International Journal of Finance & Economics

WILEY

RESEARCH ARTICLE OPEN ACCESS

CEO Age and Capital Structure Dynamics: The Moderating Effect of Overconfidence and Tenure

Ernest Ezeani[1] | Bilal Bilal[2] | Fulgence Samuel[3]

[1]Accounting, Edinburgh Business School, Heriot-Watt University, Edinburgh, UK | [2]Accounting, Durham University, Durham, UK | [3]Accounting and Finance, Leeds Business School, Leeds Beckett University, Leeds, UK

Correspondence: Ernest Ezeani (e.ezeani@hw.ac.uk)

Received: 30 October 2023 | **Revised:** 5 August 2024 | **Accepted:** 27 September 2024

Keywords: capital structure | CEO age | CEO overconfidence | CEO tenure

ABSTRACT

The Upper Echelons theory suggests that managerial characteristics will likely influence their financial decisions. Consistent with this theory, we examine CEO age's impact on Chinese firms' capital structure dynamics. We also investigate the moderating effects of overconfidence and tenure on the relationship between CEO age and capital structure. Using 18,235 firm-year observations from Chinese listed firms, we document a positive relationship between CEO age and leverage. The results show that the CEOs' age-overconfidence and age-tenure relationship have an inverse relationship with leverage. Particularly, we find that CEO overconfidence and tenure impact market leverage more than book leverage. Our sensitivity analysis indicates that young CEOs use less debt, consistent with the market-leaning hypothesis. We also find a positive relationship between CEO age and leverage in state-owned enterprises. Our results are robust for decomposition analysis, selection bias test and endogeneity.

Jel classification: G30, G32, M12

1 | Introduction

Since the irrelevance theory of Modigliani and Miller (1958) finance literature mainly focuses on the relevance of firm-level, institutional and industry-level determinants of capital structure (Chen 2004; Öztekin and Flannery 2012; Rajan and Zingales 1995) and largely ignore the contribution of individual manager in firms' leverage decision. However, the Upper echelon theory suggests that managers' characteristics influence their perceptions (Hambrick and Mason 1984). Yim (2013) also argues that age-related physiological and psychological changes impact CEO's financing choices.

One key channel through which a CEO's age influences capital structure is the variation of agency problems at the level of individual CEO. Empirical evidence demonstrates that managers characteristics result in non-homogenous corporate financial policies (Bertrand and Schoar 2003; Duong, Banti, and Instefjord 2021; Hirshleifer and Thakor 1992; Jensen and Meckling 1976). For instance, Cronqvist, Makhija, and Yonker (2012) found that managers imprint their mark on the firms they manage, while Bertrand and Schoar (2003) document evidence of managerial fixed effects. Similarly, previous studies document evidence that individual managers influence corporate cash holding (Aktas, Louca, and Petmezas 2019; Deshmukh, Goel, and Howe 2021; Ezeani, Salem, and Kwabi 2003), stock price crash risk (Andreou, Louca, and Petrou 2017), level of investment (Yim 2013) and corporate risk-taking (Andreou, Louca, and Petrou 2017; Serfling 2014; Yim 2013). Our study contributes to this area of literature by examining whether CEO age influences the capital structure dynamics of Chinese listed firms.

Our motive for undertaking this study is as follows. First, previous studies have highlighted that the standard capital structure models that rely only on firm-level characteristics and firms' industrial affiliation are insufficient in explaining a large amount of variation across firms (Bradley, Jarrell, and Kim 1984; Titman

and Wessels 1988). James, Benson, and Park (2020) show that CEOs matter in firms' financing decisions. Second, despite the centrality of CEO age in the upper echelon's theory, no study has examined its impact on firms' capital structure dynamics. Notably, studies in Chinese contexts mainly focused on the age of board members (Komal et al. 2021; Li and He 2023; Talavera, Yin, and Zhang 2018; Zhang and Luo 2021) or the top management team (Qi et al. 2018; Talavera, Yin, and Zhang 2021). Few studies on Chinese firms examined the impact of CEO age on corporate risk-taking (Farag and Mallin 2018; Li and Tang 2010) and corporate philanthropy (Wei et al. 2018). We add to the existing literature by examining CEO age's impact on Chinese firms' capital structure dynamics.

Third, the Western-oriented market learning and managerial signalling hypotheses have varying predictions regarding younger and older CEOs and offer no precise prediction regarding the capital structure decisions of CEOs. For instance, empirical evidence in support of the market learning hypothesis suggests that younger managers in the earlier stage of their careers are less motivated to engage in bold decisions to avoid negative outcomes that will impact the market perception of their managerial ability (Chevalier and Ellison 1999; Hong, Kubik, and Solomon 2000). On the other hand, studies on the managerial signalling hypothesis show that younger CEOs signal their capability to the market by adopting riskier and more ambitious investment strategies (Li, Low, and Makhija 2017; Prendergast and Stole 1996). Despite the relevance of these theories, Chen (2004) argues that empirical findings (based on established theories) derived from the developed countries' experience may not be relevant in the Chinese context due to differences in the institutional environment (Komal et al. 2021). Unlike in Western countries, Chinese firms face type II agency conflict and political interference (Chen et al. 2011; Jiang, Lee, and Yue 2010; Komal et al. 2023; Li and Zhang 2010). For instance, the politically appointed CEOs of state-owned enterprises are expected to prioritise social and political objectives (Kato and Long 2006). Also, an increasing number of younger managers are attaining CEO status in China (Fung and Pecha 2019). Since Chinese executives' job market is less developed than those of Anglo-American countries, it is essential to understand the impact of CEO age on capital structure decisions of Chinese firms.

Finally, previous literature suggests that overconfidence will result in aggressive corporate policies (Aktas, Louca, and Petmezas 2019; García-Meca, Ramón-Llorens, and Martínez-Ferrero 2021; Greiner, Kim, and Thor 2023; Malmendier and Tate 2005). Weinstein (1980) and Malmendier and Tate (2005) argue that an overconfident manager has an unrealistic optimism towards future events. Most studies suggest that overconfidence is more pronounced in younger CEOs (Galasso and Simcoe 2011; Kovalchik et al. 2005; Yim 2013). However, Billett and Qian (2008) argued that older CEOs will likely show overconfidence. To the best of our knowledge no study in the Chinese context have examined the age-overconfidence relationship and its impact on firms' leverage decisions. Also, research on CEO tenure provides contradictory findings with no clear implication on the capital structure in general. For instance, studies that incorporate career horizons suggest that older CEOs in the final stage of their career prefer 'playing it safe' and are less ambitious (Bertrand and Mullainathan 2003; Gormley and Matsa 2016), while younger CEOs in their earlier tenure will likely be under market pressure to prove their relevance (Gibbons and Murphy 1992). However, Dikolli, Mayew, and Nanda (2014) suggest that tenure may result in more ambitious projects since it enables older CEOs to evade board monitoring. Examining whether CEO overconfidence and tenure moderate the age-capital structure relationship will add to the existing literature.

We, therefore, examine the impact of CEO age on the capital structure dynamics of Chinese firms. Our studies also investigate the moderating effects of overconfidence and tenure on the relationship between CEO age and capital structure. Using 18,235 firm-year observations from Chinese listed firms, we find a positive relationship between CEO age and leverage. Our result also indicates that CEO age-overconfidence and CEO age-tenure relationship have a negative effect on leverage. Using sensitivity analysis, we show that young CEOs use less debt, which is consistent with the market-leaning hypothesis. We also find a positive relationship between CEO age and leverage in State-owned enterprises. Our results are robust for decompositional analysis, selection bias test and endogeneity.

We make a significant contribution to the literature in the following ways. First, we document evidence that risk appetite increases with age among Chinese CEOs, which contradicts the result reported in the Western setting (Bertrand and Mullainathan 2003; Coles, Daniel, and Naveen 2006; Serfling 2014). Second, we show that CEO tenure and overconfidence moderate the relationship between CEO age and leverage. Finally, using the upper echelons' theory, we contribute to capital structure literature by exploring the impact of managerial characteristics on capital structure decisions of firms in China. Our study demonstrates the relevance of the upper-echelon theory in the capital structure debate, thereby complementing the established theories of capital structure (the trade-off and the pecking order theories).

Our result will help the board of directors to recruit CEOs based on a firm's strategic objectives and risk appetite. Our findings are relevant to academics and enable them to appreciate the impact of demographic characteristics on firms' capital structure decisions. This research will help Chinese policymakers support younger CEOs by finding ways to alleviate their career concerns.

We structure the remainder of the paper as follows. We review existing literature and develop hypotheses in Section 2. In Section 3, we describe the data and discuss the methodology. Finally, we present the study's findings in Section 4 and conclude our research in the last section.

2 | Literature Review and Hypothesis Development

2.1 | Relevant Literature

The trade-off theory argues that firms' capital structure is influenced by trading-off the benefits and costs of debt (Hackbarth, Hennessy, and Leland 2007). Consistent with the trade-off assumption, several studies have employed models that assume no

effect of managerial characteristics on firms' debt-to-equity decisions (Fischer, Heinkel, and Zechner 1989; Goldstein, Ju, and Leland 2001; Strebulaev 2007).

The upper echelons theory is based on the premise that managerial demographic characteristics have implications for firms' strategic decisions and performance (Child 1972; Hambrick 2007; Hambrick and Mason 1984). The theory suggests that top executives' personalities, values and experiences influence their organisational choices (Hambrick 2007). The upper-echelon theory's premise is bounded rationality, which highlights the deficiencies in access to information, processing and use (Holmes et al. 2011). As a result of these limitations, Hambrick and Mason (1984) argue that human limitations influence CEOs' field of vision, how they perceive the realities around them, and how these realities are interpreted.

Consistent with the upper echelons theory, a growing body of research suggests that managerial characteristics influence firms' financing decisions (Berger, Ofek, and Yermack 1997; Bhagat, Bolton, and Subramanian 2011; Faccio, Marchica, and Mura 2016; Hackbarth 2008). Finance literature documents the impact of demographic characteristics on differences in management styles (Bertrand and Schoar 2003; Goergen, Limbach, and Scholz 2015; Komal et al. 2021, 2023; Malmendier, Tate, and Yan 2011; Serfling 2014; Talavera, Yin, and Zhang 2018; Wang et al. 2016).

The upper echelon theory highlighted age as one of the key demographic characteristics that can result in differences in managerial choices. Hambrick and Mason (1984) and Wang et al. (2016) argue that age indicates the experience of a CEO. Wang et al. (2016) suggest that younger CEOs have limited experiences and have less developed cognitive schema, while older CEOs with better-developed cognitive schema may be primarily unwilling or unable to enhance their learning. Despite the centrality of age in the upper echelons theory, its implication for firms' financing decisions is yet to be known.

2.2 | CEO Age and Corporate Leverage

Theoretical and empirical work engenders conflicting predictions and evidence about how a CEO's age impacts financing decisions. The market learning perspective suggests that younger managers still climbing the career ladder are unwilling to make bold and risky decisions to avoid negative outcomes that will impact the market perception of their managerial ability (Chevalier and Ellison 1999; Hong, Kubik, and Solomon 2000). Studies suggest that younger managers are constantly worried about the reputational impact of their decisions since their future employment depends on their current performance (Brickley, Linck, and Coles 1999). Fama (1980) argues that the managerial labour market can use managers' past performance to revise previously held perceptions about their abilities. Kim, Patro, and Pereira (2017) argue that leverage influences career concerns and will likely diminish CEOs with less experienced career prospects. The trade-off theory associates firm leverage with financial distress risk, debt covenant violation, default of firm's obligations and risk of bankruptcy (Hackbarth, Hennessy, and Leland 2007; Kraus and Litzenberger 1973). Another strand of the literature suggests that CEOs with debt-like claims are likely sympathetic to bondholders' interests (Edmans and Liu 2011; James, Benson, and Park 2020; Liu, Mauer, and Zhang 2014). Since older CEOs have more debt-like compensations (James, Benson, and Park 2020), they are likely to issue more debt.

