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Zodiac year fate eased by CSR: Fact or fiction?

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ABSTRACT

This study examines the relationship between the Chinese zodiac year of chairpersons and corporate social responsibility (CSR) performance. Drawing on upper echelons and stakeholder theories, we argue that zodiac beliefs may lead chairpersons to prioritise CSR activities during their zodiac year to counteract potential bad luck and mitigate corporate risk. Using 24,418 observations from Chinese listed firms over the period 2010–2020, our empirical analysis reveals a significant and positive effect of chairpersons' zodiac year on CSR performance. We observe that the effect is transient, appearing before and during the zodiac year but diminishing thereafter. Further, our findings show that the zodiac year effect is more pronounced in state-owned enterprises, firms with higher levels of public, environmental and CSR concerns and those with favourable environmental track records. This study extends the application of upper echelons and stakeholder theories by incorporating chairpersons' zodiac year effect.

1. Introduction

The culture in which we live substantially impacts our cognitive processes and behavioural patterns. Superstition, as a pervasive belief system heavily influenced by cultural factors, often operates beyond the boundaries of rational thinking and becomes deeply rooted within societal norms, thereby influencing diverse aspects of human behaviour (Vyse, 2013). Superstition can manifest in various forms, encompassing practices such as numerology, astrology, and other cultural beliefs. For example, fear associated with the number 13 has resulted in the omission of the thirteenth floor in many buildings. Similarly, in Chinese culture, the number eight is regarded as auspicious for prosperity, as demonstrated by the scheduling of the Beijing Summer Olympics opening ceremony on August 8, 2008, precisely at 8:08 p.m. Empirical research has consistently evidenced the influence of superstition in various domains, including financial decision-making (Hirshleifer et al., 2018), housing market activities (He et al., 2020), risk-taking (Fisman et al., 2022), stock price crash risk (Bai et al., 2020), corporate cash holdings (Li et al., 2021), corporate investment efficiency (Teklay et al., 2024; Zeng et al., 2022), and earnings management (Huang et al., 2023).

While these studies offer valuable insights into how superstitious beliefs shape corporate risk-taking behaviour, there is a noticeable lack of academic research investigating how managers' superstitious beliefs affect corporate social responsibility (CSR) performance. This aspect entails conducting acts of kindness to counteract the perceived negative effects of superstitious beliefs, marking a departure from previous studies that mainly concentrate on avoiding these negative effects. The influence of managers' folk cultural beliefs on CSR is crucial, especially considering the discretionary nature of CSR. This includes normative considerations related to social and

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environmental aspects, prompting moral evaluations of what is deemed desirable or valuable (Gond & Moser, 2021; Hemingway & Maclagan, 2004; Shin et al., 2022). Motivated by this literature gap, we aim to examine whether the superstitious beliefs of firm chairpersons regarding bad luck during their zodiac year affect firm CSR performance. If such an impact exists, which stakeholders are most likely to be affected, how long the zodiac year effect persists and whether it depends on firm attributes and public concern?

The Chinese zodiac operates on a 12-year cycle, assigning individuals a specific animal sign based on their lunar year of birth. In Chinese zodiac culture, people in their zodiac year, known as their *Ben Ming Nian*, are believed to encounter more challenges or bad luck, resulting in the designation of this year as the 'Year of the Hurdle'. This longstanding belief has deeply permeated Chinese society for centuries and continues to affect individual behaviour (Fisman et al., 2022). Traditional wisdom suggests that to counteract such bad luck, individuals in their zodiac year should perform good deeds, be kind and generous, and avoid risk-taking.

The correlation between zodiac year superstition and CSR presents several compelling reasons for study. First, it offers valuable insights into the intricate interplay among culture, belief systems and corporate behaviour. Specifically, it sheds light on how superstitious cultural elements influence organisational practices. In addition to the restraining effect of zodiac years (e.g., risk aversion) identified in the existing literature (e.g. Zeng et al., 2022), our study reveals their potential to yield positive outcomes for firms, the environment, customers, communities and employees. Second, examining whether the zodiac year of corporate managers influences CSR performance offers a novel research perspective for predicting CSR performance. The upper echelons theory underscores the substantial influence of managers' attributes on shaping CSR performance (e.g. Borghesi et al., 2014; W. Chen et al., 2019). However, existing literature has predominantly focused on demographic characteristics, such as age, gender and education, overlooking the potential influence of short-term and cyclical factors, particularly objective ones like the zodiac year, on managerial and corporate behaviour. The cyclical and individual-specific nature of zodiac year superstition, recurring every 12 years based on an individual's birth year, sets them apart from more static traditional social norms, such as religious doctrines, making this study particularly relevant. Third, from an empirical analysis perspective, the nature of a zodiac year creates a quasi-random setting that maximises exogeneity. Given that approximately one-twelfth of the population is in their zodiac year in any given year, concerns about unobserved heterogeneity or reverse causality are mitigated (Li et al., 2021). This strengthens the validity of our empirical analysis and adds to the reliability of our research findings. Fourth, CSR is perhaps one of the most interesting avenues to detect whether and how beliefs in zodiac years may alter firm outcomes because of their highly discretionary nature and close alignment to the traditional suggestion for countering bad luck, namely, being kind and minimising risk-taking.

