
<i>GAP5</i>	(12)	<u>–0.02</u>	<u>–0.02</u>	<u>–0.02</u>	<u>–0.01</u>	<u>–0.01</u>	<u>–0.01</u>	<u>0.49</u>	<u>0.80</u>	<u>0.33</u>	<u>0.44</u>	<u>0.63</u>	–

Note(s): All the variables are defined in [Appendix A](#). Underline indicates significance at the 1% level. Italics refer to significance at the 5% level. This table reports the pairwise correlations between the variables used in the baseline regression

Source(s): Authors' calculations

4.4 Regression analysis

In [Table 5](#), we investigate the relationship between Chair–CEO age dissimilarity and the ART. Columns 1 and 2 report the effects of *GAPS* and *GAPU* on *TONE*, respectively. Columns 4 and 5 analyse the impact of *GAPS* and *GAPU* on *TONE_P*. Lastly, the effects of *GAPS* and *GAPU*

Table 5. Chair–CEO age dissimilarity and annual report tone

Variables	(1) TONE	(2) TONE	(3) TONE	(4) TONE_P	(5) TONE_P	(6) TONE_P	(7) TONE_S	(8) TONE_S	(9) TONE_S
<i>GAPS</i>	−0.002*** (−3.757)		−0.002** (−2.239)	−0.002*** (−3.791)		−0.002** (−2.369)	−0.003*** (−3.780)		−0.003*** (−2.349)
<i>GAPU</i>		−0.002*** (−2.906)			−0.002*** (−2.806)			−0.002*** (−2.829)	
<i>GAPSQU</i>			−0.000 (−0.357)			−0.000 (−0.216)			−0.000 (−0.241)
<i>CHANGE1</i>	−0.005 (−0.368)	−0.003 (−0.242)	−0.005 (−0.356)	−0.005 (−0.414)	−0.004 (−0.289)	−0.005 (−0.407)	−0.006 (−0.315)	−0.003 (−0.189)	−0.006 (−0.307)
<i>CHANGE2</i>	0.008 (0.720)	0.009 (0.787)	0.008 (0.720)	0.008 (0.756)	0.009 (0.822)	0.008 (0.755)	0.013 (0.848)	0.014 (0.915)	0.013 (0.848)
<i>TENURE1</i>	0.009*** (6.472)	0.009*** (6.122)	0.009*** (6.474)	0.009*** (6.425)	0.009*** (6.051)	0.009*** (6.426)	0.013*** (6.421)	0.012*** (6.056)	0.013*** (6.423)
<i>TENURE2</i>	−0.005*** (−3.314)	−0.005*** (−3.079)	−0.005*** (−3.315)	−0.005*** (−3.123)	−0.005*** (−2.865)	−0.005*** (−3.123)	−0.007*** (−3.054)	−0.006*** (−2.803)	−0.007*** (−3.054)
<i>BODSIZE</i>	−0.007* (−1.946)	−0.007** (−1.969)	−0.007* (−1.952)	−0.006* (−1.829)	−0.006* (−1.854)	−0.006* (−1.832)	−0.008* (−1.745)	−0.008* (−1.769)	−0.008* (−1.749)
<i>LEVER</i>	0.128** (2.112)	0.130** (2.150)	0.128** (2.115)	0.126** (2.085)	0.129** (2.123)	0.126** (2.087)	0.173** (2.010)	0.176** (2.048)	0.173** (2.012)
<i>FIRIMAGE</i>	−0.074*** (−11.046)	−0.072*** (−10.807)	−0.074*** (−11.039)	−0.073*** (−10.899)	−0.071*** (−10.663)	−0.073*** (−10.895)	−0.103*** (−10.744)	−0.101*** (−10.508)	−0.103*** (−10.739)
<i>FSIZE</i>	−0.007 (−1.262)	−0.008 (−1.348)	−0.007 (−1.272)	−0.007 (−1.223)	−0.008 (−1.310)	−0.007 (−1.229)	−0.011 (−1.278)	−0.011 (−1.365)	−0.011 (−1.284)
<i>STDRET</i>	−0.234*** (−2.992)	−0.233*** (−2.982)	−0.234*** (−2.994)	−0.213*** (−2.732)	−0.212*** (−2.720)	−0.213*** (−2.733)	−0.327*** (−2.957)	−0.326*** (−2.945)	−0.328*** (−2.958)
<i>SALEGR</i>	0.039*** (3.920)	0.039*** (3.909)	0.039*** (3.914)	0.042*** (4.212)	0.042*** (4.204)	0.042*** (4.208)	0.057*** (4.098)	0.057*** (4.088)	0.057*** (4.094)
<i>INDDIR%</i>	−0.129 (−1.354)	−0.132 (−1.392)	−0.129 (−1.363)	−0.125 (−1.324)	−0.128 (−1.355)	−0.126 (−1.329)	−0.149 (−1.100)	−0.154 (−1.133)	−0.150 (−1.106)
<i>ROA</i>	0.329*** (3.406)	0.325*** (3.360)	0.328*** (3.401)	0.346*** (3.589)	0.341*** (3.543)	0.345*** (3.587)	0.496*** (3.628)	0.490*** (3.582)	0.495*** (3.625)
<i>LOSS</i>	−0.071*** (−4.108)	−0.071*** (−4.131)	−0.071*** (−4.108)	−0.072*** (−4.189)	−0.072*** (−4.213)	−0.072*** (−4.189)	−0.103*** (−4.198)	−0.104*** (−4.222)	−0.103*** (−4.198)
<i>O-Score</i>	−0.009 (−1.328)	−0.009 (−1.356)	−0.009 (−1.334)	−0.009 (−1.314)	−0.009 (−1.341)	−0.009 (−1.318)	−0.012 (−1.226)	−0.012 (−1.253)	−0.012 (−1.230)
<i>SALARY</i>	0.025*** (3.692)	0.025*** (3.693)	0.025*** (3.684)	0.024*** (3.445)	0.024*** (3.450)	0.024*** (3.439)	0.036*** (3.653)	0.036*** (3.657)	0.036*** (3.647)
<i>Constant</i>	2.577*** (21.177)	2.587*** (21.249)	2.580*** (21.171)	−0.224* (−1.847)	−0.215* (−1.767)	−0.223* (−1.833)	−0.344* (−1.959)	−0.331* (−1.879)	−0.342* (−1.944)
<i>INDUSTRY</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>YEAR</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876
Adjusted- <i>R</i> ²	0.0966	0.0964	0.0965	0.0231	0.0228	0.0230	0.0235	0.0232	0.0234

Note(s): Table 5 columns 1 to 12 report the results from the OLS regression of association between Chair–CEO Age Dissimilarity (*GAPS*, *GAPU* & *GAPSQU*) and Annual Report Tone (*TONE*, *TONE_P* & *TONE_S*). *t*-statistics in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A

Source(s): Authors' calculations

on *TONE_S* are examined in columns 7 and 8. There is a sensitivity test in columns 3, 6 and 9 including both *GAPS* and *GAPSQU* in the regression model (Haans, Pieters, & He, 2016). These models examine whether the association between Chair–CEO age dissimilarity and a firm's ART is nonlinear.

As anticipated, the results show negative coefficients for both *GAPS* and *GAPU* in relation to *TONE* (coefficients = −0.002, −0.002; *t*-statistics = −3.757, −2.906; *p* < 0.01), suggesting that the positive tone of the firm's annual report decreases with greater Chair–CEO age dissimilarity. Furthermore, we analyse the influence of Chair–CEO age dissimilarity on *TONE_P* and find that both *GAPS* and *GAPU* are negatively associated with it (coefficients = −0.002 and −0.002, *t*-statistics = −3.791 and −2.806), and these results are statistically significant at the 1% level. Moreover, *GAPS* and *GAPU* show a negative association with *TONE_S*, which is also statistically significant at the 1% level

(coefficients = -0.003 , t -statistics = -3.780 ; coefficients = -0.002 , t -statistics = -2.829). These findings indicate that an increasing Chair–CEO age dissimilarity corresponds to a reduction in the positive tone of the firm’s annual report, supporting H1. Moreover, there is no non-linear effect of Chair–CEO age dissimilarity on the positive tone of firms’ annual reports. Column 3 shows that the coefficient for *GAPS* is significantly negative, while the coefficient for *GAPSQU* is not statistically significant (-0.002 , t -statistics = -2.239 , $p < 0.05$; 0.000 , t -statistics = -0.357 , $p > 0.10$). Columns 6 and 9 show similar results. Regarding economic significance, a one-standard-deviation increase in *GAPS* is associated with a 0.48% decrease in *TONE* relative to the sample mean [$(-0.002 \times 8.23/3.41) = -0.0048$]. This suggests that the effect of Chair–CEO age dissimilarity on the tone of the firm’s annual report is economically meaningful. Similarly, a one-standard-deviation increase in *GAPU* is linked to a 0.42% decrease in *TONE* relative to the sample mean [$(-0.002 \times 7.09/3.41) = -0.0042$], further demonstrating the economic significance of this effect.

Regarding the control variables, we observe that firms with longer Chair tenure (*TENURE1*), higher financial leverage (*LEVER*), stronger sales growth (*SALEGR*), higher return on assets (*ROA*) and higher executive compensation (*SALARY*) tend to have a more positive tone in their annual reports (Cheng, Dhaliwal, & Zhang, 2013; Khedmati, Sualihu, & Yawson, 2020). We conducted variance inflation factor (VIF) diagnostic tests to address concerns regarding multicollinearity in the regression model. The results indicate that all VIF values are below 10 (Marquardt, 1970), suggesting that multicollinearity does not materially affect the findings. The adjusted R^2 values range from 2.28% to 9.66%.