On the other hand, the upper echelons theory suggests that younger CEOs have more appetite for risk-taking (Hambrick and Mason 1984). Consistent with the upper echelons theory, a vast body of literature finds that younger managers use bold, ambitious, risky projects to signal their potential to the market (Prendergast and Stole 1996; Serfling 2014; Yim 2013; Zhang et al. 2016). Yim (2013) and Belenzon, Shamshur, and Zarutskie (2019) find that younger CEOs acquire more, likely increasing firms' financial needs. Similarly, Serfling (2014) shows that younger CEOs exaggerate their corporate policies to appear talented. Also, Zhang et al. (2016) document evidence that younger CEOs embrace more growth opportunities by acquiring firms in different lines of business. Bertrand and Schoar (2003) argue that older CEOs will likely use lower debt levels. Similarly, Coles, Daniel, and Naveen (2006) argue that CEOs will maintain lower leverage ratios as age increases. Following these studies, we develop our hypothesis as follows:

H1. *CEO age has a negative relationship with leverage.*

2.3 | CEO Age, Overconfidence, and CEO Tenure

Behavioural finance literature suggests that overconfidence influences financing decisions (Hackbarth 2008; Malmendier, Tate, and Yan 2011). An overconfident manager has an unrealistic optimism towards future events (Malmendier and Tate 2005; Weinstein 1980). Prior theoretical and empirical evidence generates conflicting results on how this behavioural bias varies with age. For instance, Kovalchik et al. (2005) argue that managers are more overconfident in their earlier years. Similarly, Yim (2013) suggests that physiological changes reduce the likelihood of older CEOs initiating ambitious projects that may require additional borrowing. Previous studies suggest that CEO overconfidence has a positive relationship with leverage (Hackbarth 2008; Malmendier, Tate, and Yan 2011). On the other hand, Roll (1986) argues that overconfident CEOs prefer internal finance sources. Although CEO tenure is identified as a key managerial characteristic that influences behaviour (Hambrick and Mason 1984), there is relatively little evidence on whether CEO tenure affects the relationship between such CEO age and capital structure. Barkema and Pennings (1998) suggest that longer tenure symbolises the CEO's power.

Previous studies suggest that younger CEOs in their earlier tenure will likely be under market pressure to prove their relevance (Gibbons and Murphy 1992). Dikolli, Mayew, and Nanda (2014) argue that younger CEOs with shorter tenure are more likely to be replaced in the face of negative performance. In line with the agency theory of free cash flow (Jensen 1986), we expect CEOs in their earlier tenure to be

subject to the disciplinary effect of debt. Owusu et al. (2022) find that debt costs increase when a CEO is in their earlier tenure. In contrast, Dikolli, Mayew, and Nanda (2014) report a negative association between tenure and weaker corporate governance, suggesting that a longer tenure enables older CEOs to evade board monitoring. The two arguments lead us to argue that the CEO-leverage relationship is more likely to be affected by two channels—overconfidence and tenure. Thus, we extend our contribution by examining the moderating role of CEO overconfidence and CEO tenure using the following hypotheses:

H2a. *CEO overconfidence moderates the relationship between CEO age and corporate leverage.*

H2b. *CEO tenure moderates the relationship between CEO age and corporate leverage.*

3 | Data and Methodology

3.1 | Data Sources and Sampling

Our study sample is selected from Chinese non-financial firms listed on the Shenzhen and Shanghai stock exchanges between 2009 and 2021. The China Stock Market and Accounting Research (CSMAR) database is our data source. We excluded utility firms, financial firms, and firms with missing data. We obtained 18,235 firm-year observations as our final sample. Our data are winsorised at 1% and 99% levels to minimise the effect of the outliers.

3.2 | Measurement of Variables

3.2.1 | Measurement of Dependent Variables

We use two measures of leverage as our dependent variable. Using these two measures reduces the sensitivity of our independent variables to a particular measure of leverage. Following Kieschnick and Moussawi (2018), we measure our market leverage variable as follows:

$$\text{LEV\_MK}_{i,t} = \frac{\text{Debt}_{i,t}}{\text{Debt}_{i,t} \times \text{Share Price}_{i,t}} \quad (1)$$

where $\text{Debt}_{i,t}$ is the firm's (i) financial debt at the time (t). $\text{Share Price}_{i,t}$ represents a firm (i)'s outstanding ordinary shares at time t.

We measure book leverage as the ratio of a firm's total debt to total assets.

$$\text{LEV\_BK}_{i,t} = \frac{\text{Total Debt}_{i,t}}{\text{Total Assests}_{i,t}} \quad (2)$$

3.2.2 | Measurement of Independent and Moderating Variables

Following Serfling (2014), we measure CEO age as the natural log of the age of the CEO in years. For young CEOs, we use a dummy variable assigned the value of 1 if the CEO age is lower than the median CEO age and 0 if otherwise. The moderating

TABLE 1 | Summary statistics.

Variable	*N*	Mean	St. dev	Min	Median	Max
LEV_MK	18,235	0.399	0.002	0.092	0.420	0.830
LEV_BK	18,235	0.328	0.004	0.055	0.284	0.902
CEO_Age	18,235	49.692	6.476	32.000	50.00	65.000
CEO_OC	18,235	0.624	0.179	0.289	0.605	1.000
CEO_Ten	18,235	1.552	0.179	0.289	0.605	1.000
CEO_Chair	18,235	0.292	0.564	0.693	1.609	2.708
CEO_G	18,235	0.063	0.455	0.000	0.000	1.000
B_Female	18,235	0.184	0.110	0.000	0.166	0.500
B_Agediv	18,235	3.892	0.064	3.685	3.895	4.031
SOE	18,235	0.353	0.243	0.000	0.000	1.000
B_Ind	18,235	0.375	0.478	0.000	0.000	1.000
MGT_Share	18,235	15.686	0.053	0.333	0.333	0.571
Firm_Size	18,235	23.101	21.070	0.000	1.512	70.149
Profit	18,235	0.047	1.280	20.186	22.912	27.000
TAN	18,235	0.046	0.058	0.032	0.044	0.280
LIQ	18,235	2.079	0.046	0.000	0.035	0.309
GO	18,235	3.022	2.377	0.148	1.297	15.604

Note: Continuous variables are winsorised at 1% and 99%. A detailed description of all variables is given in Appendix 1.

variables used in this study are CEO overconfidence and tenure. CEO overconfidence is measured by relative compensation, a ratio of the top three executives' compensation divided by all managers' compensation. We also measure CEO tenure as the number of years an individual serves as a CEO.

3.2.3 | Control Variables

We isolate the effects of firm-level, corporate governance and ownership characteristics that are shown to influence capital structure decisions (Céspedes, González, and Molina 2010). For instance, previous studies suggest that CEO-chair duality and gender influence capital structure (García and Herrero 2021; Jiraporn, Chintrakarn, and Liu 2012). Studies also show that board independence and gender diversity influences firms' financial decisions (Ezeani et al. 2022; Ezeani, Kwabi, and Kostov 2023; García and Herrero 2021; Schopohl, Urquhart, and Zhang 2021; Usman, Nwachukwu, and Ezeani 2022; Usman, Salem, and Ezeani 2022). Leland and Pyle (1977) argue that managerial shareholding increases leverage, while Friend and Lang (1988) document a negative relationship. Consistent with the pecking order theory, Myers and Majluf (1984) show that profitability is inversely related to leverage. Opler et al. (1999) find that liquidity negatively relates to leverage. Other capital structure studies indicate a positive relationship between firm size, tangibility, growth opportunity, and leverage (Booth et al. 2001; Rajan and Zingales 1995; Titman and Wessels 1988).

3.3 | Model Specifications

We employ a two-step generalised method of moments (GMM) to examine the relationship between CEO age and leverage. We tested our hypotheses using the following specifications.

$$Y_{i,t} = a_i + \beta f_{i,t} + \gamma_1 C^1_{i,t} + \gamma_2 C^2_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

where C^1 represents the independent variables, C^2 is a set of control variables and λ_t is the time dummies vector, $\varepsilon_{i,t}$ is the error term.

System dynamic panel data estimation is a method of estimating a system's parameters over time. It combines the strengths of system dynamics and panel data methods, allowing for a more accurate estimation of the system's parameters (Bond 2001). This method utilises a panel data set consisting of data from different firms observed over multiple points. This data set is then used to estimate the system's parameters by accounting for the relationship between the system's inputs and outputs over time (Wawro 2002).

The simplest model without strictly exogenous variables with autoregressive (AR) specifications formed as follows:

$$y_{it} = a y_{i(t-1)} + N_i + v_{it,} \; |\alpha| < 1 \quad (4)$$

An individual time series $(y_{i1}, \ldots, Y_{itt})$ is assumed to be available as a random sample. There is a small t and a large N.

TABLE 2 | Summary statistics by young and older CEO terciles.

Variable	Young CEO (mean)	Older CEO (mean)	Diff.	*p*
LEV_MK	0.623	0.705	−0.082	0.000
LEV_BK	0.272	0.411	−0.139	0.020
CEO_Age	40.912	55.212	−14.300	0.000
CEO_OC	0.630	0.618	0.012	0.000
CEO_Ten	1.458	1.662	−0.204	0.000
CEO_Chair	0.235	0.357	−0.122	0.000
CEO_G	0.068	0.058	0.010	0.000
B_Female	0.184	0.180	0.004	0.797
B_Agediv	3.873	3.913	−0.040	0.000
SOE	0.329	0.382	−0.053	0.000
B_Ind	0.373	0.376	0.003	0.000
MGT_Share	16.576	14.673	1.903	0.000
Firm_Size	22.980	23.239	−0.259	0.000
Profit	0.047	0.048	−0.001	0.234
TAN	0.044	0.047	−0.003	0.000
LIQ	2.173	1.973	0.200	0.000
GO	3.018	3.026	−0.008	0.000

Note: Continuous variables are winsorised at 1% and 99%. A detailed description of all variables is given in Appendix 1.

TABLE 3 | Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	VIF
(1) CEO_Age	1.000															1.137
(2) CEO_OC	−0.055	1.000														1.094
(3) CEO_Ten	0.233	−0.024	1.000													1.138
(4) CEO_Chair	0.175	0.076	0.165	1.000												1.237
(5) CEO_G	−0.041	0.071	0.001	−0.030	1.000											1.023
(6) B_Female	−0.008	0.166	0.051	0.150	0.191	1.000										1.164
(7) B_Agediv	0.347	−0.094	0.075	−0.186	−0.065	−0.223	1.000									1.388
(8) SOE	0.087	−0.193	−0.121	−0.322	−0.059	−0.245	0.319	1.000								1.585
(9) B_Ind	0.019	0.086	0.027	0.122	0.058	0.097	−0.036	−0.078	1.000							1.048
(10) MGT_Share	−0.060	0.072	0.045	0.266	0.055	0.173	−0.281	−0.519	0.095	1.000						1.506
(11) Firm_Size	0.114	−0.218	0.025	−0.192	−0.035	−0.179	0.351	0.362	−0.007	−0.378	1.000					2.469
(12) Profit	0.018	−0.013	0.047	0.071	0.005	0.054	−0.031	−0.151	−0.006	0.185	−0.066	1.000				1.167
(13) TAN	0.011	−0.050	−0.032	−0.045	−0.011	−0.032	0.037	0.055	−0.015	−0.057	0.021	−0.045	1.000			1.024
(14) LIQ	−0.034	0.084	−0.020	0.135	0.016	0.124	−0.174	−0.234	0.021	0.286	−0.366	0.235	−0.102	1.000		1.316
(15) GO	0.050	−0.143	0.001	−0.107	−0.022	−0.133	0.186	0.206	−0.008	−0.226	0.717	0.077	−0.029	−0.344	1.000	2.235

Note: Continuous variables are winsorised at 1% and 99%. For brevity and space, all values significant at least 5% are in bold. A detailed description of all variables is given in Appendix 1.

TABLE 4 | CEO age and capital structure dynamics.