China offers an appealing venue for studying the zodiac year effect on firm behaviour. First, Chinese culture is characterised by a harmony with nature philosophy that promotes respect for the supernatural and acknowledges the influence of superstition. Superstition remains a crucial part of business life in Chinese societies (Tsang, 2004). Zeng et al. (2022) find that senior managers exhibit more conservative and cautious behaviour during their zodiac year. Fisman et al. (2022) discover a decline in investment in research and development (R&D) and corporate acquisitions during a chairperson's zodiac year. Second, the Chinese economy is marked by weak law enforcement, making the role of informal institutions crucial in shaping business practices. Legitimacy theory asserts that the survival and development of a firm are intertwined with the external social environment and cultural climate (Deegan et al., 2002). Specifically, traditional cultures and folk customs, such as zodiac beliefs, can influence the behaviour of individuals and firms. These cultural symbols inevitably manifest in corporate decisions.

Drawing on upper echelons and stakeholder theories, we posit that managers in their zodiac years are particularly prone to superstitious beliefs. This deeply rooted Chinese zodiac culture may influence managers' cognition during this time, prompting them to prioritise CSR activities as a way to counteract perceived negative effects associated with the zodiac year. In addition, the perceived increase in risk during their zodiac year may lead managers to engage their firms in more CSR activities, because CSR as a strategic tool can serve as a form of insurance-like protection for their business, helping to mitigate corporate risk through balancing resource allocation among stakeholders. We focus specifically on chairpersons to measure the zodiac effect, given their prominent role as the highest authority in corporate decision-making within Chinese listed firms (Fisman et al., 2022).

Using data from Chinese listed firms on the Shanghai and Shenzhen stock exchanges spanning the years from 2010 to 2020, we document a significant and positive effect of a chairperson's zodiac year on CSR performance. However, the effect is transient, manifesting one year before the commencement of the zodiac year and fading by its conclusion. The findings indicate that chairpersons demonstrate increased vigilance and proactivity leading up to the onset of the zodiac year, which is reminiscent of the traditional measures taken to ward off misfortune during this period. Moreover, we find that the zodiac year effect causes firms to prioritise their responsibilities to other stakeholders (e.g. employee wellbeing, customer satisfaction, environmental stewardship and broader social responsibility compliance) over their obligations to shareholders (e.g. profit-generating). The findings align well with the zodiac year-related saying that less material goals should prevail during this period.

Furthermore, we find that the zodiac year effect is more pronounced in state-owned enterprises (SOEs), firms that have high levels of public, environmental and CSR concerns, firms that receive government environmental subsidies, those that have a favourable environmental track record (e.g. compliance with emission standards) and firms that have robust environmental and quality management systems (e.g. ISO14001 and ISO9001 certified firms). To test whether CSR performance is influenced by a chairperson's zodiac year and is not a result of spurious correlations with other omitted variables, we employ a series of robustness tests, including a propensity score matching difference-in-differences (PSM-DiD) analysis, alternative measures for the zodiac year effect and placebo tests to address potential endogeneity concerns. Our results remain consistent with the primary findings.

Our findings make several contributions. First, we enrich the existing literature on the determinants of CSR performance. We are the first to find that a chairperson's zodiac year has a noteworthy positive impact on firms' CSR performance. Prior studies have largely focused on demographic traits as predictors of CSR performance while overlooking the potential influence of recessive and periodic features, for example, the zodiac year. Our study addresses this gap by shedding light on the significant role of informal institutions,

specifically, the zodiac year, in predicting CSR performance alongside other formal institutional factors.

Second, this study adds to the literature on the effect of cultural norms, specifically, superstition, on corporate behaviour. Despite the existing body of literature examining the impact of superstition in fields such as psychology and marketing (Darke & Freedman, 1997; Mowen & Carlson, 2003), as well as in corporate decision-making and capital markets (Bai et al., 2020; Hirshleifer et al., 2018; Tsang, 2004), only a handful of studies have directly linked the zodiac year effect to corporate behaviour. Prior studies on executives' zodiac years have centred primarily on areas such as inefficient corporate investments (Zeng et al., 2022), corporate cash holdings (Li et al., 2021) and risk-taking (Fisman et al., 2022). Our study investigates the effects of a chairperson's zodiac year on CSR performance. As mentioned previously, CSR does not only relate to risk reduction, which is the primary focus of existing studies on the zodiac year effect. In fact, CSR aligns closely with recommended good deeds to ward off bad luck.