4.5 Robustness test

(1) Alternative measure of ART

To test the robustness of the research findings (Shahzad, Rehman, Nawaz, & Nawab, 2018), we followed Qi *et al.* (2023) and used alternative measures of ART. We calculated the tone full index (*TONEF*) by summing the number of positive and negative words and dividing by the number of sentences in the annual report. In line with the primary measures of ART (*TONE*, *TONE_P* and *TONE_S*), we constructed three additional measures for the dependent variables (*TONEF*, *TONEF_P* and *TONEF_S*). Higher values of these alternative dependent variables indicate a more positive tone in ART.

The results are presented in Table 6. We replicate the analysis from equation (1). Columns 1 and 2, we examine the relationship between *TONEF*, *GAPS* and *GAPU*, respectively. In columns 3 and 4, the relationship between *TONEF_P*, *GAPS* and *GAPU* is explored. Columns 5 and 6 analyse the link between *TONEF_S*, *GAPS* and *GAPU*. All findings support H1. Furthermore, the results for the control variables align with the findings presented in Table 6.

Furthermore, to enhance the reliability of our findings, we conducted additional robustness tests by enriching the measurement of ART using an alternative textual sentiment indicator. Following Jian, Yang, Liu, and Liu (2024), we performed a word-frequency-based sentiment analysis of firms’ annual reports using the National Taiwan University Sentiment Dictionary of Chinese Sentiment Polarity [2] (NTUSD). A higher value of National Taiwan University Positive Words (*NTUPW*) indicates a greater prevalence of positive tone words in annual reports. We replaced the baseline tone measure with *NTUPW* in Equation (1). As reported in columns 1 and 2 of Table 7, all results are consistent with baseline results.

Annual reports consist of multiple narrative sections, such as the MD&A and the Chief Executive Officer’s Letter (CEO Letter). Among these sections, management enjoys greater discretion in both content organisation and language choice. To ensure comprehensive coverage of textual content, we separately extracted the MD&A section and the CEO Letter from firms’ annual reports. We then conducted regression analyses using the positive tone measures constructed from each section individually. Specifically, we replaced the baseline tone variable with Management Discussion and Analysis Positive Words (*MDAPW*) and CEO

Table 6. Chair–CEO age dissimilarity and annual report tone (alternative measure)

Variables	(1) TONEF	(2) TONEF	(3) TONEF_P	(4) TONEF_P	(5) TONEF_S	(6) TONEF_S
<i>GAPS</i>	−0.003*** (−4.257)		−0.003*** (−4.249)		−0.003*** (−4.280)	
<i>GAPU</i>		−0.002** (−2.051)		−0.002** (−1.994)		−0.002** (−2.023)
<i>Constant</i>	5.172*** (29.045)	5.178*** (29.062)	0.747*** (4.199)	0.752*** (4.225)	0.705*** (3.926)	0.711*** (3.953)
Control variables	Yes					
INDUSTRY	Yes					
YEAR	Yes					
Observations	26,876	26,876	26,876	26,876	26,876	26,876
Adjusted- <i>R</i> ²	0.0928	0.0923	0.0112	0.0107	0.0114	0.0109

Note(s): Table 6 columns 1 to 6 report the results from the OLS regression of the association between Chair–CEO Age Dissimilarity (*GAPS* & *GAPU*) and Annual Report Tone (*TONEF*, *TONEF_P* & *TONEF_S*). *t*-statistics in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in [Appendix A](#)

Source(s): Authors’ calculations

Table 7. Chair–CEO age dissimilarity and annual report tone (Based on the Chinese Affective Polarity Dictionary from National Taiwan University, MD&A, CEO Letter, Earnings Communications Conference Calls Question and Answer Sessions)

Variables	(1) NTUPW	(2) NTUPW	(3) MDAPW	(4) MDAPW	(5) CEOLPW	(6) CEOLPW	(7) ECCCQASPW	(8) ECCCQASPW
<i>GAPS</i>	−0.000* (−1.761)		−0.000*** (−3.492)		−0.007*** (−3.030)		−0.001 (−1.402)	
<i>GAPU</i>		−0.001*** (−3.743)		−0.001*** (−4.758)		−0.008*** (−3.036)		−0.003*** (−3.059)
<i>Constant</i>	6.435*** (200.363)	6.440*** (200.350)	6.238*** (193.596)	6.244*** (193.648)	3.549*** (5.513)	3.515*** (5.411)	0.713*** (3.337)	0.738*** (3.454)
Control variables	Yes							
INDUSTRY	Yes							
YEAR	Yes							
Observations	26,848	26,848	26,848	26,848	437	437	13,631	13,631
Adjusted- <i>R</i> ²	0.6052	0.6054	0.5867	0.5869	0.1189	0.1194	0.1522	0.1527

Note(s): Table 7 columns 1 to 8 report the results from the OLS regression of the association between Chair–CEO Age Dissimilarity (*GAPS* & *GAPU*) and Annual Report Tone (*NTUPW*, *MDAPW*, *CEOLPW* & *ECCCQASPW*). *t*-statistics in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in [Appendix A](#)

Source(s): Authors’ calculations

Letter Positive Words (*CEOLPW*) to re-estimate the models. As shown in Columns 3 to 6 of [Table 7](#), regardless of the specific section of the annual report, the results support H_1 .

In addition to audited financial statements, earnings conference calls represent an important disclosure channel through which management communicates firm information to the public ([Price, Doran, Peterson, & Bliss, 2012](#)). During these calls, market participants can interact directly with the management, particularly during the question-and-answer (Q&A) session. The tone adopted by managers in earnings conference calls, especially during the Q&A segment, conveys valuable information to investors ([Loughran & McDonald, 2011](#)). Unlike annual reports, which are pre-written and highly standardised, conference call disclosures are more flexible and responsive to investor concerns ([Larcker & Zakolyukina, 2012](#)).

Consequently, the Q&A session provides a more effective setting for validating inferences regarding managerial tone. Accordingly, following [Qin, Xiao, He, and Meng \(2025\)](#), we employ tone data for Chinese listed firms from the Earnings Conference Call Database (ECCD) compiled by the China National Research Data Service (CNRDS). We use the number of positive tone words used by management during the Q&A sessions of earnings calls (*ECCCQASPW*) as an alternative proxy for managerial tone. As reported in columns 7 and 8 of [Table 7](#), the results are consistent with the prior results, further reinforcing our main results.

Prior dictionary-based approaches may place disproportionate emphasis on positive tone in annual reports while overlooking the overall sentiment composition of the text. To complement the dictionary method and better capture complex emotional expressions, we calculated the proportion of negative tone words and the proportion of other tone-related words and replaced the original dependent variables accordingly. [Table 8](#) illustrates how Chair–CEO age dissimilarity affects the proportion of negative tone words and other tone-related words in annual reports. In contrast to the positive tone, Columns 1 and 2 show that Chair–CEO age dissimilarity is significantly positively associated with the use of negative tone words, while Columns 3 and 4 indicate a significantly negative association between Chair–CEO age dissimilarity and the use of other tone-related words. All results consistently support our hypothesis.

Although the Loughran and McDonald dictionary has been widely applied in financial text analysis, recent studies suggest that FinBERT, a finance-domain-specific language model, outperforms dictionary-based approaches in sentiment classification, particularly in capturing contextual nuances ([Huang, Wang, & Yang, 2023](#)). Built upon phrase-level sentiment analysis and advanced Chinese word-segmentation techniques, FinBERT accurately parses textual content before sentiment evaluation, thereby mitigating misclassification arising from character-level or partial-word interpretations ([Huang et al., 2023](#)). Moreover, FinBERT is particularly effective in identifying positive or negative sentiment in sentences that are often misclassified as neutral by other algorithms, likely due to its ability to leverage contextual information embedded in financial texts. This approach further integrates textual tone analysis with quantitative performance indicators such as accounting earnings and free cash flows to validate sentiment classifications and improve accuracy.

Table 8. Chair–CEO age dissimilarity and annual report tone (Negative Word% & Other Tone Word%)

Variables	(1) NEG%	(2) NEG%	(3) OTW%	(4) OTW%
<i>GAPS</i>	0.000 (0.080)		−0.025*** (−4.614)	
<i>GAPU</i>		0.000*** (3.209)		−0.018*** (−2.875)
<i>Constant</i>	0.069*** (52.059)	0.069*** (51.868)	27.484*** (21.295)	27.567*** (21.334)
Control variables	Yes			
INDUSTRY	Yes			
YEAR	Yes			
Observations	27,030	27,030	27,030	27,030
Adjusted-R ²	0.0936	0.0931	0.0113	0.0108

Note(s): [Table 8](#) columns 1 to 4 report the results from the OLS regression of the association between Chair–CEO Age Dissimilarity (*GAPS* & *GAPU*) and Annual Report Tone (*NEG%* & *OTW%*). *t*-statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in [Appendix A](#)

Source(s): Authors' calculations

To critically evaluate the effectiveness of tone measurement, we process firms' annual reports using the FinBERT model and classify textual content into multiple sentiment categories, including positive, negative, uncertain, neutral and irrelevant. Following the main empirical design, we separately construct dependent variables for positive, negative and neutral tone measures, yielding the FinBERT positive tone indices (*FinBERT_TONE*, *FinBERT_TONE_P*, *FinBERT_TONE_S*), FinBERT negative tone indices (*FinBERT_NEGT*, *FinBERT_NEGT_P*, *FinBERT_NEGT_S*), and FinBERT neutral tone indices (*FinBERT_NEUTRAL*, *FinBERT_NEUTRAL_P*, *FinBERT_NEUTRAL_S*).