	GMM models		Fixed effect (FE) models	
	Model (1)	Model (2)	Model (3)	Model (4)
Variables	LEV_MK	LEV_BK	LEV_MK	LEV_BK
L.LEV_MK	0.3810***			
	(0.0202)			
L.LEV_BK		0.2555***		
		(0.0129)		
CEO_Age	0.0396***	0.0233***	0.0388***	0.0279**
	(0.0037)	(0.0028)	(0.0124)	(0.0114)
CEO_Chair	0.0038	0.0082	0.0049	0.0071*
	(0.0077)	(0.0056)	(0.0042)	(0.0040)
CEO_G	−0.0009	−0.0034	−0.0081	−0.0045
	(0.0146)	(0.0090)	(0.0071)	(0.0063)
B_Female	−0.0002	−0.0002	0.0002	0.0001
	(0.0002)	(0.0003)	(0.0002)	(0.0002)
B_Agediv	0.1017**	0.1017**	0.0335	0.0355
	(0.0444)	(0.0495)	(0.0336)	(0.0305)
SOE	0.0445***	0.0096*	0.0304***	0.0281***
	(0.0164)	(0.0061)	(0.0066)	(0.0062)
B_Ind	0.1265**	0.0926***	−0.0209	−0.0149
	(0.0568)	(0.0268)	(0.0347)	(0.0318)
MGT_Share	0.0016***	0.0006**	0.0010***	0.0011***
	(0.0002)	(0.0003)	(0.0002)	(0.0001)
Firm_Size	0.0322***	0.0238***	0.0490***	0.0331***
	(0.0036)	(0.0032)	(0.0050)	(0.0024)
Profit	−0.0098	−0.0383	−0.9989***	−0.8961***
	(0.0463)	(0.0266)	(0.0439)	(0.0402)
TAN	0.0163	0.1060	−0.2632***	−0.1547***
	(0.0868)	(0.0792)	(0.0553)	(0.0507)
LIQ	0.0072***	−0.0032	−0.0398***	−0.0378***
	(0.0012)	(0.0026)	(0.0017)	(0.0013)
GO	0.1419***	0.0373**	0.3160***	0.3265***
	(0.0264)	(0.0160)	(0.0278)	(0.0246)
SOA (%)	61.90	74.45		
Observations	16,480	16,480	18,235	18,235
Sargan	0.245	0.272		
AR1	0.134	0.127		
AR2	0.201	0.228		
Firm effect			Yes	Yes
Year effect			Yes	Yes
Adj. R^2			0.402	0.378

Note: Robust standard errors in parentheses. A detailed description of all variables is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

TABLE 5 | The moderating role of CEO overconfidence and CEO tenure.

	CEO overconfidence				CEO tenure			
	GMM models		Fixed effect (FE) models		GMM models		Fixed effect (FE) models	
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
Variables	LEV_MK	LEV_BK	LEV_MK	LEV_BK	LEV_MK	LEV_BK	LEV_MK	LEV_BK
L.LEV_MK	0.3714***				0.3723***			
	(0.0212)				(0.0213)			
L.LEV_BK		0.2546***				0.2558***		
		(0.0206)				(0.0206)		
CEO_Age	0.0584***	0.0358**	0.0851**	0.0757**	0.0650***	0.0203**	0.0649**	0.0730***
	(0.0206)	(0.0173)	(0.0384)	(0.0374)	(0.0121)	(0.0098)	(0.0268)	(0.0271)
CEO_OC	−0.0438***	−0.0381***	−0.5332**	−0.4861**				
	(0.0032)	(0.0060)	(0.2185)	(0.2239)				
CEO_Age×CEO_OC	−0.0798***	−0.0708***	−0.1370**	−0.1230**				
	(0.0079)	(0.0192)	(0.0589)	(0.0578)				
CEO_Ten					−0.0171***	−0.0109**	−0.1190*	−0.1422**
					(0.0042)	(0.0047)	(0.0612)	(0.0653)
CEO_Age×CEO_Ten					−0.0972**	−0.0415**	−0.0342**	−0.0409**
					(0.0396)	(0.0189)	(0.0157)	(0.0170)
CEO_Chair	0.0087	0.0044	0.0134***	0.0142***	0.0015	0.0011	−0.0155***	−0.0166***
	(0.0082)	(0.0055)	(0.0041)	(0.0039)	(0.0034)	(0.0029)	(0.0038)	(0.0037)
CEO_G	0.0048	0.0055	0.0010	0.0007	0.0066	0.0021	−0.0022	−0.0009
	(0.0137)	(0.0089)	(0.0052)	(0.0059)	(0.0047)	(0.0050)	(0.0054)	(0.0057)
B_Female	−0.0010***	0.0002	−0.0002	0.0001	−0.0009**	−0.0002	0.0003	0.0001
	(0.0004)	(0.0002)	(0.0003)	(0.0002)	(0.0004)	(0.0003)	(0.0002)	(0.0002)
B_Agediv	0.3469***	0.0321	0.1088**	0.0348	0.3774***	0.1053**	0.0279	0.0271
	(0.0689)	(0.0341)	(0.0499)	(0.0307)	(0.0697)	(0.0497)	(0.0339)	(0.0307)
SOE	0.0616***	0.0121**	0.0088**	0.0119***	0.0139*	0.0107*	−0.0065*	−0.0088**
	(0.0105)	(0.0055)	(0.0043)	(0.0038)	(0.0081)	(0.0055)	(0.0034)	(0.0038)

(Continues)

TABLE 5 | (Continued)

	CEO overconfidence				CEO tenure			
	GMM models		Fixed effect (FE) models		GMM models		Fixed effect (FE) models	
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
B_Ind	0.0683	0.0750**	0.0428	0.0512*	0.0174	0.0074	−0.0430	−0.0511*
	(0.0502)	(0.0322)	(0.0263)	(0.0273)	(0.0261)	(0.0229)	(0.0267)	(0.0270)
MGT_Share	0.0013***	0.0005*	0.0006***	0.0004***	0.0008***	0.0007***	−0.0004***	−0.0003***
	(0.0003)	(0.0003)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Firm_Size	0.0226***	0.0253***	0.0326***	0.0309***	0.0109**	0.0276***	0.0330***	0.0312***
	(0.0087)	(0.0032)	(0.0017)	(0.0018)	(0.0045)	(0.0031)	(0.0019)	(0.0019)
Profit	−0.0601	−0.0018	−0.2019***	−0.1971***	−0.4746***	−0.4484***	−0.2081***	−0.2050***
	(0.0392)	(0.0239)	(0.0378)	(0.0381)	(0.0245)	(0.0214)	(0.0374)	(0.0381)
TAN	0.0291	0.1815**	0.0411	0.0131	0.1112**	0.0861*	−0.0388	0.0219
	(0.0747)	(0.0847)	(0.0272)	(0.0232)	(0.0551)	(0.0515)	(0.0285)	(0.0238)
LIQ	0.0114***	0.0271***	0.0393***	0.0408***	0.0284***	0.0260***	−0.0399***	−0.0404***
	(0.0006)	(0.0012)	(0.0015)	(0.0016)	(0.0013)	(0.0012)	(0.0016)	(0.0016)
GO	0.1159***	0.0324**	0.0269	0.0318	0.0636***	0.0642***	−0.0270	−0.0302
	(0.0260)	(0.0151)	(0.0208)	(0.0203)	(0.0121)	(0.0108)	(0.0210)	(0.0204)
SOA (%)	62.86	74.54			62.77	74.42		
Observations	16,480	16,480	18,235	18,235	16,480	16,480	18,235	18,235
Sargan	0.457	0.482			0.462	0.448		
AR1	0.113	0.114			0.127	0.142		
AR2	0.208	0.219			0.193	0.239		
Firm effect			Yes	Yes			Yes	Yes
Year effect			Yes	Yes			Yes	Yes
Adj. R^2			0.473	0.456			0.453	0.427

Note: Robust standard errors in parentheses. A detailed description of all variables is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

TABLE 6 | Young CEOs and capital structure dynamics.

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
L.LEV_MK	0.3733***		0.3888***		0.4062***	
	(0.0206)		(0.0089)		(0.0196)	
L.LEV_BK		0.2578***		0.2852***		0.3281***
		(0.0201)		(0.0180)		(0.0156)
CEO_Young	−0.0473***	−0.0342***	−0.0495***	−0.0321***	−0.0381**	−0.0318***
	(0.0072)	(0.0036)	(0.0131)	(0.0043)	(0.0179)	(0.0042)
CEO_OC			−0.0897***	−0.0598***		
			(0.0094)	(0.0063)		
CEO_Youn×CEO_OC			−0.1273**	−0.0651***		
			(0.0546)	(0.0164)		
CEO_Ten					−0.0060**	−0.0032**
					(0.0026)	(0.0015)
CEO_Young×CEO_Ten					−0.0485**	−0.0408***
					(0.0204)	(0.0046)
CEO_Chair	0.0026	0.0012	0.0086	0.0044	0.0024	0.0012
	(0.0153)	(0.0014)	(0.0083)	(0.0056)	(0.0043)	(0.0029)
CEO_G	0.0472***	0.0098*	0.0040	0.0063	0.0073	0.0024
	(0.0181)	(0.0057)	(0.0129)	(0.0097)	(0.0054)	(0.0050)
B_Female	−0.0011***	−0.0002	−0.0011***	−0.0002	−0.0010***	−0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
B_Agediv	0.3712***	0.1235**	0.3822***	0.1302***	0.3850***	0.1121**
	(0.0686)	(0.0493)	(0.0689)	(0.0498)	(0.0696)	(0.0489)
SOE	0.1272**	0.0932***	0.0665***	0.0119**	0.0133*	0.0098*
	(0.0564)	(0.0354)	(0.0148)	(0.0053)	(0.0078)	(0.0054)
B_Ind	−0.0018***	−0.0009*	−0.0675	−0.0738**	−0.0172	−0.0074
	(0.0002)	(0.0005)	(0.0502)	(0.0310)	(0.0260)	(0.0232)
MGT_Share	−0.0330***	−0.0253***	−0.0013***	−0.0005*	−0.0008***	−0.0007***
	(0.0048)	(0.0040)	(0.0003)	(0.0003)	(0.0002)	(0.0002)
Firm_Size	0.0034	0.0434	0.0188***	0.0251***	0.0069**	0.0232***
	(0.0459)	(0.0276)	(0.0045)	(0.0030)	(0.0029)	(0.0043)
Profit	−0.0261	−0.1077	−0.0584	−0.0024	−0.4739***	−0.4487***
	(0.0893)	(0.0804)	(0.0376)	(0.0242)	(0.0243)	(0.0225)
TAN	0.0074***	0.0033	0.0290	0.1821**	0.1123**	0.0855*
	(0.0016)	(0.0025)	(0.0745)	(0.0853)	(0.0558)	(0.0501)

(Continues)

TABLE 6 | (Continued)

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
LIQ	−0.1477***	−0.0370**	−0.0131***	−0.0051*	−0.0284***	−0.0260***
	(0.0288)	(0.0159)	(0.0015)	(0.0029)	(0.0012)	(0.0012)
GO	0.0014	0.0005	0.1195***	0.0320**	0.0631***	0.0640***
	(0.0145)	(0.0099)	(0.0296)	(0.0146)	(0.0118)	(0.0112)
SOA (%)	62.67	74.22	61.12	71.48	59.38	67.19
Observations	16,480	16,480	16,480	16,480	16,480	16,480
Sargan	0.237	0.221	0.294	0.341	0.371	0.318
AR1	0.114	0.129	0.116	0.112	0.116	0.132
AR2	0.183	0.176	0.172	0.198	0.169	0.294

Note: Robust standard errors in parentheses. A detailed description of all variables is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

Assuming that the v_{it} are finite moments, $E(v_{it}) = E(v_{it}v_{ij}) = 0$ for $t \neq s$. The relation between $E(\mathrm{v_{it}})$ and $E(v_{it}v_{ij})$ is assumed to be uncorrelated, but it is not assumed to be independent.

$T \geqq 3$ the model indicates that $m = (T-2)(T-1)/2$ moment linear restrictions.

$$D\left[\left(\bar{y}_{it} - \mathrm{a}\bar{y}_{i(t-1)}\right)y_{i(t-j)}\right] = 0\,(j = 2, \ldots,)t-1); t-3, \ldots, T) \quad (5)$$

where, $\bar{y}_{it} = y_{it} - y_{i(t-1)}$. Ideally, we would like to obtain the best estimator of α as $N \to \infty$ for fixed T based solely on these restrictions (Arellano & Bond, 1991). Arellano–Bond dynamic panel data estimation are a powerful econometric method used to estimate models with lagged dependent variables, often used in panel data models. It is a generalisation of the static panel data estimator developed by (Bond, 2002). The method is used to estimate a large number of parameters efficiently. It has the advantage of including lagged dependent variables and using fixed effects models. The Arellano–Bond estimator applies a two-stage least squares (2SLS) technique to a system of equations that includes lagged dependent variables and then uses the estimates from the 2SLS to estimate the parameters of the static panel data model. The Arellano–Bond estimator has many advantages over other estimation techniques, including the ability to estimate a large number of parameters efficiently and the ability to estimate models with lagged dependent variables.