Panel A of Table 9 presents the associations between Chair–CEO age dissimilarity and sentiment categories derived from the FinBERT framework. We re-estimate Equation (1), and Columns 1 to 3 show that Chair–CEO age dissimilarity significantly reduces the use of positive tone words in annual reports. Columns 4 to 6 indicate a significant positive association between Chair–CEO age dissimilarity and the use of negative tone words, while Columns 7 to 9 demonstrate a significant negative effect on the use of neutral tone words. In Panel B, we exclude 49 observations classified as uncertain and re-estimate the regressions reported in Panel A. The results remain qualitatively unchanged. Overall, all findings consistently support our hypothesis.

(2) Alternative measure of Chair–CEO Age Dissimilarity

We develop four alternative measures of Chair–CEO age dissimilarity: *GAP20*, *GAP15*, *GAP10* and *GAP5*. *GAP20* is a dummy variable assigned a value of 1 if the age difference between the Chair and the CEO is 20 years and 0 otherwise. Similarly, *GAP15*, *GAP10* and *GAP5* represent age differences of 15, 10 and 5 years, respectively. Table 10 shows the relationships between Chair–CEO age dissimilarity (*GAP20/15/10/5*) and the primary annual reports' tone indicators: *TONE* (columns 1 to 4), *TONE_P* (columns 5 to 8) and *TONE_S* (columns 9 to 12). These results further support H1.

(3) Company fixed-effects model

The baseline models in this study incorporate industry and year fixed effects rather than firm fixed effects. Within a given firm, Chair–CEO age dissimilarity typically changes through Chair–CEO turnover and the joint ageing of the two executives. As a result, much of the identifying variation in Chair–CEO age dissimilarity is cross-sectional. Firms that systematically appoint Chairs and CEOs of similar ages may differ from other firms in a variety of unobservable characteristics. To alleviate this concern, we re-estimate our models using firm and year fixed effects as a robustness test.

The results are reported in Table 11. The coefficients on *GAPS* remain negative and statistically significant for *TONE*, *TONE_P* and *TONE_S* (coefficients = -0.002 , -0.002 and -0.003 ; t-statistics = -3.005 , -3.052 and -2.955 , respectively; all *p*-values < 0.01). Similar results were obtained when using *GAPU* as the measure of Chair–CEO age dissimilarity. Furthermore, the results reported in Columns (3), (6) and (9) provide additional evidence that no nonlinear relationship exists between Chair–CEO age dissimilarity and annual reports' tone. Overall, these results provide further support for H1 and demonstrate that our findings are robust to the inclusion of firm and year fixed effects.

4.6 Cross-sectional test

As outlined in the previous section, our research has revealed a distinct negative relationship between Chair–CEO age dissimilarity and ART. We conduct cross-sectional analyses in this section to better understand the underlying complexities of this association, particularly concerning the concentration of controlling rights, institutional investors, information asymmetry, agency conflicts, family-firm and state-owned enterprises' (SOEs) dynamics.

(1) Does controlling right concentration affect the association between the Chair–CEO age dissimilarity and ART?

Table 9. Chair-CEO Age Dissimilarity and Annual Report Tone (FinBERT)

Variables	(1) FinBert_ TONE	(2) FinBert_ TONE_ P	(3) FinBert_TONE_S	(4) FinBert_ NEGT	(5) FinBert_ NEGT_ P	(6) FinBert_ NEGT_S	(7) FinBert_ NEUTRAL	(8) FinBert_ NEUTRAL_P	(9) FinBert_ NEUTRAL_S
<i>Panel A: FinBERT (Full observations)</i>									
<i>GAPU</i>	−0.001*	−0.001**	−0.002*	0.000	0.000	0.001	−0.000	−0.000	0.000
	(−1.930)	(−1.988)	(−1.767)	(0.607)	(0.668)	(1.072)	(−0.227)	(−0.298)	(0.039)
<i>Constant</i>	−0.616***	−0.784***	−1.395***	0.525***	0.383***	1.082***	0.699***	−0.125**	−0.133
	(−7.462)	(−9.549)	(−8.722)	(11.054)	(8.087)	(6.731)	(13.039)	(−2.325)	(−0.743)
Control variables	Yes								
INDUSTRY	Yes								
YEAR	Yes								
Observations	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876
Adjusted-R ² or Pseudo R ²	0.1974	0.0504	0.0479	0.1359	0.0616	0.0488	0.1448	0.0602	0.0470
<i>Panel B: FinBERT (Exclude uncertain observations)</i>									
<i>GAPU</i>	−0.001**	−0.001**	−0.002*	0.000	0.000	0.001	−0.000	−0.000	0.000
	(−1.983)	(−2.038)	(−1.814)	(0.622)	(0.684)	(1.092)	(−0.210)	(−0.279)	(0.059)
<i>Constant</i>	−0.625***	−0.794***	−1.411***	0.527***	0.385***	1.086***	0.702***	−0.122**	−0.127
	(−7.573)	(−9.669)	(−8.822)	(11.084)	(8.127)	(6.756)	(13.083)	(−2.281)	(−0.710)
Control variables	Yes								
INDUSTRY	Yes								
YEAR	Yes								
Observations	26,827	26,827	26,827	26,827	26,827	26,827	26,827	26,827	26,827
Adjusted-R ² or Pseudo R ²	0.1975	0.0506	0.0481	0.1358	0.0617	0.0488	0.1443	0.0603	0.0469
Note(s): Table 9 columns 1 to 12 report the results from the OLS regression of association between Chair-CEO Age Dissimilarity (<i>GAPU</i>) and Annual Report Tone (FinBert Measure). <i>t</i> -statistics in parentheses. * <i>p</i> < 0.10, ** <i>p</i> < 0.05, *** <i>p</i> < 0.01. Robust <i>t</i> -statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A									
Source(s): Authors' calculations									

Table 10. Chair–CEO age dissimilarity (alternative measure) and annual report tone

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	TONE	TONE	TONE	TONE	TONE_P	TONE_P	TONE_P	TONE_P	TONE_S	TONE_S	TONE_S	TONE_S
<i>GAP20</i>	−0.062*** (−3.588)				−0.060*** (−3.502)				−0.084*** (−3.421)			
<i>GAP15</i>		−0.029** (−2.046)				−0.027* (−1.943)				−0.040* (−1.955)		
<i>GAP10</i>			−0.024** (−2.186)				−0.023** (−2.068)				−0.032** (−2.026)	
<i>GAP5</i>				−0.020** (−2.201)				−0.019** (−2.098)				−0.029** (−2.217)
<i>Constant</i>	2.586*** (21.238)	2.581*** (21.192)	2.581*** (21.204)	2.579*** (21.186)	−0.216* (−1.777)	−0.221* (−1.820)	−0.221* (−1.818)	−0.223* (−1.835)	−0.333* (−1.893)	−0.340* (−1.931)	−0.340* (−1.932)	−0.342* (−1.943)
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876
Adjusted-R ²	0.0965	0.0962	0.0963	0.0963	0.0230	0.0227	0.0227	0.0227	0.0234	0.0231	0.0231	0.0231

Note(s): Table 10 columns 1 to 12 report the results from the OLS regression of association between Chair–CEO Age Dissimilarity (*GAP20/GAP15/GAP10/GAP5*) and Annual Report Tone (*TONE*, *TONE_P* & *TONE_S*). *t*-statistics in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in [Appendix A](#)

Source(s): Authors' calculations

Table 11. Chair–CEO age dissimilarity and annual report tone (Firm fixed)

Variables	(1) TONE	(2) TONE	(3) TONE	(4) TONE_P	(5) TONE_P	(6) TONE_P	(7) TONE_S	(8) TONE_S	(9) TONE_S
<i>GAPS</i>	−0.002*** (−3.005)		−0.002** (−2.555)	−0.002*** (−3.052)		−0.002*** (−2.772)	−0.003*** (−2.955)		−0.003*** (−2.724)
<i>GAPU</i>		−0.001* (−1.856)			−0.001* (−1.740)			−0.002* (−1.649)	
<i>GAPSQU</i>			0.000 (0.501)			0.000 (0.784)			0.000 (0.828)
<i>Constant</i>	2.457*** (11.029)	2.457*** (11.034)	2.455*** (11.019)	−0.803*** (−3.634)	−1.154*** (−6.699)	−0.806*** (−3.645)	−1.240*** (−3.908)	−1.737*** (−7.047)	−1.244*** (−3.921)
Control variables	Yes								
FIRM	Yes								
YEAR	Yes								
Observations	26,704	26,704	26,704	26,704	26,704	26,704	26,704	26,704	26,704
Adjusted- <i>R</i> ²	0.4747	0.4746	0.4747	0.4333	0.4310	0.4333	0.4324	0.4300	0.4324

Note(s): Table 11 columns 1 to 9 report the results from the OLS regression of the association between Chair–CEO Age Dissimilarity (*GAPS*, *GAPU* & *GAPSQU*) and Annual Report Tone (*TONE*, *TONE_P* & *TONE_S*). *t*-statistics in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A

Source(s): Authors' calculations

Controlling rights are a key element in corporate governance (Becht, Bolton, & Röell, 2003). Cao, Di, and Sun (2025) suggest that controlling rights substantially impact the tone of a firm's annual reports. Firms with low controlling rights generally have a more dispersed ownership structure, increasing the potential for internal conflicts. In such firms, disagreements between the Chair and the CEO are more prominent, leading to greater managerial tensions. These conflicts can affect the tone of corporate disclosures, resulting in a more cautious or even negative sentiment in the annual reports, thereby reducing the proportion of positive tone words. In essence, in firms with high controlling rights, agency problems are less prevalent and relational conflicts arising from Chair–CEO age dissimilarity are less likely to influence the linguistic tone of corporate disclosures.