3.4 | Robust Analyses

For the robust analysis, we employ the fixed-effects estimation. We also conducted a battery of additional analyses using the alternative proxies of leverage and CEO age. To address the sample selection bias, we employ the propensity score matching using the nearest neighbouring matching approach and difference-in-difference. We use the Heckman two-stage models and a step-by-step sampling approach to control for endogeneity and validate the main findings. These rigorous methods ensure the robustness of our results, instilling confidence in the validity of our findings.

4 | Results and Discussion

4.1 | Descriptive Statistics

Tables 1 and 2 present the full sample's descriptive statistics and correction matrix. Table 1 shows that market leverage ranges between 0.09 and 0.83 with an average of nearly 0.39 relative to book value leverage, which ranges from 0.05 and 0.90 with an average of 0.32. The table shows that the median CEO age in our sample is 50 years, with the youngest CEO aged 32 years and the oldest CEO aged 65 years. We present the difference between younger and old CEOs in Table 2, which shows significant variation between younger and older CEOs for most of the variables.

4.2 | Correlation Analysis

Table 3 presents the correlation analysis for this study's independent and control variables. We observe that the correlation coefficient among the independent variables is significantly low. A further check using the variance inflation factors (VIF) procedure confirms that the average VIF for each variable is far less than the threshold of 10 recommended by Hair et al. (1995). This suggests that multicollinearity is not a concern in this study.

TABLE 7 | CEO age and capital structure (SOEs and non-SOEs).

Panel A: State-owned firms' sample[a]

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
L.LEV_MK	0.3781***		0.4876***		0.4783***	
	(0.0212)		(0.0240)		(0.0367)	
L.LEV_BK		0.3472***		0.2985***		0.3404***
		(0.0184)		(0.0511)		(0.0178)
CEO_Age	0.0630***	0.0482***	−0.0922***	−0.0722***	−0.0163***	−0.0223***
	(0.0027)	(0.0044)	(0.0072)	(0.0061)	(0.0034)	(0.0031)
CEO_OC			−0.0521***	−0.0370***		
			(0.0059)	(0.0050)		
CEO_Age×CEO_OC			−0.1055***	−0.0944***		
			(0.0274)	(0.0295)		
CEO_Ten					−0.0153***	−0.0042**
					(0.0039)	(0.0018)
CEO_Age×CEO_Ten					−0.0296***	−0.0172***
					(0.0049)	(0.0023)
CEO_Chair	0.0056	0.0084	−0.0013	−0.0014	−0.0017	−0.0031
	(0.0072)	(0.0053)	(0.0030)	(0.0030)	(0.0055)	(0.0026)
CEO_G	−0.0008	−0.0034	−0.0119	0.0092*	0.0069	0.0107*
	(0.0136)	(0.0091)	(0.0082)	(0.0054)	(0.0094)	(0.0055)
B_Female	−0.0011***	−0.0002	−0.0010***	0.0002	−0.0009**	−0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0002)	(0.0004)	(0.0003)
B_Agediv	0.3380***	0.1017**	0.3469***	0.0321	0.3774***	0.1053**
	(0.0693)	(0.0495)	(0.0689)	(0.0341)	(0.0697)	(0.0497)
B_Ind	0.1206**	0.0979***	0.0509	0.1030*	0.0553	0.0655**
	(0.0578)	(0.0349)	(0.0335)	(0.0542)	(0.0355)	(0.0268)
MGT_Share	0.0019***	−0.0006**	0.0021***	0.0001	0.0019***	−0.0006**
	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0003)	(0.0003)
Firm_Size	−0.0378***	0.0228***	−0.0282***	0.0370***	−0.0349***	0.0561***
	(0.0050)	(0.0042)	(0.0049)	(0.0050)	(0.0051)	(0.0032)
Profit	−0.0145	0.0383	−0.0622	−0.0072	−0.4455***	−0.4455***
	(0.0448)	(0.0266)	(0.0468)	(0.0280)	(0.0234)	(0.0194)
TAN	0.0142	0.1060	0.0591	0.1065	−0.0254	0.0225
	(0.0851)	(0.0792)	(0.1092)	(0.0798)	(0.0693)	(0.0399)
LIQ	0.0077***	−0.0032	0.0142***	0.0028	−0.0252***	−0.0248***
	(0.0016)	(0.0026)	(0.0018)	(0.0072)	(0.0012)	(0.009)

(Continues)

TABLE 7 | (Continued)

Panel A: State-owned firms' sample[a]

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
GO	0.1471***	−0.0373**	0.1632***	0.0746***	0.0704***	0.0690***
	(0.0287)	(0.0160)	(0.0365)	(0.0126)	(0.0133)	(0.0121)
SOA (%)	54.29	53.82	51.30	62.48	58.12	64.20
Observations	10,463	10,463	10,463	10,463	10,463	10,463
Sargan	0.407	0.416	0.493	0.526	0.491	0.515
AR1	0.112	0.124	0.119	0.117	0.129	0.142
AR2	0.196	0.218	0.198	0.218	0.238	0.284

Panel B: Privately-owned firm's sample

	Direct models		Moderation analysis			
			CEO Over confidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
L.LEV_MK	0.3812***		0.4722***		0.3690***	
	(0.0209)		(0.0390)		(0.0203)	
L.LEV_BK		0.3497***		0.2832***		0.2558***
		(0.0187)		(0.0201)		(0.0206)
CEO_Age	0.0305	0.0298**	0.0844	0.0039	0.018	0.0046
	(0.0224)	(0.0152)	(0.0621)	(0.0404)	(0.0097)	(0.0284)
CEO_OC			−0.0112	−0.0102		
			(0.0225)	(0.0143)		
CEO_Age×CEO_OC			−0.0845	−0.0165		
			(0.0733)	(0.0392)		
CEO_Ten					−0.0025	−0.0018
					(0.0032)	(0.0027)
CEO_Age×CEO_Ten					−0.0193	−0.0165
					(0.0158)	(0.0128)
CEO_Chair	0.0033	0.0036	0.0094	0.0069	0.0015	0.0022
	(0.0072)	(0.0091)	(0.0073)	(0.0074)	(0.0037)	(0.0034)
CEO_G	0.0098*	0.0132**	0.0120	0.0091	0.0082	0.0080
	(0.0055)	(0.0059)	(0.0163)	(0.0056)	(0.0062)	(0.0052)
B_Female	−0.0011***	−0.0002	−0.0009**	0.0003	−0.0009**	−0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0002)	(0.0004)	(0.0003)
B_Agediv	0.3380***	0.1017**	0.3703***	0.0283	0.3774***	0.1053**
	(0.0693)	(0.0495)	(0.0694)	(0.0343)	(0.0697)	(0.0497)

(Continues)

TABLE 7 | (Continued)

Panel B: Privately-owned firm's sample

	Direct models		Moderation analysis			
			CEO Over confidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
B_Ind	0.1206**	0.0979***	0.0598	0.1008*	0.0512	0.0668**
	(0.0578)	(0.0349)	(0.0789)	(0.0533)	(0.0339)	(0.0282)
MGT_Share	0.0019***	−0.0006**	0.0021***	0.0004**	0.0008***	0.0007***
	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0001)
Firm_Size	−0.0378***	0.0228***	−0.0309***	0.0287***	0.0349***	0.0586***
	(0.0050)	(0.0042)	(0.0048)	(0.0052)	(0.0051)	(0.0039)
Profit	−0.0145	0.0383	−0.0561	−0.0095	−0.4402***	−0.4382***
	(0.0448)	(0.0266)	(0.0407)	(0.0288)	(0.0236)	(0.0180)
TAN	0.0142	0.1060	0.0408	0.2249**	−0.0223	0.0097
	(0.0851)	(0.0792)	(0.0858)	(0.1102)	(0.0665)	(0.0386)
LIQ	0.0077***	−0.0032	0.0142***	0.0032	−0.0250***	−0.0258***
	(0.0016)	(0.0026)	(0.0018)	(0.0026)	(0.0012)	(0.0008)
GO	0.1471***	−0.0373**	0.1432***	−0.0272***	0.0708***	0.0748***
	(0.0287)	(0.0160)	(0.0283)	(0.0013)	(0.0141)	(0.0144)
SOA (%)	51.28	53.15	46.29	58.16	54.10	59.23
Observations	6017	6017	6017	6017	6017	6017
Sargan	0.415	0.438	0.491	0.548	0.494	0.518
AR1	0.103	0.116	0.123	0.108	0.119	0.142
AR2	0.186	0.219	0.194	0.202	0.197	0.233

Note: Robust standard errors are in parentheses. A detailed description of all variables is given in Appendix 1.
[a]LT_LEV and ST_LEV are the long-term and short-leverage dependent variables, respectively.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

4.3 | Baseline Multivariate Results and Discussion

4.3.1 | CEO Age and Corporate Leverage

The study examines the effect of CEO age on capital structure. Our first hypothesis states that CEO age have an inverse relationship with corporate leverage (H1). We test our first hypothesis using Equation (3) and report the result in Table 4. Using, system GMM, we find a positive and statistically significant relationship between CEO age and leverage, with the estimated leverage adjustment speed of 61.90% and 74.45% in Models 1 and 2, respectively. In Models 3 and 4, the coefficient of CEO_Age remains the same and statistically significant when estimated using fixed effect (FE) regression. These results suggest that while the corporate leverage increases with CEO age among Chinese listed firms. Also, the speed of leverage adjustment is higher by 12.55% for book value leverage relative to market value leverage. This speedier adjustment for book leverage may be due to sensitivity of market to firms' information environment. Thus, the results support our first hypothesis H1.

Theoretically, our findings align with the upper echelons theory, suggesting that the underlying individual characteristics shape the CEO's capital structure decisions. Empirically, our findings are consistent with Malmendier, Tate, and Yan (2011), who suggest that older CEOs are more likely to engage in higher corporate leverage. This result implies that the CEOs borrow more as they grow older. In line with career concerns theory, one plausible explanation is that in the case of adversity, older CEOs have relatively nothing/little to lose in their career compared with young CEOs. These implications shed new light on the dynamics of CEO age and corporate leverage, sparking further interest in this area of research.

4.3.2 | CEO Age, Overconfidence, and Tenure

In this Table 4, we delve into the potential moderating effects of CEO overconfidence and CEO tenure on the relationship between CEO age and capital structure dynamics. Our second hypothesis, which posits that CEO overconfidence (H2a)

TABLE 8 | Main results after PSM.

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
L.LEV_MK	0.3808***		0.4566***		0.3499***	
	(0.0221)		(0.0208)		(0.0183)	
L.LEV_BK		0.3518***		0.3724***		0.3508***
		(0.0196)		(0.0234)		(0.0189)
CEO_Age	0.0409***	0.0256***	0.0844***	0.0684***	0.0495***	0.0242***
	(0.0053)	(0.0044)	(0.0275)	(0.0068)	(0.0054)	(0.0038)
CEO_OC			−0.0350*	−0.0296**		
			(0.0195)	(0.0131)		
CEO_Age×CEO_OC			−0.0992***	−0.0791***		
			(0.0296)	(0.0230)		
CEO_Ten					−0.0058***	−0.0048**
					(0.0022)	(0.0020)
CEO_Age×CEO_Ten					−0.0176***	−0.0164***
					(0.0028)	(0.0022)
CEO_Chair	0.0078	0.0088	0.0089	0.0085	−0.0028	−0.0032
	(0.0075)	(0.0062)	(0.0078)	(0.0060)	(0.0032)	(0.0034)
CEO_G	−0.0006	−0.0003	−0.0048	−0.0046	0.0082	0.0109*
	(0.0146)	(0.0102)	(0.0156)	(0.0100)	(0.0060)	(0.0062)
B_Female	−0.0012***	−0.0003	−0.0011***	0.0003	−0.0008**	−0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0002)
B_Agediv	0.3470***	0.1127**	0.3549***	0.1158**	0.3844***	0.1092**
	(0.0680)	(0.0508)	(0.0685)	(0.0510)	(0.0690)	(0.0506)
SOE	0.0494***	0.0098*	0.0507***	0.0108*	0.0158*	0.0238***
	(0.0184)	(0.0056)	(0.0186)	(0.0058)	(0.0088)	(0.0084)
B_Ind	0.1166*	0.0914***	0.1228**	0.1064***	0.0224	0.0376
	(0.0598)	(0.0358)	(0.0616)	(0.0372)	(0.0264)	(0.0254)
MGT_Share	0.0022***	−0.0008*	0.0024***	−0.0006*	0.0011***	0.0012***
	(0.0004)	(0.0004)	(0.0003)	(0.0003)	(0.0002)	(0.0001)
Firm_Size	−0.0344***	0.0272***	−0.0342***	0.0268***	0.0496***	0.0655***
	(0.0052)	(0.0046)	(0.0054)	(0.0044)	(0.0054)	(0.0038)
Profit	0.0184	0.0548**	0.0104	0.0452*	−0.4788***	−0.4528***
	(0.0476)	(0.0268)	(0.0484)	(0.0261)	(0.0254)	(0.0208)
TAN	0.0079	0.1023	0.0046	0.0902	−0.0703	−0.0498
	(0.0875)	(0.0816)	(0.0894)	(0.0812)	(0.0558)	(0.0367)
LIQ	0.0084***	−0.0038	0.0078***	−0.0034	−0.0276***	−0.0266***
	(0.0019)	(0.0029)	(0.0020)	(0.0028)	(0.0014)	(0.0010)

(Continues)

TABLE 8 | (Continued)

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
GO	0.1468***	−0.0432**	0.1433***	−0.0442**	0.0728***	0.0736***
	(0.0299)	(0.0174)	(0.0309)	(0.0178)	(0.0130)	(0.0134)
SOA (%)	61.83	62.97	52.38	59.02	61.29	60.44
Observations	14,725	14,725	14,725	14,725	14,725	14,725
Sargan	0.236	0.231	0.288	0.250	0.246	0.229
AR1	0.123	0.129	0.141	0.116	0.112	0.138
AR2	0.191	0.213	0.216	0.183	0.207	0.193

Note: Robust standard errors in parentheses. A detailed description of all variables is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

and CEO tenure (H2b) moderate the relationship between CEO age and corporate leverage, is put to the test. To do so, we introduce interactive variables (CEO_Age×CEO_OC and CEO_Age×CEO_Ten) into our central equation and present the results in Table 5. The individual coefficients of CEO age, CEO overconfidence, and CEO tenure now represent conditional effects expected to differ from those in the previous models (see Chizema et al. 2015; Friedrich 1982). The results in Models 1–4 provide evidence for the conditional impact of CEO overconfidence on corporate leverage, while Models 5–8 support the conditional impact of CEO tenure on corporate leverage. In the absence of CEO overconfidence and tenure, CEO age's effect on leverage is positive and significant. However, when CEO overconfidence (Models 1 and 2) and CEO tenure (Models 3 and 4) are introduced, the effect of CEO age is diminished, as indicated by a negative and significant coefficient. When the proportion of CEO overconfidence increases to 0.624, the market leverage is reduced by 8.58% [100(exp(0.085)−1)], whereas the book value leverage is reduced by 8.34% [100(exp(0.084)−1)].

Furthermore, we find that when the proportion of CEO tenure increases to 1.552, the market leverage is reduced by 8.22%, whereas the book value leverage is reduced by 4.31%. In Models 3 and 4, the coefficient of CEO_Age×CEO_OC and in Models 7 and 8 the coefficient of CEO_Age×CEO_Ten remains statistically significant when estimated using fixed effect (FE) regression. This robustness of the results further supports hypotheses (H2a and H2b).

4.4 | Sensitivity Analysis

4.4.1 | Young CEOs and Capital Structure Dynamics

Our CEO age variable is a proxy of the natural logarithm of the age of the CEO in years. However, if the baseline results are robust and the corporate leverage increases as the CEO age advances, firms whose CEOs are young are likely to experience lower leverage. In this context, CEO_Young is negatively related to corporate leverage. We use a dummy variable assigned a value of 1 if the CEO's age is less than the median age of all CEOs in our sample and 0 if otherwise. We re-run Equation (3) by replacing CEO_Age with CEO_Young and report the result in Table 6. The results in Models 1 and 2 have negative and statistically significant coefficients at the 1% level. Thus, the coefficients of CEO_Young are −0.0473 and −0.0342 for market leverage and book leverage, respectively, with 62.67% and 74.22% speed of adjustment in Models 1 and 2. This result indicates that young CEOs are risk-averse and are less likely to consider investments that require external borrowings.

This result is consistent with the market learning hypothesis, which suggests that younger managers in the earlier stage of their careers are less motivated to engage in bold decisions to avoid negative outcomes that will impact the market perception of their managerial ability (Chevalier and Ellison 1999; Hong, Kubik, and Solomon 2000). Interestingly, the moderating role of CEO overconfidence (Models 3 and 4) and CEO tenure (Models 5 and 6) remain negative and statistically significant. Thus, the results support the baseline findings.

4.4.2 | State-Owned and Non-State Owner Firms

One of the unique features of China is that there are a significant number of firms owned by the state, thereby necessitating examining whether the CEO age and the role of CEO overconfidence and tenure are similar between private and state-owned enterprises. Previous studies suggest that state-owned firms in China are affected by political interference and weaker managerial incentives (Komal et al. 2021; Tan et al. 2022). Jiang, Lee, and Yue (2010) argues that Type 2 agency conflict is prevalent among SOEs which may result in the monitoring effect of debt.

TABLE 9 | Main results after Heckman.

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
L.LEV_MK	0.3833***		0.3821***		0.4872***	
	(0.0213)		(0.0213)		(0.0396)	
L.LEV_BK		0.2694***		0.3768***		0.3498***
		(0.0216)		(0.0223)		(0.0192)
CEO_Age	0.0358***	0.0286***	0.0492***	0.0386***	0.0198***	0.0147***
	(0.0056)	(0.0044)	(0.0054)	(0.0048)	(0.0042)	(0.0038)
CEO_OC			−0.0398***	−0.0327***		
			(0.0036)	(0.0048)		
CEO_Age×CEO_OC			−0.0496**	−0.0526***		
			(0.0205)	(0.0094)		
CEO_Ten					−0.0216***	−0.0138***
					(0.0048)	(0.0026)
CEO_Age×CEO_Ten					−0.0294***	−0.0189***
					(0.0078)	(0.0047)
CEO_Chair	0.0078	0.0088	0.0114	0.0096	0.0006	0.0008
	(0.0074)	(0.0059)	(0.0078)	(0.0059)	(0.0032)	(0.0036)
CEO_G	−0.0004	−0.0002	0.0026	0.0037	0.0106*	0.0128**
	(0.0148)	(0.0105)	(0.0148)	(0.0099)	(0.0060)	(0.0064)
B_Female	−0.0012***	−0.0002	−0.0014***	−0.0003	−0.0011***	−0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0004)
B_Agediv	0.3750***	0.1274**	0.3834***	0.1412***	0.3902***	0.1151**
	(0.0694)	(0.0512)	(0.0690)	(0.0518)	(0.0698)	(0.0508)
SOE	0.0506***	0.0099*	0.0477***	0.0114*	0.0164*	0.0228***
	(0.0188)	(0.0058)	(0.0185)	(0.0060)	(0.0088)	(0.0084)
B_Ind	0.1157*	0.0899***	0.1428**	0.1078***	0.0253	0.0387
	(0.0598)	(0.0348)	(0.0598)	(0.0368)	(0.0258)	(0.0284)
MGT_Share	0.0022***	−0.0007*	0.0026***	0.0009*	0.0012***	0.0014***
	(0.0004)	(0.0004)	(0.0003)	(0.0005)	(0.0004)	(0.0002)
Firm_Size	−0.0352***	0.0286***	0.0334***	0.0276***	0.0512***	0.0694***
	(0.0058)	(0.0046)	(0.0060)	(0.0044)	(0.0058)	(0.0042)
Profit	0.0188	0.0561**	−0.0073	−0.0437	−0.4846***	−0.4598***
	(0.0478)	(0.0276)	(0.0485)	(0.0289)	(0.0265)	(0.0209)
TAN	0.0088	0.1034	0.0276	0.1040	−0.0709	−0.0498
	(0.0877)	(0.0818)	(0.0893)	(0.0843)	(0.0548)	(0.0383)

(Continues)

TABLE 9 | (Continued)

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
LIQ	0.0086***	−0.0038	0.0079***	0.0040	0.0048**	0.0034**
	(0.0020)	(0.0028)	(0.0018)	(0.0030)	(0.0020)	(0.0014)
GO	0.1492***	−0.0428**	0.1498***	0.0442**	0.0742***	0.0788***
	(0.0306)	(0.0174)	(0.0310)	(0.0182)	(0.0136)	(0.0142)
IMR	−0.0672***	−0.0513***	−0.1074***	−0.0986***	−0.0957***	−0.0875***
	(0.0031)	(0.0050)	(0.0081)	(0.0076)	(0.0070)	(0.0066)
SOA (%)	60.18	64.38	58.26	59.39	50.15	62.21
Observations	16,480	16,480	16,480	16,480	16,480	16,480
Sargan	0.258	0.271	0.430	0.442	0.416	0.422
AR1	0.127	0.120	0.119	0.101	0.115	0.124
AR2	0.239	0.246	0.228	0.241	0.218	0.260

Note: Robust standard errors in parentheses. A detailed description of all variables is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

In this section, we grouped our sample into two sub-samples. We re-run Equation (3) for each group, and Panels A and B of Table 7 report sub-sample results. The state-owned firms' result in Panel A (Models 1 and 2) shows that the CEO_Age is positively and statistically significant. Economically, the findings suggest that a one standard deviation change (increase) in CEO age in state-owned enterprises increases book and market value leverage. Likewise, the moderating role of CEO overconfidence (Models 3 and 4) and CEO tenure (Models 5 and 6) are negative and statistically significant.

For private firms in Panel B, we observe that the impact of CEO_Age is positive and statistically significant for both market and book value leverage (Models 1 and 2). Models 3–6 report a negative but statistically insignificant moderating effect of CEO overconfidence and tenure. These results suggest that CEO age and the moderating effect of CEO overconfidence and CEO tenure are more pronounced in state-owned enterprises.

Theoretically, the findings extend the career concerns theory, arguing that Chinese CEOs are risk-takers as they age. We extend the theory by arguing that while this is hypothetically valid, the institutional settings embedded in private and state-owned enterprises may influence CEO age characteristics regarding financing decisions differently.

4.4.3 | Selection Bias Tests

Even though the fixed effect addresses the unobserved heterogeneity across firms, we used propensity score matching (PSM) estimation to account for sample selection bias. In the first stage of the PSM, the propensity scores are calculated from the logit regression. The dummy of the dependent variable, the CEO-Young, is regressed on the study's control variables. The rationale for the treatment variable is the possibility of observation loss due to the missing information on the demographic variables of a few Chinese CEOs. Following Fernandes et al. (2024), we have used the location of the headquarters of the firms as the CEO origin dummy as one if the CEO is located in an economically developed region and 0 for the CEO located in a less developed economic region. The rationale behind this choice is that the CEOs from economically developed regions are in more stable situations and less likely to make riskier leverage decisions compared to their counterpart in the less developed regions. The firms are matched based on the nearest-neighbouring approach. In the second stage, the poorly matched firms are eliminated based on the calliper value of 0.05 of the standard deviation of the propensity scores. The PSM second stage results reported in Table 8 support this study's hypotheses as the findings are more pronounced after removing the poorly matched firms.

We also run the difference-in-difference (DID) estimation, following Qiu and Cheng (2022). The deleveraging is the treatment dummy. It was taken as the 1 for the sample year 2016, as at the end of 2015, China's Central Economic Work Conference decided to deleverage its economy by announcing a deleveraging campaign, which was 0 otherwise. The untabulated findings indicate that CEO age still has a positive relationship, and the interaction of CEO age with the treatment has a negative significant relationship, which shows this policy impact of the reduction in leverage.

TABLE 10 | Short-term versus long-term liabilities.