We use controlling rights to measure the extent of ownership concentration and of managerial decision-making authority. Higher (lower) controlling rights indicate stronger (weaker) decision-making power of the controlling shareholder, more (less) concentrated ownership and a lower (higher) likelihood of internal conflicts, leading to a more (less) positive tone in the annual reports. The sample is divided into low-control firms ($CCS\ 50\% = 0$) and high-control firms ($CCS\ 50\% = 1$) (Wu & Chang, 2024). Results are presented in Panel A of Table 12. Columns 1 to 6 represent high-control firms, while columns 7 to 12 correspond to low-control firms. Results suggest that the negative effect of Chair–CEO age dissimilarity on ART is mainly evident in firms with low controlling rights or dispersed ownership structures.

- (2) Do institutional investors affect the association between the Chair–CEO age dissimilarity and the ART?

Institutional investors are crucial in corporate governance (Li, Wang, & Wu, 2021). Liu, Wu, and Zhou (2023) found that the shareholding ratio of institutional investors could significantly affect the tone of annual reports. Based on the ineffective monitoring hypothesis, institutional investors usually use short-sighted behaviour (Pound, 1992), in pursuit of obtaining short-term returns (Graves & Waddock, 1994). When a firm's short-term profitability does not meet expectations, there can be external pressure from institutional investors to replace the CEO (Aggarwal, Erel, Ferreira, & Matos, 2011). The Chair and the CEO may take different positions in dealing with such external pressure: the Chair usually pays more attention to the long-term strategic stability of the enterprise, while the CEO may be more inclined to adopt short-term management strategies to meet the expectations of institutional investors. This divergence in business philosophy may exacerbate internal conflicts and power struggles between the Chair and the CEO, which in turn may make the annual reports' tone more negative, with the conflict affecting the firm's external information disclosure.

Panel B of Table 12 shows the empirical results. This study uses the proportion of institutional investors' holdings to measure the intensity of external governance pressure, where a higher (lower) proportion of institutional investors' holdings reflects stronger (weaker) investor supervision and greater (smaller) management conflicts. Following Liu et al. (2022), we divide the sample into two groups: firms with low institutional investor holdings ($INSINVS\ 50\% = 0$) and companies with high institutional investor holdings ($INSINVS\ 50\% = 1$). Columns 1 to 6 represent firms with low institutional investor holdings, while columns 7 to 12 represent firms with high institutional investor holdings. The results show that the negative impact of a Chair–CEO age difference on ART mainly occurs in firms with a higher proportion of institutional investors holding shares and stronger external pressure.

- (3) Does information asymmetry affect the association between the Chair–CEO age dissimilarity and the ART?

Information asymmetry can worsen agency problems, especially in firms with a high proportion of intangible assets (Shakina, 2022). As a result, the CEO, possessing more

Table 12. Cross-Sectional Tests

Variables	(1) TONE	(2) TONE	(3) TONE_P	(4) TONE_P	(5) TONE_S	(6) TONE_S	(7) TONE	(8) TONE	(9) TONE_P	(10) TONE_P	(11) TONE_S	(12) TONE_S
<i>Panel A: Chair–CEO age dissimilarity and annual report tone (higher controlling rights vs. lower controlling rights)</i>												
	CCS 50% = 1						CCS 50% = 0					
<i>GAPS</i>	–0.001 (–0.953)		–0.001 (–0.921)		–0.001 (–0.955)		–0.002*** (–3.433)		–0.002*** (–3.492)		–0.003*** (–3.461)	
<i>GAPU</i>		–0.002 (–1.430)		–0.002 (–1.577)		–0.003 (–1.607)		–0.002** (–2.273)		–0.001** (–2.080)		–0.002** (–2.108)
<i>Constant</i>	3.808*** (15.396)	3.824*** (15.419)	0.504** (2.045)	0.523** (2.116)	0.686* (1.960)	0.713** (2.033)	3.168*** (22.707)	3.177*** (22.765)	–0.181 (–1.299)	–0.174 (–1.246)	–0.279 (–1.405)	–0.268 (–1.348)
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	6,530	6,530	6,530	6,530	6,530	6,530	20,346	20,346	20,346	20,346	20,346	20,346
Adjusted- <i>R</i> ²	0.1114	0.1115	0.0364	0.0367	0.0366	0.0369	0.0957	0.0954	0.0236	0.0233	0.0241	0.0238
Note(s): Table 12 Panel A Columns 1 to 12 report the results from the OLS regression of the association between Chair–CEO Age Dissimilarity (<i>GAPS</i> & <i>GAPU</i>) and Annual Report Tone (<i>TONE</i> , <i>TONE_P</i> & <i>TONE_S</i>) (Higher controlling rights vs. Lower controlling rights). <i>t</i> -statistics in parentheses. * <i>p</i> < 0.10, ** <i>p</i> < 0.05, *** <i>p</i> < 0.01. Robust <i>t</i> -statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A												
<i>Panel B: Chair–CEO age dissimilarity and annual report tone (lower proportion of institutional investors vs. higher proportion of institutional investors)</i>												
	INSINVS 50% = 0						INSINVS 50% = 1					
<i>GAPS</i>	–0.001 (–1.406)		–0.001 (–1.474)		–0.001 (–1.448)		–0.004*** (–4.643)		–0.004*** (–4.606)		–0.006*** (–4.612)	
<i>GAPU</i>		–0.001 (–0.809)		–0.000 (–0.595)		–0.001 (–0.625)		–0.005*** (–4.413)		–0.005*** (–4.515)		–0.007*** (–4.505)
<i>Constant</i>	2.771*** (16.511)	2.770*** (16.495)	–0.587*** (–3.503)	–0.590*** (–3.519)	–0.849*** (–3.543)	–0.852*** (–3.557)	3.530*** (18.190)	3.569*** (18.403)	0.219 (1.127)	0.258 (1.331)	0.265 (0.960)	0.321 (1.165)
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	16,972	16,972	16,972	16,972	16,972	16,972	9,904	9,904	9,904	9,904	9,904	9,904

(continued)

Table 12. Continued

Variables	(1) TONE	(2) TONE	(3) TONE_P	(4) TONE_P	(5) TONE_S	(6) TONE_S	(7) TONE	(8) TONE	(9) TONE_P	(10) TONE_P	(11) TONE_S	(12) TONE_S
Adjusted-R ²	0.0944	0.0943	0.0261	0.0260	0.0264	0.0263	0.0974	0.0972	0.0255	0.0254	0.0256	0.0255
Note(s): Table 12 Panel B Columns 1 to 12 report the results from the OLS regression of association between Chair–CEO Age Dissimilarity (<i>GAPS</i> & <i>GAPU</i>) and Annual Report Tone (<i>TONE</i> , <i>TONE_P</i> & <i>TONE_S</i>) (Lower proportion of institutional investors vs. Higher proportion of institutional investors). <i>t</i> -statistics in parentheses. * <i>p</i> < 0.10, ** <i>p</i> < 0.05, *** <i>p</i> < 0.01. Robust <i>t</i> -statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A												
<i>Panel C: Chair–CEO age dissimilarity and annual report tone (lower information asymmetry vs. higher information asymmetry)</i>												
	INTANG_median = 0					INTANG_median = 1						
<i>GAPS</i>	–0.000 (–0.586)		–0.001 (–0.606)		–0.001 (–0.607)		–0.003*** (–4.502)		–0.003*** (–4.485)		–0.004*** (–4.460)	
<i>GAPU</i>		–0.001 (–0.777)		–0.001 (–0.640)		–0.001 (–0.575)		–0.003*** (–3.324)		–0.003*** (–3.247)		–0.004*** (–3.323)
<i>Constant</i>	3.028*** (12.956)	3.035*** (12.970)	–0.295 (–1.259)	–0.289 (–1.234)	–0.430 (–1.304)	–0.423 (–1.281)	3.413*** (20.861)	3.430*** (20.951)	0.054 (0.332)	0.071 (0.434)	0.075 (0.323)	0.100 (0.431)
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	11,234	11,234	11,234	11,234	11,234	11,234	15,642	15,642	15,642	15,642	15,642	15,642
Adjusted-R ²	0.1117	0.1117	0.0280	0.0280	0.0280	0.0280	0.0893	0.0888	0.0236	0.0230	0.0239	0.0234
Note(s): Table 12 Panel C Columns 1 to 12 report the results from the OLS regression of association between Chair–CEO Age Dissimilarity (<i>GAPS</i> & <i>GAPU</i>) and Annual Report Tone (<i>TONE</i> , <i>TONE_P</i> & <i>TONE_S</i>) (Lower information asymmetry vs. Higher information asymmetry). <i>t</i> -statistics in parentheses. * <i>p</i> < 0.10, ** <i>p</i> < 0.05, *** <i>p</i> < 0.01. Robust <i>t</i> -statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A												
<i>Panel D: Chair–CEO age dissimilarity and annual report tone (low agency conflict vs. high agency conflict)</i>												
	LARGEFIRM = 0					LARGEFIRM = 1						
<i>GAPS</i>	–0.001 (–1.271)		–0.001 (–1.356)		–0.002 (–1.506)		–0.003*** (–4.107)		–0.003*** (–3.996)		–0.004*** (–3.862)	
<i>GAPU</i>		–0.000 (–0.412)		–0.000 (–0.358)		–0.001 (–0.579)		–0.003*** (–3.766)		–0.003*** (–3.641)		–0.004*** (–3.511)
												(continued)