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LR-LEV**	**SR-LEV**	**LR-LEV**	**SR-LEV**	**LR-LEV**	**SR-LEV**
LR-LEV	0.2364***		0.4877***		0.4982***	
	(0.0162)		(0.0245)		(0.0214)	
SR-LEV		0.1512***		0.2177***		0.2224***
		(0.0196)		(0.0206)		(0.0160)
CEO_Age	0.0198***	0.0216***	0.0403***	0.0409***	0.0324***	0.0294***
	(0.0010)	(0.0014)	(0.0052)	(0.0061)	(0.0042)	(0.0040)
CEO_OC			−0.0310***	−0.0292***		
			(0.0054)	(0.0052)		
CEO_Age×CEO_OC			−0.0396***	−0.0401***		
			(0.0009)	(0.0060)		
CEO_Ten					−0.0233***	−0.0184***
					(0.0068)	(0.0046)
CEO_Age×CEO_Ten					−0.0296***	−0.0318***
					(0.0064)	(0.0024)
CEO_Chair	−0.0007	−0.0010	0.0046*	0.0043*	0.0006	0.0005
	(0.0041)	(0.0041)	(0.0025)	(0.0023)	(0.0016)	(0.0018)
CEO_G	0.0158**	0.0194*	0.0034	0.0032	0.0012	0.0011
	(0.0081)	(0.0101)	(0.0048)	(0.0042)	(0.0032)	(0.0030)
B_Female	0.0001	0.0001	0.0001	−0.0004	0.0001	−0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
B_Agediv	−0.0901***	−0.0475	−0.0782**	0.0406	−0.0719***	0.0549
	(0.0217)	(0.0443)	(0.0313)	(0.0448)	(0.0269)	(0.0501)
SOE	−0.0158	−0.0121*	0.0056**	0.0103***	0.0112***	0.0098***
	(0.0097)	(0.0073)	(0.0024)	(0.0024)	(0.0020)	(0.0020)
B_Ind	−0.0104	−0.0060	0.0492***	0.0552***	0.0019	0.0018
	(0.0318)	(0.0323)	(0.0184)	(0.0182)	(0.0138)	(0.0136)
MGT_Share	0.0006***	0.0005***	0.0390***	0.0342***	0.0172***	0.0118**
	(0.0002)	(0.0001)	(0.0055)	(0.0055)	(0.0040)	(0.0040)
Firm_Size	0.0167***	0.0155***	0.0384***	0.0272***	0.0278***	0.0284***
	(0.0031)	(0.0041)	(0.0076)	(0.0074)	(0.0012)	(0.0010)
Profit	−0.1718***	−0.1738***	−0.0915*	−0.1156**	−0.1903***	−0.1432***
	(0.0279)	(0.0277)	(0.0512)	(0.0508)	(0.0364)	(0.0378)
TAN	0.0696	0.0855	0.2590***	0.2568***	0.1614***	0.1658***
	(0.0462)	(0.0572)	(0.0206)	(0.0210)	(0.0212)	(0.0170)

(Continues)

TABLE 10 | (Continued)

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LR-LEV**	**SR-LEV**	**LR-LEV**	**SR-LEV**	**LR-LEV**	**SR-LEV**
LIQ	0.0025***	0.0026***	0.0256***	0.0266***	0.0032***	0.0028***
	(0.0008)	(0.0006)	(0.0006)	(0.0005)	(0.0003)	(0.0004)
GO	0.0128	0.0148	0.1772***	0.1663***	0.1310***	0.1446***
	(0.0162)	(0.0176)	(0.0184)	(0.0179)	(0.0140)	(0.0138)
SOA (%)	66.28	71.20	49.92	64.37	48.07	66.21
Observations	16,480	16,480	16,480	16,480	16,480	16,480
Sargan	0.293	0.287	0.296	0.289	0.299	0.335
AR1	0.132	0.143	0.126	0.119	0.117	0.122
AR2	0.201	0.223	0.240	0.227	0.199	0.247

Note: LT_LEV and ST_LEV are the long-term and short-leverage dependent variables, respectively. Robust standard errors are in parentheses. The rest of the variables detailed description is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

4.5 | Endogeneity Test Using Heckman-Two Stage Model

We employed the Heckman two-stage model to address the endogeneity issues. In the first stage of the Heckman model, the young CEO dummy is regressed on the control variables of the study. We also included CEO origin dummy as the instrumental variable for the estimation of the inverse mills' ratio (IMR). As discussed earlier, the rationale for the treatment variable is the possibility of observation loss due to the missing information on the demographic variables of a few Chinese CEOs. Following Fernandes et al. (2024), we have used the location of the headquarters of the firms as the CEO origin dummy as one if the CEO is located in an economically developed region and 0 for the CEO located in a less developed economic region. Further, we use this IMR as additional control in our primary model in the second stage. The results reported in Table 9 are quantitatively similar, thus continuing to support the baseline results.

4.6 | Additional Analysis

In this section, we provide three further sensitivity tests, including long-term versus short-term debt, step-by-step sub-sample exclusion, and non-linear tests, to check the robustness of our baseline results and provide insightful findings.

4.6.1 | Long-Term Versus Short-Term Debt

We believe that the decompositional analysis will help us examine the impact of CEO age on leverage. We examine this by replacing the LEV_MK and LEV_BK with long-run and short-run leverage. The results in Table 10 continue to support the baseline results. Importantly, these results show that the CEO age and the moderating effect on CEO overconfidence and CEO tenure have a similar effect on long-term and short-term liability as they would on overall corporate leverage.

4.6.2 | Step-By-Step Industrial Analysis

As shown in Appendix 2, the manufacturing (30.4%), extractive (12.0%), and energy (11.0%) industries represent a significant size in our sample. Thus, in line with existing studies such as Fulgence et al. (2023), there is concern that this industry may have driven our results. We further excluded manufacturing industries from our sample to address this concern and re-ran the main regressions. The results in Table 11 are quantitatively similar and thus continue to support the baseline results.

We further excluded second and third in ranking from our sample, each at a time; the untabulated results are quantitatively identical, hence continuing to support our baseline results. Our sample covers a period from 2009 to 2021, including COVID-19. Thus, we are concerned that this period might impact our baseline results. As such, we further excluded 2019–2020, and untabulated results remain quantitatively identical. Thus, we can confirm that COVID-19 has no impact on the choice of capital structure dynamics based on the CEO's Age. Finally, we excluded both the global financial crisis period (2007–2008) and the COVID-19 period (2019–2020), and again, the untabulated results are quantitatively identical, thus continuing to support our baseline findings.

TABLE 11 | Industry effect.

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
L.LEV_MK	0.3682***		0.4840***		0.2520***	
	(0.0204)		(0.0145)		(0.0216)	
L.LEV_BK		0.2590***		0.3676***		0.3597***
		(0.0226)		(0.0215)		(0.0190)
CEO_Age	0.0368***	0.0342**	0.0527***	0.0340**	0.0792***	0.0736***
	(0.0098)	(0.0115)	(0.0090)	(0.0149)	(0.0283)	(0.0272)
CEO_OC			−0.0814***	−0.0796***		
			(0.0124)	(0.0146)		
CEO_Age×CEO_OC			−0.1068***	−0.0935***		
			(0.0268)	(0.0260)		
CEO_Ten					−0.1288**	−0.1016***
					(0.0585)	(0.0076)
CEO_Age×CEO_Ten					−0.0952***	−0.0854***
					(0.0070)	(0.0060)
CEO_Chair	0.0013	0.0017	0.0006	0.0002	0.0016	−0.0012
	(0.0084)	(0.0050)	(0.0078)	(0.0034)	(0.0056)	(0.0030)
CEO_G	0.0048	0.0080	0.0062	0.0096	0.0098	0.0113**
	(0.0136)	(0.0060)	(0.0132)	(0.0058)	(0.0062)	(0.0053)
Ftmt_w	−0.0010**	−0.0001	−0.0009**	0.0004	−0.0009**	−0.0001
	(0.0004)	(0.0004)	(0.0004)	(0.0002)	(0.0004)	(0.0004)
Logagetmt_w	0.2065**	0.1067*	0.2111**	−0.0305	0.2547***	0.1126**
	(0.0849)	(0.0567)	(0.0845)	(0.0433)	(0.0860)	(0.0571)
SOE	0.0465**	0.0149***	0.0432**	0.0400***	0.0202***	0.0124***
	(0.0217)	(0.0054)	(0.0180)	(0.0040)	(0.0036)	(0.0032)
B_Ind	0.1278**	0.0704**	0.1292**	0.0797**	0.0304	0.0375
	(0.0590)	(0.0327)	(0.0600)	(0.0384)	(0.0245)	(0.0258)
MGT_Share	0.0020***	0.0005*	0.0018***	0.0011***	0.0007*	0.0013***
	(0.0004)	(0.0003)	(0.0003)	(0.0002)	(0.0004)	(0.0004)
Firm_Size	0.0352***	0.0250***	0.0734***	0.0578***	0.0338***	0.0235***
	(0.0056)	(0.0040)	(0.0040)	(0.0052)	(0.0054)	(0.0036)
Profit	0.0318	0.0382	0.0378	−0.5141***	0.0408	0.4714***
	(0.0504)	(0.0294)	(0.0464)	(0.0342)	(0.0312)	(0.0218)
TAN	0.1222	0.1472	0.1432	0.0728	0.1466	0.0553
	(0.0864)	(0.0942)	(0.0892)	(0.0598)	(0.0961)	(0.0409)

(Continues)

TABLE 11 | (Continued)

	Direct models		Moderation analysis			
			CEO overconfidence		CEO tenure	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**	**LEV_MK**	**LEV_BK**
LIQ	0.0258***	0.0242***	0.0330**	0.0278***	0.0250***	0.0101***
	(0.0012)	(0.0006)	(0.0140)	(0.0017)	(0.0006)	(0.0016)
GO	0.1132***	0.0828***	0.1118***	0.0842***	0.0740***	0.0412***
	(0.0291)	(0.0124)	(0.0298)	(0.0130)	(0.0132)	(0.0150)
SOA (%)	69.77	65.51	51.40	64.39	58.62	53.60
Observations	10,936	10,936	10,936	10,936	10,936	10,936
Sargan	0.428	0.374	0.386	0.340	0.324	0.339
AR1	0.109	0.126	0.104	0.143	0.102	0.118
AR2	0.262	0.291	0.245	0.253	0.272	0.271

Note: Robust standard errors in parentheses. A detailed description of all variables is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

4.6.3 | Non-Linearity Relationship

We have further tested the non-linear relationship as shown in Table 12. The findings indicate that CEO age has a positive and significant relationship. We also find a concave relationship for CEO age^2. Hence, we further examine the cause of the concave relationship at the 25th, 75th, and 95th percentiles. We find a significant difference at these different quantiles, which are consistent with our main results.

5 | Conclusion

Our study examined the effect of CEO age on the capital structure of Chinese firms. We also investigate the moderating effects of overconfidence and tenure on the relationship between CEO age and capital structure. Using 18,235 firm-year observations from Chinese listed firms, we find a positive and statistically significant relationship between CEO age and leverage in both system GMM and fixed effects regressions. We also show that the speed of leverage adjustment is higher for book leverage than market leverage. Theoretically, our findings align with the upper echelons theory, suggesting that the underlying individual characteristics shape the CEO's capital structure decisions.

We also investigated the moderating effect of overconfidence and tenure on the relationship between CEO age and leverage. Our result provide novel evidence that the CEOs' age-overconfidence and age-tenure relationship have an inverse relationship with leverage. We also show that CEO overconfidence and tenure impact market leverage more than book leverage.

We performed sensitivity analysis by replacing CEO Age with CEO_Young and document an inverse relationship between CEO_Young and our leverage proxies. We also examined whether ownership structure influence the relationship between CEO age and leverage. We document a positive relationship between CEO age and leverage for state-owned firms and private firms. We also confirmed the robustness of our result after employing PSM technique, difference-in-difference (DID) estimation and decomposition analysis.

We add to the existing literature by examining the impact of CEO age on Chinese firms' capital structure dynamics and the moderating effect of overconfidence and tenure. Our study has several implications. First, it will enable the board of directors to consider the impact of CEO's age when recruiting CEOs. Our study is useful for investors to access the impact of overconfidence and tenure on firms financing policy. It will also help policy makers to Chinese policymakers support younger CEOs by finding ways to alleviate their career concerns.

Despite the novelty of this research, it has some limitations. One of its limitation is that it focuses on historic data of Chinese-listed firms. Also, the positivists research approach used in this study may not explain why CEOs age influences capital structure decision. Future research will benefit from extending the scope of this study by using data from both emerging and developed economies. We also recommend an in-depth interviews with Older (younger) CEOs to gain understanding of how age influence their capital structure decisions.

TABLE 12 | Non-linearity relationship.

	GMM models		GMM models		
	Model (1)	Model (2)	Model (3, Q25)	Model (4, Q50)	Model (4, Q95)
Variables	LEV_MK	LEV_BK	LEV_MK	LEV_MK	LEV_MK
L.LEV_MK	0.3598***		0.2793***	0.2942***	0.3462***
	(0.0190)		(0.0256)	(0.0199)	(0.0223)
L.LEV_BK		0.2573***			
		(0.0214)			
CEO_Age	0.0954**	0.0832**	−0.0714	−0.7096*	0.9009*
	(0.0423)	(0.0409)	(0.3159)	(0.3943)	(0.5221)
CEO_Age^2	−0.7356**	−0.6445**	0.0067	0.0937*	−0.1199*
	(0.3248)	(0.3144)	(0.0410)	(0.0513)	(0.0674)
CEO_Chair	0.0137***	0.0133***	0.0065**	−0.0085***	0.0051
	(0.0028)	(0.0027)	(0.0031)	(0.0031)	(0.0047)
CEO_G	0.0036	0.0010	0.0106**	0.0026	0.0078
	(0.0046)	(0.0046)	(0.0053)	(0.0064)	(0.0088)
B_Fmale	−0.0002	−0.0001	−0.0001	−0.0000	−0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
B_Agediv	0.0398*	0.0411*	−0.1251***	−0.2942***	−0.2950***
	(0.0228)	(0.0215)	(0.0260)	(0.0261)	(0.0416)
SOE	0.0134***	0.0119***	0.0207***	0.0391***	0.0510***
	(0.0026)	(0.0025)	(0.0032)	(0.0039)	(0.0048)
B_Ind	0.0562***	0.0511**	−0.0383*	−0.0154	0.0065
	(0.0212)	(0.0203)	(0.0220)	(0.0297)	(0.0403)
MGT_Share	0.0003***	0.0003***	0.0002***	−0.0001	−0.0007***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Firm_Size	0.0313***	0.0307***	0.0361***	0.0449***	0.0369***
	(0.0014)	(0.0013)	(0.0017)	(0.0017)	(0.0024)
Profit	0.2112***	0.1999***	−0.6681***	−1.3017***	−1.3636***
	(0.0288)	(0.0278)	(0.0313)	(0.0362)	(0.0423)
TAN	0.0163	0.0126	−0.3733***	−0.2291***	−0.1297***
	(0.0185)	(0.0177)	(0.0349)	(0.0332)	(0.0463)
LIQ	0.0378***	0.0405***	−0.0537***	−0.0376***	−0.0310***
	(0.0013)	(0.0012)	(0.0018)	(0.0014)	(0.0008)
GO	0.0325*	0.0289	0.2793***	0.3462***	0.2897***
	(0.0185)	(0.0179)	(0.0219)	(0.0272)	(0.0407)
SOA (%)	69.77	65.51	69.77	65.51	69.77
Observations	10,936	10,936	2734	5468	10,389
Sargan	0.428	0.374	0.327	0.331	0.406
AR1	0.109	0.126	0.133	0.118	0.123
AR2	0.262	0.291	0.281	0.272	0.290

Note: Robust standard errors in parentheses. A detailed description of all variables is given in Appendix 1.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study will be made available if requested by the journal.

References

Aktas, N., C. Louca, and D. Petmezas. 2019. "CEO Overconfidence and the Value of Corporate Cash Holdings." *Journal of Corporate Finance* 54: 85–106.

Andreou, P. C., C. Louca, and A. P. Petrou. 2017. "CEO Age and Stock Price Crash Risk." *Review of Finance* 21, no. 3: 1287–1325.

Arellano, M., and S. Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58, no. 2: 277–297.

Barkema, H., and J. Pennings. 1998. "Top Management Pay: Impact of Power and Influence." *Organization Studies* 19, no. 6: 975–1004.

Belenzon, S., A. Shamshur, and R. Zarutskie. 2019. "CEO's Age and the Performance of Closely Held Firms." *Strategic Management Journal* 40, no. 6: 917–944.

Berger, P. G., E. Ofek, and D. L. Yermack. 1997. "Managerial Entrenchment and Capital Structure Decisions." *Journal of Finance* 52, no. 4: 1411–1438.

Bertrand, M., and S. Mullainathan. 2003. "Enjoying the Quiet Life? Corporate Governance and Managerial Preferences." *Journal of Political Economy* 111, no. 5: 1043–1075.

Bertrand, M., and A. Schoar. 2003. "Managing With Style: The Effect of Managers on Firm Policies." *Quarterly Journal of Economics* 118, no. 4: 1169–1208.

Bhagat, S., B. Bolton, and A. Subramanian. 2011. "Manager Characteristics and Capital Structure: Theory and Evidence." *Journal of Financial and Quantitative Analysis* 46, no. 6: 1581–1627.

Billett, M. T., and Y. Qian. 2008. "Are Overconfident CEOs Born or Made? Evidence of Self-Attribution Bias From Frequent Acquirers." *Management Science* 54, no. 6: 1037–1051.

Bond, S. R. 2002. "Dynamic Panel Data Models: A Guide to Micro Data Methods and Practice." *Portuguese economic journal* 1: 141–162.

Booth, L., V. Aivazian, A. Demirguc-Kunt, and V. Maksimovic. 2001. "Capital Structures in Developing Countries." *Journal of Finance* 56, no. 1: 87–130.

Bradley, M., G. A. Jarrell, and E. H. Kim. 1984. "On the Existence of an Optimal Capital Structure: Theory and Evidence." *Journal of Finance* 39, no. 3: 857–878.

Brickley, J. A., J. S. Linck, and J. L. Coles. 1999. "What Happens to CEOs After They Retire? New Evidence on Career Concerns, Horizon Problems, and CEO Incentives." *Journal of Financial Economics* 52, no. 3: 341–377.

Céspedes, J., M. González, and C. A. Molina. 2010. "Ownership and Capital Structure in Latin America." *Journal of Business Research* 63, no. 3: 248–254.

Chen, J. J. 2004. "Determinants of Capital Structure of Chinese-Listed Companies." *Journal of Business Research* 57, no. 12: 1341–1351.

Chen, S., Z. Sun, S. Tang, and D. Wu. 2011. "Government Intervention and Investment Efficiency: Evidence From China." *Journal of Corporate Finance* 17, no. 2: 259–271.

Chevalier, J., and G. Ellison. 1999. "Career Concerns of Mutual Fund Managers." *Quarterly Journal of Economics* 114, no. 2: 389–432.

Child, J. 1972. "Organizational Structure, Environment and Performance: The Role of Strategic Choice." *Sociology* 6, no. 1: 1–22.

Chizema, A., X. Liu, J. Lu, and L. Gao. 2015. "Politically Connected Boards and Top Executive Pay in Chinese Listed Firms." *Strategic Management Journal* 36, no. 6: 890–906.

Coles, J. L., N. D. Daniel, and L. Naveen. 2006. "Managerial Incentives and Risk-Taking." *Journal of Financial Economics* 79, no. 2: 431–468.

Cronqvist, H., A. K. Makhija, and S. E. Yonker. 2012. "Behavioral Consistency in Corporate Finance: CEO Personal and Corporate Leverage." *Journal of Financial Economics* 103, no. 1: 20–40.

Deshmukh, S., A. M. Goel, and K. M. Howe. 2021. "Do CEO Beliefs Affect Corporate Cash Holdings?" *Journal of Corporate Finance* 67: 101886.

Dikolli, S. S., W. J. Mayew, and D. Nanda. 2014. "CEO Tenure and the Performance-Turnover Relation." *Review of Accounting Studies* 19: 281–327.

Duong, K. T., C. Banti, and N. Instefjord. 2021. "Managerial Conservatism and Corporate Policies." *Journal of Corporate Finance* 68: 101973. https://doi.org/10.1016/j.jcorpfin.2021.101973.

Edmans, A., and Q. Liu. 2011. "Inside Debt." *Review of Finance* 15, no. 1: 75–102.

Ezeani, E., F. Kwabi, R. Salem, M. Usman, R. M. H. Alqatamin, and P. Kostov. 2023. "Corporate Board and Dynamics of Capital Structure: Evidence From UK, France and Germany." *International Journal of Finance and Economics* 28, no. 3: 3281–3298.

Ezeani, E., R. Salem, F. Kwabi, K. Boutaine, and B. Komal. 2022. "Board Monitoring and Capital Structure Dynamics: Evidence From Bank-Based Economies." *Review of Quantitative Finance and Accounting* 58, no. 2: 473–498.

Ezeani, E., R. I. A. Salem, M. Usman, and F. Kwabi. 2023. "Board Characteristics and Corporate Cash Holding: Evidence From the UK, France and Germany." *International Journal of Accounting and Information Management* 31: 413–439.

Faccio, M., M.-T. Marchica, and R. Mura. 2016. "CEO Gender, Corporate Risk-Taking, and the Efficiency of Capital Allocation." *Journal of Corporate Finance* 39: 193–209.

Fama, E. F. 1980. "Agency Problems and the Theory of the Firm." *Journal of Political Economy* 88, no. 2: 288–307.

Farag, H., and C. Mallin. 2018. "The Influence of CEO Demographic Characteristics on Corporate Risk-Taking: Evidence From Chinese IPOs." *European Journal of Finance* 24, no. 16: 1528–1551.

Fernandes, F. D. S., G. Sermpinis, C. Stasinakis, and Y. Zhao. 2024. "Corporate Social Responsibility and Firm Survival: Evidence From Chinese Listed Firms." *British Journal of Management* 35, no. 2: 1014–1039.

Fischer, E. O., R. Heinkel, and J. Zechner. 1989. "Dynamic Capital Structure Choice: Theory and Tests." *Journal of Finance* 44, no. 1: 19–40.

Friend, I., and L. H. Lang. 1988. "An Empirical Test of the Impact of Managerial Self-Interest on Corporate Capital Structure." *Journal of Finance* 43, no. 2: 271–281.

Friedrich, R. J. 1982. "In Defense of Multiplicative Terms in Multiple Regression Equations." *American Journal of Political Science*: 797–833.

Fulgence, S., F. Kwabi, A. Boateng, W. Hu, and K. Paudyal. 2023. "Cross-Country Analysis of the Effects of Political Uncertainty on Stock Price Informativeness." *Journal of International Financial Markets, Institutions and Money* 88: 101829.

Fung, J. K., and D. Pecha. 2019. "The Efficiency of Compensation Contracting in China: Do Better CEOs Get Better Paid?" *Review of Quantitative Finance and Accounting* 53, no. 3: 749–772.

Galasso, A., and T. S. Simcoe. 2011. "CEO Overconfidence and Innovation." *Management Science* 57, no. 8: 1469–1484.

García, C. J., and B. Herrero. 2021. "Female Directors, Capital Structure, and Financial Distress." *Journal of Business Research* 136: 592–601.

García-Meca, E., M.-C. Ramón-Llorens, and J. Martínez-Ferrero. 2021. "Are Narcissistic CEOs More Tax Aggressive? The Moderating Role of Internal Audit Committees." *Journal of Business Research* 129: 223–235.

Gibbons, R., and K. J. Murphy. 1992. "Optimal Incentive Contracts in the Presence of Career Concerns: Theory and Evidence." *Journal of Political Economy* 100, no. 3: 468–505.

Goergen, M., P. Limbach, and M. Scholz. 2015. "Mind the Gap: The Age Dissimilarity Between the Chair and the CEO." *Journal of Corporate Finance* 35: 136–158.

Goldstein, R., N. Ju, and H. Leland. 2001. "An EBIT-Based Model of Dynamic Capital Structure." *Journal of Business* 74, no. 4: 483–512.

Gormley, T. A., and D. A. Matsa. 2016. "Playing It Safe? Managerial Preferences, Risk, and Agency Conflicts." *Journal of Financial Economics* 122, no. 3: 431–455.