Table 12. Continued

Variables	(1) TONE	(2) TONE	(3) TONE_P	(4) TONE_P	(5) TONE_S	(6) TONE_S	(7) TONE	(8) TONE	(9) TONE_P	(10) TONE_P	(11) TONE_S	(12) TONE_S
<i>Constant</i>	2.692*** (8.991)	2.692*** (8.992)	−0.555* (−1.857)	−0.555* (−1.856)	−0.832* (−1.945)	−0.831* (−1.941)	3.435*** (19.024)	3.466*** (19.175)	0.057 (0.315)	0.087 (0.480)	0.059 (0.229)	0.100 (0.390)
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	11,560	11,560	11,560	11,560	11,560	11,560	15,316	15,316	15,316	15,316	15,316	15,316
Adjusted- R^2	0.1212	0.1211	0.0354	0.0353	0.0355	0.0354	0.0846	0.0844	0.0194	0.0193	0.0201	0.0199

Note(s): Table 12 Panel D Columns 1 to 12 report the results from the OLS regression of association between Chair–CEO Age Dissimilarity (*GAPS* & *GAPU*) and Annual Report Tone (*TONE*, *TONE_P* & *TONE_S*) (Low agency conflict vs. High agency conflict). If control variables are excluded without *FIRMSIZE*, the results remain consistent (untabulated). *t*-statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A

Panel E: Chair–CEO age dissimilarity and annual report tone (non-family firm vs. family firm)

	FFIRM = 0						FFIRM = 1					
<i>GAPS</i>	−0.002 (−1.449)		−0.002 (−1.346)		−0.002 (−1.288)		−0.002*** (−3.924)		−0.002*** (−3.977)		−0.003*** (−3.981)	
<i>GAPU</i>		−0.001 (−0.574)		−0.001 (−0.370)		−0.001 (−0.283)		−0.003*** (−4.097)		−0.003*** (−4.018)		−0.004*** (−4.060)
<i>Constant</i>	3.442*** (17.993)	3.452*** (17.998)	0.141 (0.738)	0.148 (0.774)	0.188 (0.691)	0.197 (0.721)	2.943*** (17.639)	2.951*** (17.685)	−0.417** (−2.497)	−0.410** (−2.457)	−0.611** (−2.568)	−0.601** (−2.525)
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	8,870	8,870	8,870	8,870	8,870	8,870	18,006	18,006	18,006	18,006	18,006	18,006
Adjusted- R^2	0.1234	0.1232	0.0253	0.0251	0.0257	0.0255	0.0831	0.0831	0.0288	0.0288	0.0287	0.0287

Note(s): Table 12 Panel E Columns 1 to 12 report the results from the OLS regression of association between Chair–CEO Age Dissimilarity (*GAPS* & *GAPU*) and Annual Report Tone (*TONE*, *TONE_P* & *TONE_S*) (Non-family firm vs. Family firm). *t*-statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A

(continued)

Table 12. Continued

Variables	(1) TONE	(2) TONE	(3) TONE_P	(4) TONE_P	(5) TONE_S	(6) TONE_S	(7) TONE	(8) TONE	(9) TONE_P	(10) TONE_P	(11) TONE_S	(12) TONE_S
<i>Panel F: Chair–CEO age dissimilarity and annual report tone (SOE vs. non-SOE)</i>												
	SOE = 1						SOE = 0					
Variables	(1) TONE	(2) TONE	(3) TONE_P	(4) TONE_P	(5) TONE_S	(6) TONE_S	(7) TONE	(8) TONE	(9) TONE_P	(10) TONE_P	(11) TONE_S	(12) TONE_S
<i>GAPS</i>	−0.001 (−0.407)		−0.000 (−0.289)		−0.001 (−0.307)		−0.003*** (−4.463)		−0.003*** (−4.535)		−0.004*** (−4.489)	
<i>GAPU</i>		0.001 (0.644)		0.001 (0.853)		0.002 (0.797)		−0.003*** (−4.373)		−0.003*** (−4.306)		−0.004*** (−4.284)
<i>Constant</i>	3.496*** (17.025)	3.489*** (16.933)	0.201 (0.983)	0.190 (0.927)	0.280 (0.959)	0.265 (0.907)	2.981*** (18.580)	2.993*** (18.652)	−0.381** (−2.370)	−0.370** (−2.302)	−0.573** (−2.501)	−0.557** (−2.432)
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	7,828	7,828	7,828	7,828	7,828	7,828	19,048	19,048	19,048	19,048	19,048	19,048
Adjusted- R^2	0.1225	0.1225	0.0244	0.0244	0.0244	0.0244	0.0847	0.0847	0.0287	0.0286	0.0286	0.0285

Note(s): Table 12 Panel F Columns 1 to 12 report the results from the OLS regression of association between Chair–CEO Age Dissimilarity (*GAPS* & *GAPU*) and Annual Report Tone (*TONE*, *TONE_P* & *TONE_S*) (SOE vs. non-SOE). *t*-statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in [Appendix A](#)

Source(s): Authors' calculations

accurate information, may manipulate financial reports, exaggerate profitability, or conceal risks, thereby misleading shareholders and investors. In contrast, the Chair, the board members and external investors face informational disadvantages, making effective monitoring challenging and intensifying agency problems. Moreover, the long investment cycle of intangible assets further deepens the divide between the CEO's short-term focus on performance and the Chair's long-term strategy, such as increased R&D investment or brand development. This misalignment of priorities likely contributes to tensions between the two roles, which could be reflected in ART.

Panel C of Table 12 presents the findings. In line with Goergen *et al.* (2015), we use a dummy variable to represent firms with intangible assets above the median as a proxy for the extent of information asymmetry. The sample is categorised into two groups: firms with lower information asymmetry (*INTANG_median* = 0) and firms with higher information asymmetry (*INTANG_median* = 1). Columns 1 to 6 correspond to firms with lower information asymmetry, while columns 7 to 12 represent firms with higher information asymmetry. The results indicate that in firms with higher information asymmetry, there is a significant negative association between Chair–CEO age dissimilarity and the tone of the firms' annual reports.

- (4) Does agency conflict affect the association between the Chair–CEO age dissimilarity and the ART?

Previous literature suggests that firm size is a significant determinant of corporate disclosure decisions (Lang & Lundholm, 1993). Larger firms generally have more complex organisational structures, which lead to prolonged decision-making processes, reduced efficiency in information flow and higher governance coordination costs. As a result, the information asymmetry between management and shareholders tends to increase, exacerbating agency problems and conflicts among top management. This dynamic can worsen agency problems. The intensification of agency problems and management conflicts influences the firm's disclosure strategies, which is reflected in the tone of the annual report. Thus, in environments with higher agency conflicts due to generational conflicts between the Chair and the CEO, larger firms may adopt a more cautious or even negative tone when disclosing financial information and prospects, reducing the proportion of positive tone words appearing in the annual report.

Panel D of Table 12 presents the findings. Following Hu, Wang, Wang, Yao, and Zhang (2012), we use a dummy variable (*LARGEFIRM*) to divide the sample into two groups: firms with low agency conflict (*LARGEFIRM* = 0) and firms with high agency conflict (*LARGEFIRM* = 1). Columns 1 to 6 correspond to firms with low agency conflict, while columns 7 to 12 correspond to firms with high agency conflict. The results show that in environments characterised by higher agency conflict, Chair–CEO age dissimilarity is significantly negatively associated with ART. If control variables are excluded without *FIRMSIZE*, the results remain consistent (untabulated).

- (5) Does a family firm affect the association between the Chair–CEO age dissimilarity and the ART?

Family businesses integrate both family and corporate systems, creating a unique managerial environment (Chrisman, Chua, & Sharma, 2003). Chrisman *et al.* (2003) further suggested that the “familiness” of family firms is complex and challenging. On the one hand, in family businesses with multigenerational leadership, significant cognitive conflicts may be interpreted as a certain branch of the family pursuing its own interests, potentially damaging the firm's performance (Kellermanns & Eddleston, 2007). On the other hand, due to family members working within the business, it is difficult to clearly separate work from family matters, which means that work-related disagreements often evolve into personal, negative conflicts. The unpleasant atmosphere caused by such disagreements within family firms may be misinterpreted as personal attacks and eventually escalate into hostile, personal

conflicts (Simons & Peterson, 2000), lowering managerial satisfaction and consensus (Jehn & Bendersky, 2003). These factors complicate the operational environment of family firms, intensifying the conflict between the Chair and the CEO and amplifying its negative effects, which in turn influence the tone of the firm's annual reports.

Panel E of Table 12 presents the findings. We divide the sample into two groups, using a dummy variable where 1 denotes family firms and 0 denotes non-family firms. In Panel E, columns 1 to 6 represent non-family firms ($FFIRM = 0$), while columns 7 to 12 represent family firms ($FFIRM = 1$). The results indicate that the significant negative impact of Chair–CEO age dissimilarity on the ART occurs primarily in family firms. This significant negative association with family firms may be attributed to the high level of “familiness” and the complex operational environment within family businesses [3].

- (6) Does state ownership affect the association between the Chair–CEO age dissimilarity and the ART?

SOEs operate under a distinctive institutional and governance framework (Shleifer, 1998). In China, SOEs constitute a substantial proportion of listed firms and are characterised by close government involvement, preferential access to resources and relatively soft budget constraints. Moreover, the Chair and CEO positions in SOEs are often appointed or influenced by government authorities rather than determined purely by internal promotion or market mechanisms. As a result, agency conflicts between top executives may be mitigated, and Chair–CEO age dissimilarity is less likely to trigger severe managerial frictions. In such a setting, Chair–CEO age dissimilarity is less likely to escalate into cognitive or affective conflicts, thereby weakening their negative influence on ART.

Panel F of Table 12 reports the results of the cross-sectional analysis based on state ownership. Columns 1 to 6 present the regression results for SOEs, while columns 7 to 12 correspond to non-SOEs. The results show that, for non-SOEs, Chair–CEO age dissimilarity is significantly and negatively associated with ART [4].

4.7 Endogeneity test

- (1) Heckman's two-step selection model

Sample selection constraints may lead to sample selection bias, which can introduce endogeneity issues and result in inaccurate conclusions (Tucker, 2010). Since the appointment of the Chair and the CEO within a firm is not random, unobservable factors influencing any Chair–CEO age dissimilarity may introduce biases in the results. To address the potential endogeneity stemming from sample selection bias, we employ the Heckman two-stage model (1979), as used in previous research.

Following Zhu *et al.* (2021), we use a dummy variable, *CRG* (Cultural Revolution Generation), as an instrumental variable for the Heckman two-stage analysis. The variable is set to 1 if either the Chair or the CEO was at least 16 years old during the Cultural Revolution (1966–1976), and 0 otherwise. This variable captures the notion that the older generation, who experienced the Cultural Revolution first-hand and developed a sense of personal independence, may have cognitive conflicts with the newer generation of business managers due to differing values and thought processes, which are reflected in firm governance. The *CRG* variable is linked to age but is not correlated with the tone of the annual report, thus effectively capturing the specific historical context of the Chair and the CEO. This avoids multicollinearity between the explanatory variables and the inverse Mills ratio. As shown in Table 2, with *NCN* meaning non-Chinese national, the mean values of *ChairNCN* and *CEONCN* are 0.98 and 0.97, respectively, indicating that nearly all of the Chairs and CEOs are Chinese nationals, making this instrumental variable appropriate for the sample.

Next, we include the dummy variable *GAPS_median* or *GAPU_median* as the dependent variable in the first stage of the model. The inverse Mills ratio (IMR) is computed in the first-

stage probability model, and then included as an additional independent variable in the second-stage regression model to test for sample selection bias in the original results. The regression results for the first stage are presented in columns 1 and 5 of [Table 13](#). Probit regression is conducted using *GAPS_median* and *GAPU_median* in columns 1 and 5, respectively. The coefficient for the association between *GAPS_median* and *CRG* is positive (coefficient = 0.673, *t*-statistics = 34.623) and significant at the 1% level. Similarly, the coefficient for the association between *GAPU_median* and *CRG* is also positive (coefficient = 1.019, *t*-statistics = 50.359) and significant at the 1% level. The second-stage regression results are shown in columns 2, 3, 4, 6, 7 and 8. In these columns, *GAPS* and *GAPU* both have a significantly negative association with all dependent variables (*TONE*, *TONE_P* and *TONE_S*). The IMR coefficients for *TONE* (columns 2 and 6), *TONE_P* (columns 3 and 7) and *TONE_S* (columns 4 and 8) are positive but not statistically significant. Therefore, no sample selection bias exists in this study, and all findings support our hypothesis.

(2) Entropy balancing analysis

Previous research indicates that matching techniques can help mitigate endogeneity issues ([Armstrong, Jagolinzer, & Larcker, 2010](#)). More recent studies have preferred using entropy balance matching over propensity score matching, with evidence suggesting that the former is more effective because it avoids sample reduction and minimises reliance on less restrictive assumptions. More importantly, entropy balance matching achieves balance at multiple points in the distribution of covariates ([Merkley, Michaely, & Pacelli, 2020](#)). We re-estimate the baseline model using the entropy-balanced sample to address any endogeneity concerns related to observable firm-specific characteristics, particularly self-selection bias ([Rosenbaum & Rubin, 1985](#)). The regression outcomes are reported in [Table 13](#).

We employ the dummy variable *GAPD* (Chair–CEO age dissimilarity dummy) as the grouping variable ([Zhu et al., 2021](#)). Firms with a Chair–CEO age dissimilarity (*GAPD* = 1) form the treatment group, while firms without such a dissimilarity (*GAPD* = 0) comprise the control group. The entropy matching technique ensures that the covariates are well balanced

Table 13. Heckman two-step selection model test

Variables	(1) GAPS_ median 1st stage	(2) TONE 2nd stage	(3) TONE_P 2nd stage	(4) TONE_S 2nd stage	(5) GAPU_ median 1st stage	(6) TONE 2nd stage	(7) TONE_P 2nd stage	(8) TONE_S 2nd stage
<i>GAPS</i>		−0.002*** (−3.205)	−0.002*** (−3.188)	−0.003*** (−3.201)				
<i>GAPU</i>						−0.001** (−2.182)	−0.001** (−1.983)	−0.002** (−2.025)
<i>CRG</i>	0.673*** (34.623)				1.019*** (50.359)			
<i>IMR</i>		0.025 (0.977)	0.029 (1.129)	0.039 (1.067)		0.018 (1.006)	0.022 (1.258)	0.031 (1.212)
<i>Constant</i>	−1.334*** (−5.933)	2.538*** (19.804)	−0.269** (−2.102)	−0.405** (−2.190)	−0.211 (−0.926)	2.571*** (20.898)	−0.236* (−1.920)	−0.359*** (−2.023)
Control variables	YES							
INDUSTRY	YES							
YEAR	YES							
Observations	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876
Adjusted- <i>R</i> ² or Pseudo <i>R</i> ²	0.0936	0.0981	0.0247	0.0251	0.1261	0.0979	0.0245	0.0249

Note(s): [Table 13](#) reports the Heckman two-step selection model. Columns 1 to 5 are Probit regression, columns 2, 3, 4, 6, 7, 8 are OLS regression. *t*-statistics in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01. Robust *t*-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in [Appendix A](#).

Source(s): Authors' calculations

between the treated ($GAPD = 1$) and control ($GAPD = 0$) groups. Using entropy balancing, weights are assigned to observations in the control group, ensuring that the distribution's mean, variance and skewness for each covariate closely match those in the treatment group. As a result, the matching process creates a sample without significant differences between the treated and control groups (Armstrong *et al.*, 2010). This matching process is based on 15 covariates, and the covariate differences, which are shown in Panel A of Table 14, confirm that proper entropy balance has been achieved. Subsequently, we conducted entropy-balanced regression, and the results are shown in Panel B of Table 14. All coefficients of $GAPD$ on $TONE$, $TONE_P$ and $TONE_S$ are significant and negative (coefficients = -0.050 , -0.050 , and -0.073 ; t -statistics = -4.353 , -4.356 and -4.470 ; $p < 0.01$). These results suggest that when there is a Chair–CEO age dissimilarity, the positive tone of the firm's annual report decreases. In conclusion, the entropy balancing analysis supports H1 and the overall findings are consistent with the baseline regression results, further reinforcing our previous conclusions.

4.8 Additional test

(1) Mediation test

This study further explores potential mediation variables to deepen the understanding of how the Chair–CEO age dissimilarity affects the ART. Given the governance characteristics of listed Chinese firms, four potential mediation effects are monitoring effectiveness, coordination stability, agency conflict and earnings quality. They are measured by firm internal monitoring intensity, measured by the number of board meetings ($MEETING$), the length of Chair–CEO tenure overlap ($JONTENU$), free cash flow (FCF) and accruals quality, measured using the Modified Jones Model ($MJONES$), respectively.