Greiner, M., J. Kim, and J. C. Thor. 2023. "Narcissistic CEOs and Their Corporate Political Activity." *Journal of Business Research* 163: 113930.

Hackbarth, D. 2008. "Managerial Traits and Capital Structure Decisions." *Journal of Financial and Quantitative Analysis* 43, no. 4: 843–881.

Hackbarth, D., C. A. Hennessy, and H. E. Leland. 2007. "Can the Trade-Off Theory Explain Debt Structure?" *Review of Financial Studies* 20, no. 5: 1389–1428.

Hair, J., R. Anderson, R. Tatham, and W. Black. 1995. *Multivariate Data Analysis With Readings*. Upper Saddle River, NJ: R Prentice-Hall.

Hambrick, D. C. 2007. *Upper Echelons Theory: An Update*. Vol. 32, 334–343. New York: Academy of Management Briarcliff Manor.

Hambrick, D. C., and P. A. Mason. 1984. "Upper Echelons: The Organization as a Reflection of Its Top Managers." *Academy of Management Review* 9, no. 2: 193–206.

Hirshleifer, D., and A. V. Thakor. 1992. "Managerial Conservatism, Project Choice, and Debt." *Review of Financial Studies* 5, no. 3: 437–470.

Holmes, R. M., P. Bromiley, C. E. Devers, T. R. Holcomb, and J. B. McGuire. 2011. "Management Theory Applications of Prospect Theory: Accomplishments, Challenges, and Opportunities." *Journal of Management* 37, no. 4: 1069–1107.

Hong, H., J. D. Kubik, and A. Solomon. 2000. "Security Analysts' Career Concerns and Herding of Earnings Forecasts." *RAND Journal of Economics* 31: 121–144.

James, H. L., B. W. Benson, and J. C. Park. 2020. "CEO Fixed Effects and Inside Debt Compensation." *Journal of Business Research* 117: 71–86.

Jensen, M. C. 1986. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers." *American Economic Review* 76, no. 2: 323–329.

Jensen, M. C., and W. H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3, no. 4: 305–360.

Jiang, G., C. M. Lee, and H. Yue. 2010. "Tunneling Through Intercorporate Loans: The China Experience." *Journal of Financial Economics* 98, no. 1: 1–20.

Jiraporn, P., P. Chintrakarn, and Y. Liu. 2012. "Capital Structure, CEO Dominance, and Corporate Performance." *Journal of Financial Services Research* 42: 139–158.

Kato, T., and C. Long. 2006. "Executive Turnover and Firm Performance in China." *American Economic Review* 96, no. 2: 363–367.

Kieschnick, R., and R. Moussawi. 2018. "Firm Age, Corporate Governance, and Capital Structure Choices." *Journal of Corporate Finance* 48: 597–614.

Kim, K., S. Patro, and R. Pereira. 2017. "Option Incentives, Leverage, and Risk-Taking." *Journal of Corporate Finance* 43: 1–18.

Komal, B., E. Ezeani, A. Shahzad, M. Usman, and J. Sun. 2021. "Age Diversity of Audit Committee Financial Experts, Ownership Structure and Earnings Management: Evidence From China." *International Journal of Finance and Economics* 28, no. 3: 2664–2682.

Komal, B., E. Ezeani, M. Usman, F. Kwabi, A. Abbas, and C. Ye. 2023. "Do the Educational Profile, Gender, and Professional Experience of Audit Committee Financial Experts Improve Financial Reporting Quality?" *Journal of International Accounting, Auditing and Taxation* 53: 100580.

Kovalchik, S., C. F. Camerer, D. M. Grether, C. R. Plott, and J. M. Allman. 2005. "Aging and Decision Making: A Comparison Between Neurologically Healthy Elderly and Young Individuals." *Journal of Economic Behavior & Organization* 58, no. 1: 79–94.

Kraus, A., and R. H. Litzenberger. 1973. "A State-Preference Model of Optimal Financial Leverage." *Journal of Finance* 28, no. 4: 911–922.

Leland, H. E., and D. H. Pyle. 1977. "Informational Asymmetries, Financial Structure, and Financial Intermediation." *Journal of Finance* 32, no. 2: 371–387.

Li, J., and Y. I. Tang. 2010. "CEO Hubris and Firm Risk Taking in China: The Moderating Role of Managerial Discretion." *Academy of Management Journal* 53, no. 1: 45–68.

Li, W., and R. Zhang. 2010. "Corporate Social Responsibility, Ownership Structure, and Political Interference: Evidence From China." *Journal of Business Ethics* 96: 631–645.

Li, X., A. Low, and A. K. Makhija. 2017. "Career Concerns and the Busy Life of the Young CEO." *Journal of Corporate Finance* 47: 88–109.

Li, Y. x., and C. He. 2023. "Board Diversity and Corporate Innovation: Evidence From Chinese Listed Firms." *International Journal of Finance and Economics* 28, no. 1: 1092–1115.

Liu, Y., D. C. Mauer, and Y. Zhang. 2014. "Firm Cash Holdings and CEO Inside Debt." *Journal of Banking & Finance* 42: 83–100.

Malmendier, U., and G. Tate. 2005. "CEO Overconfidence and Corporate Investment." *Journal of Finance* 60, no. 6: 2661–2700.

Malmendier, U., G. Tate, and J. Yan. 2011. "Overconfidence and Early-Life Experiences: The Effect of Managerial Traits on Corporate Financial Policies." *Journal of Finance* 66, no. 5: 1687–1733.

Modigliani, F., and M. H. Miller. 1958. "The Cost of Capital, Corporation Finance and the Theory of Investment." *American Economic Review* 48, no. 3: 261–297.

Myers, S. C., and N. S. Majluf. 1984. "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have." *Journal of Financial Economics* 13, no. 2: 187–221.

Opler, T., L. Pinkowitz, R. Stulz, and R. Williamson. 1999. "The Determinants and Implications of Corporate Cash Holdings." *Journal of Financial Economics* 52, no. 1: 3–46.

Owusu, A., F. Kwabi, E. Ezeani, and R. Owusu-Mensah. 2022. "CEO Tenure and Cost of Debt." *Review of Quantitative Finance and Accounting* 59, no. 2: 507–544.

Öztekin, Ö., and M. J. Flannery. 2012. "Institutional Determinants of Capital Structure Adjustment Speeds." *Journal of Financial Economics* 103, no. 1: 88–112.

Prendergast, C., and L. Stole. 1996. "Impetuous Youngsters and Jaded Old-Timers: Acquiring a Reputation for Learning." *Journal of Political Economy* 104, no. 6: 1105–1134.

Qi, B., J. W. Lin, G. Tian, and H. C. X. Lewis. 2018. "The Impact of Top Management Team Characteristics on the Choice of Earnings

Management Strategies: Evidence From China." *Accounting Horizons* 32, no. 1: 143–164.

Qiu, B., and B. Cheng. 2022. "Is a Deleveraging Policy Effective? Evidence From China." *International Review of Economics and Finance* 77: 471–480. https://doi.org/10.1016/j.iref.2021.10.015.

Rajan, R. G., and L. Zingales. 1995. "What Do We Know About Capital Structure? Some Evidence From International Data." *Journal of Finance* 50, no. 5: 1421–1460.

Roll, R. 1986. "The Hubris Hypothesis of Corporate Takeovers." *Journal of Business* 59: 197–216.

Schopohl, L., A. Urquhart, and H. Zhang. 2021. "Female CFOs, Leverage and the Moderating Role of Board Diversity and CEO Power." *Journal of Corporate Finance* 71: 101858.

Serfling, M. A. 2014. "CEO Age and the Riskiness of Corporate Policies." *Journal of Corporate Finance* 25: 251–273.

Strebulaev, I. A. 2007. "Do Tests of Capital Structure Theory Mean What They Say?" *Journal of Finance* 62, no. 4: 1747–1787.

Talavera, O., S. Yin, and M. Zhang. 2018. "Age Diversity, Directors' Personal Values, and Bank Performance." *International Review of Financial Analysis* 55: 60–79.

Talavera, O., S. Yin, and M. Zhang. 2021. "Tournament Incentives, Age Diversity and Firm Performance." *Journal of Empirical Finance* 61: 139–162.

Tan, D., B. Komal, E. Ezeani, M. Usman, and R. Salem. 2022. "Carbon Emission Disclosures and Financial Reporting Quality: Does Ownership Structure and Economic Development Matter?" *Environmental Science & Policy* 137: 109–119.

Titman, S., and R. Wessels. 1988. "The Determinants of Capital Structure Choice." *Journal of Finance* 43, no. 1: 1–19.

Usman, M., J. Nwachukwu, and E. Ezeani. 2022. "The Impact of Board Characteristics on the Extent of Earnings Management: Conditional Evidence From Quantile Regressions." *International Journal of Accounting and Information Management* 30, no. 5: 600–616.

Usman, M., R. Salem, and E. Ezeani. 2022. "The Impact of Board Characteristics on Classification Shifting: Evidence From Germany." *International Journal of Accounting and Information Management* 30, no. 5: 565–582.

Wang, G., R. M. Holmes Jr., I. S. Oh, and W. Zhu. 2016. "Do CEOs Matter to Firm Strategic Actions and Firm Performance? A Meta-Analytic Investigation Based on Upper Echelons Theory." *Personnel Psychology* 69, no. 4: 775–862.

Wawro, G. 2002. "Estimating Dynamic Panel Data Models in Political Science." *Political Analysis* 10, no. 1: 25–48.

Wei, J., Z. Ouyang, and H. A. Chen. 2018. "CEO Characteristics and Corporate Philanthropic Giving in an Emerging Market: The Case of China." *Journal of Business Research* 87: 1–11.

Weinstein, N. D. 1980. "Unrealistic Optimism About Future Life Events." *Journal of Personality and Social Psychology* 39, no. 5: 806–820.

Yim, S. 2013. "The Acquisitiveness of Youth: CEO Age and Acquisition Behavior." *Journal of Financial Economics* 108, no. 1: 250–273.

Zhang, C., and L. Luo. 2021. "Board Diversity and Risk-Taking of Family Firms: Evidence From China." *International Entrepreneurship and Management Journal* 17, no. 4: 1569–1590.

Zhang, T., S. Sabherwal, N. Jayaraman, and S. P. Ferris. 2016. "The Young and the Restless: A Study of Age and Acquisition Propensity of CEOs of UK Firms." *Journal of Business Finance & Accounting* 43, no. 9–10: 1385–1419.

Appendix 1

Variable definitions

Variable type	Variable name	Definition
Dependent variable	LEV_MK (Market leverage)	Market debt-to-capital ratio.
	LEV_BK (Book leverage)	Long-term debt and short-term debt are scaled by total assets.
Independent variables	CEOAge	This variable is the natural log of the CEO's age in years.
	CEOYoung	A dummy variable, taken as 1 if the CEO's age is less than the median age of CEOs, 0 otherwise.
	CEO_OC	CEO overconfidence is measured by relative compensation, a ratio of the top three executives' compensation divided by all managers' compensation.
Moderating variable	CEO_Ten	The number of years served as CEO in a particular firm.
Control variables	CEO_Chair	CEO duality, a dummy variable, is taken as 1 if the CEO is also chairman of the board of directors and 0 otherwise.
	CEO_G	A dummy variable, taken as 1 if the company's CEO is a female, 0 otherwise.
	B_Female	Female proportion in the board of directors.
	B_Agediv	The natural log of the average age of the board of directors.
	SOE	A dummy variable is taken as 1 for state-owned enterprises and 0 for privately-owned enterprises.
	B_Ind	Board independence is measured through the percentage of independent directors in the board.
	MGT_Share	Management shareholding is the proportion of shares held by the managers.
	Firm_Size	Natural log of the total assets.
	Profit	The profitability of the firm is measured through return on assets.
	TAN	Tangible assets scaled by total assets.
	LIQ	Liquidity is measured through the current ratio.
	GO	Growth opportunities are measured through the log of annual change in the revenues of the firm.

Appendix 2

Sampling distribution

Sample	Observations	Percentage
Manufacturing industries	5543	30.4
Extractive industries	2188	12
Energy	2006	11
Construction industry	1824	10
Tourism and hospitality	1641	9
Pharmaceutical industry	1641	9
Service providers	1386	7.6
Agriculture	1094	6
IT industry	912	5
Total	18,235	100