To test the mediation effects, this study follows Baron and Kenny's (1986) causal step regression approach and develops three models. First, the baseline regression examines the total effect of Chair–CEO age dissimilarity ($GAPU$) on the ART ($TONE$) in equation (1). Secondly, the mediating variable is regressed on $GAPU$ to test whether age dissimilarity significantly affects the proposed channel. Thirdly, both $GAPU$ and the mediator are included in the tone regression to assess whether the mediator significantly influences $TONE$ and whether the coefficient on $GAPU$ is affected.

$$\begin{aligned} MEDIATOR_{i,t} = & \alpha_0 + \alpha_1 GAP_{i,t} + \alpha_2 CHANGE1_{i,t} + \alpha_3 CHANGE2_{i,t} + \alpha_4 TENURE1_{i,t} \\ & + \alpha_5 TENURE2_{i,t} + \alpha_6 BODSIZE_{i,t} + \alpha_7 LEVER_{i,t} \\ & + \alpha_8 FIRMAGE_{i,t} + \alpha_9 FSIZE_{i,t} + \alpha_{10} STDRET_{i,t} + \alpha_{11} SALEGR_{i,t} \\ & + \alpha_{12} INDDIR\%_{i,t} + \alpha_{13} ROA_{i,t} + \alpha_{14} LOSS_{i,t} + \alpha_{15} O - Score_{i,t} \\ & + \alpha_{16} SALARY_{i,t} + INDUSTRY + YEAR + \varepsilon_{i,t} \end{aligned} \quad (2)$$

$$\begin{aligned} ART_{i,t} = & \gamma_0 + \gamma_1 GAP_{i,t} + \gamma_2 MEDIATION + \gamma_3 CHANGE1_{i,t} + \gamma_4 CHANGE2_{i,t} \\ & + \gamma_5 TENURE1_{i,t} + \gamma_6 TENURE2_{i,t} + \gamma_7 BODSIZE_{i,t} + \gamma_8 LEVER_{i,t} \\ & + \gamma_9 FIRMAGE_{i,t} + \gamma_{10} FSIZE_{i,t} + \gamma_{11} STDRET_{i,t} + \gamma_{12} SALEGR_{i,t} + \gamma_{13} INDDIR\%_{i,t} \\ & + \gamma_{14} ROA_{i,t} + \gamma_{15} LOSS_{i,t} + \gamma_{16} O - Score_{i,t} + \gamma_{17} SALARY_{i,t} + INDUSTRY \\ & + YEAR + \varepsilon_{i,t} \end{aligned} \quad (3)$$

Table 14. Entropy Balancing Analysis

Panel A: Weight variable before and after entropy balancing												
	Weight variable before entropy balancing						Weight variable after entropy balancing					
	(1)	(2)	(3)	Control	(5)	(6)	Treated	(8)	(9)	Control	(11)	(12)
Variables	Mean	Variance	Skewness	(4)	Variance	Skewness	(7)	Variance	Skewness	(10)	Variance	Skewness
Panel A: Covariate balance												
CHANGE1	0.212	0.167	1.410	0.131	0.114	2.189	0.212	0.167	1.410	0.212	0.167	1.410
CHANGE2	0.314	0.215	0.803	0.167	0.139	1.782	0.314	0.215	0.803	0.314	0.215	0.803
TENURE1	5.471	15.656	0.916	5.921	13.894	0.785	5.471	15.656	0.916	5.471	15.656	0.916
TENURE2	3.923	9.849	1.348	5.285	12.300	0.839	3.923	9.849	1.348	3.923	9.849	1.348
BODSIZE	8.577	2.774	0.531	7.993	2.229	0.304	8.577	2.774	0.531	8.577	2.774	0.531
LEVER	0.439	0.047	0.324	0.391	0.043	0.545	0.439	0.047	0.324	0.439	0.047	0.324
FIRMAGE	2.278	0.578	−0.756	1.919	0.615	−0.260	2.278	0.578	−0.756	2.279	0.578	−0.756
FSIZE	22.206	1.617	0.632	21.820	1.237	0.866	22.206	1.617	0.632	22.206	1.617	0.632
STDRET	0.128	0.004	1.796	0.134	0.004	1.811	0.128	0.004	1.796	0.128	0.004	1.796
SALEGR	0.162	0.215	3.430	0.175	0.197	3.278	0.162	0.215	3.430	0.162	0.215	3.430
INDDIR%	0.372	0.003	1.338	0.386	0.003	0.848	0.372	0.003	1.338	0.372	0.003	1.338
ROA	0.026	0.006	−2.182	0.030	0.006	−2.146	0.026	0.006	−2.182	0.026	0.006	−2.182
LOSS	0.151	0.128	1.955	0.149	0.126	1.977	0.151	0.128	1.955	0.150	0.128	1.955
O-Score	−8.319	3.816	0.070	−8.566	3.679	0.070	−8.319	3.816	0.070	−8.319	3.816	0.071
SALARY	14.928	0.685	−0.093	14.904	0.574	0.048	14.928	0.685	−0.093	14.928	0.685	−0.093
Note(s): Table 14 Panel A reports the 14 different covariates information (Mean, Variance, Skewness) of the treated group ($GAPD = 1$) and the control group ($GAPD = 0$) from both weight variables before entropy balancing and the weight variable after entropy balancing. t -statistics in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Robust t -statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A												
Panel B: Entropy balancing method												
Variables	(1)			(2)			(3)					
	TONE			TONE_P			TONE_S					
GAPD	−0.050*** (−4.353)			−0.050*** (−4.356)			−0.073*** (−4.470)					
Constant	2.453*** (14.479)			−0.363*** (−2.138)			−0.522** (−2.122)					
Control variables	Yes											
INDUSTRY	Yes											
YEAR	Yes											
Observations	26,876			26,876			26,876					
Adjusted- R^2	0.0932			0.0253			0.0256					
F	43.67			10.93			10.85					
Note(s): Table 14 Panel B reports entropy balancing method results. Regression (1) (2) (3) report the results from the OLS regression of association between GAPD and Annual Report Tone (TONE, TONE_P & TONE_S). t -statistics in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Robust t -statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A												
Source(s): Authors' calculations												

Panel A of [Table 15](#) reports the results of the causal step mediation tests. Results show that Chair–CEO age dissimilarity is significantly negatively associated with *MEETING* and *JONTENU*, suggesting that larger age gaps weaken internal monitoring intensity and reduce the stability of the Chair–CEO working relationship. In turn, both *MEETING* and *JONTENU* are positively associated with *TONE*, implying that weaker monitoring and shorter tenure overlap hinder the disclosure of a more positive narrative tone. These findings support the view that age dissimilarity exacerbates communication frictions and coordination inefficiencies within the Chair and CEO, thereby suppressing positive tone through internal governance channels.

In addition, *GAPU* is positively associated with free cash flow. Higher agency conflicts induced by Chair–CEO age dissimilarity may delay or scale down investment activities, leading to passive cash accumulation ([Jensen, 1986](#)). The regression results further show that *FCF* is negatively related to *TONE*, indicating that excess internal funds encourage conservative financing behaviour and more cautious or strategically biased narrative disclosures. Similarly, *GAPU* is significantly associated with lower accrual quality, reflecting weakened monitoring cohesion and increased managerial discretion. Lower accrual quality, in turn, is associated with less favourable disclosure tone, suggesting that managers may use optimistic narratives to obscure earnings management and performance deterioration. Notably, for both *FCF* and accrual quality, the indirect effects partially offset the negative direct effect of age dissimilarity on tone, indicating the presence of suppressing mediation effects [\[5\]](#).

Since the causal step regression approach of [Baron and Kenny \(1986\)](#) has been criticised in recent years ([Zhao, Lynch, & Chen, 2010](#)), following [Preacher and Hayes \(2004\)](#), we use a bootstrap to test for mediation effects. Panel B of [Table 15](#) reports the bootstrap results based on 5,000 replications. The indirect effects through *MEETING*, *JONTENU*, *FCF* and *MJONES* are all statistically significant, and the corresponding confidence intervals do not include zero. The ratios of indirect to total effects further confirm that all four variables act as partial and suppressing mediators in the relationship between Chair–CEO age dissimilarity and the ART.

Overall, the mediation analysis reveals that Chair–CEO age dissimilarity affects disclosure tone through multiple governance and agency-related channels. Larger age gaps intensify managerial conflict, reduce monitoring effectiveness and coordination stability, increase free cash flow accumulation and deteriorate earnings quality, all of which ultimately constrain the positivity of narrative disclosures. These findings provide a more nuanced understanding of the internal mechanisms through which demographic differences at the top of the organisation shape corporate communication outcomes.

(2) Mechanism test

A positive ART does not necessarily reflect superior firm fundamentals or a high-quality information environment. A positive ART does not necessarily reflect superior firm fundamentals or a high-quality information environment. Prior literature documents that managers may strategically adopt an overly optimistic tone as a form of tone-based earnings management, particularly under external pressure, ownership incentives and information asymmetry ([Davis & Tama-Sweet, 2012](#); [Huang, Teoh, & Zhang, 2014](#); [Xiong, Liu, Zhao, & Xiao, 2024](#); [Jin, Zhao, Sun, & Guan, 2026](#)). These studies suggest that an abnormally positive tone in corporate disclosures may reflect the impression of management by managers rather than genuine economic performance. Consistent with this view, managers may exaggerate firm prospects and manipulate tone to shape investor perceptions. Therefore, whether the positive tone associated with Chair–CEO characteristics reflects genuine information or managerial “bragging” remains an empirical question. To address this concern and to further unravel the underlying information channel through which Chair–CEO age dissimilarity affects disclosure tone, this study examines earnings response coefficients (*ERC*) and post-earnings announcement drift (*PEAD*). A lower *ERC* indicates weaker investor trust or reduced

Table 15. Regression results of mediation tests (mediation effects)

Panel A - Baron and Kenny's (1986) causal step regression results (TONE)									
Variables	(1) TONE	(2) MEETING	(3) TONE	(4) JONTENU	(5) TONE	(6) FCF	(7) TONE	(8) MJONES	(9) TONE
<i>GAPU</i>	−0.002*** (−2.906)	−0.001*** (−2.602)	−0.002*** (−2.725)	−0.004*** (−9.826)	−0.002*** (−2.653)	0.000*** (3.125)	−0.002*** (−2.840)	0.000** (2.456)	−0.002*** (−2.839)
<i>MEETING</i>			0.046*** (5.251)						
<i>JONTENU</i>					0.021** (2.500)				
<i>FCF</i>							0.168* (1.760)		
<i>MJONES</i>									0.129** (2.147)
<i>Constant</i>	3.336*** (27.769)	−0.385*** (−4.931)	2.320*** (20.617)	2.662*** (33.283)	2.245*** (19.554)	0.011 (1.498)	2.300*** (20.442)	0.158*** (13.811)	2.282*** (20.207)
Control variables	Yes								
INDUSTRY	Yes								
YEAR	Yes								
Observations	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876	26,876
Adjusted- <i>R</i> ²	0.0964	0.1105	0.0279	0.6847	0.0272	0.7066	0.0270	0.3726	0.0271
Panel B: Bootstrap approach results (mediation effects) (TONE)									
Dependent variable	TONE								
Independent variable	GAPU								
	(1)		(2)		(3)		(4)		
Mediation variables	MEETING		JONTENU		FCF		MJONES		
Indirect effect	−0.0000104		−0.0000275		−0.0000185		−0.0000227		
Direct effect	−0.0017525		−0.0017354		−0.0017444		−0.0017856		
Total effect	−0.0017629		−0.0017629		−0.0017629		−0.0018083		
Indirect/total	0.0058993		0.0155993		0.0104941		0.0125532		
Indirect/direct	0.0059343		0.0158465		0.0106054		0.0127128		
Total/direct	1.0059344		1.0158465		1.0106054		1.0127128		
Control variables	Yes								
INDUSTRY	Yes								
YEAR	Yes								
Observations	26,876		26,876		26,876		26,876		
Note(s): Table 15 reports the mediation effects test results. Table 15 Panel A reports the mediation test results (Baron and Kenny's (1986) causal step regression results (<i>TONE</i>, <i>GAPU</i>, <i>MEETING</i> & <i>JONTENU</i>)). Table 15 Panel B reports the mediation effects test using the Bootstrap approach results (Panel B Column 1 to 4, Replications 5,000 times). <i>t</i>-statistics are in parentheses. *<i>p</i> < 0.10, **<i>p</i> < 0.05, ***<i>p</i> < 0.01. Robust <i>t</i>-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A Source(s): Authors' calculations									

understandability of earnings information. *PEAD*, by contrast, reflects the timeliness and completeness of the market’s reaction to earnings news. Larger *PEAD* suggests that investors are initially misled or unable to fully process information at the announcement date, resulting in delayed price adjustments (Richardson, Tuna, & Wysocki, 2010).

$$\begin{aligned} CAR_{i,t} = & \lambda_0 + \lambda_1 ES_{i,t} + \lambda_2 GAP_{i,t} + \lambda_3 ES*GAP_{i,t} + \lambda_4 CHANGE1_{i,t} + \lambda_5 CHANGE2_{i,t} \\ & + \lambda_6 TENURE1_{i,t} + \lambda_7 TENURE2_{i,t} + \lambda_8 BODSIZE_{i,t} + \lambda_9 LEVER_{i,t} \\ & + \lambda_{10} FIRMAGE_{i,t} + \lambda_{11} FSIZE_{i,t} + \lambda_{12} STDRET_{i,t} + \lambda_{13} SALEGR_{i,t} \\ & + \lambda_{14} INDDIR\%_{i,t} + \lambda_{15} ROA_{i,t} + \lambda_{16} LOSS_{i,t} + \lambda_{17} O - Score_{i,t} + \lambda_{18} SALARY_{i,t} \\ & + INDUSTRY + YEAR + \varepsilon_{i,t} \end{aligned} \tag{4}$$

We test the mechanism analysis using Equation (4). To examine whether Chair–CEO age dissimilarity affects the market’s response to earnings news, cumulative abnormal returns (*CAR*) are used as the dependent variable in the mechanism regression models. *ERC* refers to the coefficient of earnings surprise in the earnings–return regression. The key variable of interest is the interaction term between earnings surprise (*ES*) and Chair–CEO age dissimilarity. The coefficient of this interaction term indicates whether age dissimilarity weakens or strengthens *ERC*.

Table 16 reports the empirical results. Column 1 shows that the coefficient of interaction term is significantly negative, while *ES* is positively associated with *CAR*. Column 2 shows that the coefficient on the interaction term is statistically insignificant, and the coefficient on *ES* remains significantly positive. Overall, *ERC* declines, but *PEAD* does not increase. Therefore, the results suggest that Chair–CEO age dissimilarity restrains aggressive financial reporting behaviour.

Table 16. Mechanism test

	ERC (1) CAR [–1:1]	PEAD (2) CAR[2:60]
<i>ES</i>	0.004*** (2.740)	0.000 (0.947)
<i>GAPD</i>	–0.003* (–1.827)	–0.000 (–0.148)
<i>ES*GAPD</i>	–0.003* (–1.690)	–0.000 (–1.176)
<i>Constant</i>	–0.004*** (–3.299)	–0.005*** (–23.409)
Control variables	Yes	
INDUSTRY	Yes	
YEAR	Yes	
Observations	5,584	4,116
Adjusted-R ²	0.0279	0.0005

Note(s): Table 16 reports the mechanism effects test results. t-statistics are in parentheses. **p* < 0.10, ***p* < 0.05, ****p* < 0.01. Robust t-statistics (in parentheses) are based on standard errors clustered by firm and year. All the variables are defined in Appendix A

Source(s): Authors’ calculations

5. Conclusion

This study investigates the impact of age dissimilarity between the Chair and the CEO on the tone of a firms' annual reports. Prior research has highlighted that various dimensions of TMT diversity, including age, affect firm performance and decision-making (Hu *et al.*, 2025; Rabl & Triana, 2014; Wang *et al.*, 2021). Our findings suggest that a larger age dissimilarity between the Chair and the CEO is significantly associated with a decline in the positive tone of annual reports. This indicates that age differences between these key leadership roles contribute to tension and communication challenges within the TMT, which ultimately affect the tone of corporate disclosures. Furthermore, the study investigates the underlying mechanisms through which Chair–CEO age dissimilarity affects disclosure practices. The results are consistent with similarity-attraction theory, which suggests that greater age dissimilarity fosters interpersonal and task conflicts, further undermining the clarity and positivity of corporate reports.

The implications of this study are multifaceted. Firstly, this research fills this research gap. The negative correlation between Chair–CEO age dissimilarity and the tone of annual reports suggests that organisations should be mindful of leadership dynamics, particularly in firms with higher external monitoring pressures, lower concentrated controlling rights, higher information asymmetry, higher agency conflicts, family-owned and non-state-owned. The results also indicate that Chair–CEO age dissimilarity affects the positive tone of annual reports through differing mediation effects, including internal monitoring intensity, tenure overlap, free cash flow and earnings management. Our mechanism tests suggest that Chair–CEO age dissimilarity reduces the positive tone of annual reports, reflecting a disciplining effect on aggressive reporting behaviour. Additionally, this research expands the scope of corporate governance by shedding light on the specific relationship between Chair–CEO age dissimilarity and firm disclosures, an area previously underexplored. However, certain limitations must be acknowledged. The study focuses on listed firms in China, and therefore, the findings may not directly apply to other cultural or corporate contexts. Future research could extend this inquiry to different regions and examine factors such as firm performance or governance structures.

Notes

1. Because the age information in the data set is measured in integer years rather than exact birth dates, and observations with an actual age difference of less than one year are also encoded as $GAPU = 0$. For example, a Chair and a CEO with an age difference of 11 months would still be classified as the same age. Therefore, a 0 value not only represents completely equal ages but also ages within a 12-month difference. This partially explains the specific distribution of $GAPU = 0$ at 33.40%, but does not affect our main conclusions. After deleting the data with $GAPU = 0$ from the database, the conclusions remain consistent with the existing findings.
2. Following Wang and Wang (2018), we classify words conveying positive attributes, such as “positive,” “progressive” and “efficient,” as positive tone words, and words conveying negative attributes, such as “frustrated,” “gloomy” and “unfavourable,” as negative tone words. We count the frequency of words in each category and construct the positive tone measure as NTUPW (National Taiwan University Positive Words), defined as the natural logarithm of the total number of positive tone words in the annual report based on the NTUSD dictionary.
3. Because the sample contains both SOEs and family firms, while non-SOEs encompass the majority of family firms, the regression results for SOEs and family firms are not entirely independent. To address this concern, we conducted an additional analysis by excluding SOE observations and then partitioning the remaining non-SOE sample into family and non-family firms. The results remain consistent with our main findings (not tabulated). Specifically, the significant negative impact of Chair–CEO age dissimilarity on annual report tone occurs primarily in family firms.
4. Given that the sample includes both family firms and SOEs, and that family firms are predominantly classified as non-SOEs, the subsample analyses for family firms and SOEs are not fully mutually exclusive. To alleviate this concern, we performed an additional test by first removing all family firm

observations and then dividing the remaining sample into SOE and non-SOE groups. The results are qualitatively unchanged and support our main findings (untabulated). Specifically, for non-SOEs, Chair-CEO age dissimilarity is significantly and negatively associated with annual report tone (ART).

5. Because *FCF* and *MJONES* may be jointly determined with disclosure tone, the mediation analyses may be subject to potential reverse-causality concerns. To address this issue, we conduct additional reverse-causality tests for the mediation analyses involving *FCF* and *MJONES*. The results indicate that no evidence of reverse causality is found, and thus the findings remain consistent with our main conclusions (not tabulated).

Supplementary material

The supplementary material for this article can be found online.

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