Our study reveals that superstition can be a driving force for enhancing CSR performance. Unlike the common assumption that senior managers make rational decisions, the psychological literature has suggested that irrational beliefs in luck, good and bad, can significantly impact individual behaviour (Wohl & Enzle, 2002). Therefore, firms must recognise and proactively address the influence of superstition in business practices because it can significantly affect managerial behaviour and subsequently influence business decisions and outcomes. Most importantly, if cultural values persist (as they have for thousands of years), firm stakeholders and regulators may capitalise on the positive outcomes.

Third, our study contributes to the corporate finance literature on the role of leadership in shaping corporate decisions. Upper echelons theory suggests that organisational decisions are heavily influenced by the backgrounds, personalities, and values of the top management team (Hambrick & Mason, 1984). Our study extends the application of this theory by documenting how a recessive cyclical characteristic of senior managers can shape the outcomes of a business.

The remainder of this study proceeds as follows. Section 2 reviews the related literature and then develops the hypothesis. The research design and measurement of variables are described in Section 3. Section 4 presents the empirical results. Further analyses are revealed in Section 5. Section 6 provides additional robustness checks. The conclusion and the implications of the study are summarised in Section 7.

2. Literature review and hypothesis development

2.1. Superstitious beliefs about the zodiac

Superstitious beliefs exhibit specificity, manifesting in different ways across various cultures. For example, in Chinese culture, the colour red is strongly associated with prosperity and good luck. Differently, in New Zealand, the colour black is commonly regarded as the national identity and is often seen as a symbol of pride and loyalty to the country's sports teams. Although superstition is often considered irrational, individuals rely on superstition to hope these beliefs will bring them luck and help them perform better (Kramer & Block, 2008; Tsang, 2004). For example, following a series of subpar performances, Michael Jordan decided to change the number on his basketball uniform in an effort to alter his luck.

Chinese superstitious practices are diverse and deeply ingrained in the culture. These practices may have a broader and deeper influence on individual behaviour than the closely related but different religious beliefs because they are rooted in the fundamental value of living in harmony with nature, which is inherent to Chinese culture (Simmons & Schindler, 2003). Religion, as a cultural symbol, tends to exhibit strong universality (Zeng et al., 2022). However, superstition is a traditional folk custom. Simply put, an individual may not be religious but is superstitious. Chinese zodiac culture dates to the Han dynasty (202 BC–220 AD) and represents a unique regional culture that contributes to the heterogeneous business environment. The Chinese zodiac, also known as '*sheng xiao*', is a centuries-old astrological system rooted in Chinese tradition and is probably one of the earliest and most well-known symbols of China in the rest of the world. It assigns a specific animal sign (e.g. pig, dragon) to each lunar year in a 12-year cycle. In the Chinese zodiac system, the zodiac year refers to the animal year associated with a person's birth, occurring once every 12 years for each individual. This zodiac system follows the Chinese lunar calendar, meaning that a person whose age is a multiple of 12 is said to be in his or her zodiac year. According to Chinese astrology, when people enter their zodiac year, they face challenges and bad luck because they are believed to conflict with Tai Sui, the God of Age. This belief comes from the idea that Tai Sui is a powerful force that affects a person's fortune during his or her zodiac year. To counteract the bad luck of the zodiac year, Chinese astrology suggests wearing red, reducing risk-taking and performing good deeds, such as donating money and blood, participating in volunteer work and engaging in other benevolent acts.

2.2. Superstitions and corporate behaviour

The impact of superstitious beliefs on individual behaviour has been extensively documented in the psychology literature (Darke & Freedman, 1997). Indeed, superstition extends into the corporate world. Although it is limited, evidence suggests that superstitions influence corporate behaviour. In financial markets, numerological superstition is associated with stock prices and returns. Hirshleifer et al. (2018) find that firms in China that go public often choose lucky listing codes (e.g. 6, 8, 9) more frequently than what would be expected by chance and the unlucky listing codes (e.g. 4) are associated with the lowest post-IPO (initial public offering) abnormal stock returns. Bai et al. (2020) demonstrate that Chinese firms with unlucky listing numbers are significantly more likely to experience stock price crashes. Brown et al. (2002) and Brown and Mitchell (2008) show that the daily opening and closing prices cluster at number eight in the Chinese and the Asian Pacific stock markets. Kolb and Rodriguez (1987), using US samples, uncover that the Centre for Research in Security Prices market returns are lower on Friday the thirteenth than on other Fridays. In addition,

numerological beliefs affect market participants in the Taiwan stock market. Bhattacharya et al. (2017) document that individual investors submit disproportionately more limit orders ending in the number eight than the number four. In terms of firm reporting quality, Huang et al. (2023) present compelling evidence that firms reporting lucky earnings-per-share numbers that end with six or eight are more prone to earnings management. In real estate markets, Fortin et al. (2014) and He et al. (2020) investigate the housing markets in Canada and Singapore, two of which have a significant population of Chinese migrants. Their findings reveal that house prices enjoy a premium when the floor or address number is considered lucky. In addition to numerological superstition, prior studies have shown that eclipses correlate with below-average stock returns in the US and Asian stock markets (Lepori, 2009).

Furthermore, being the most relevant to our context, nascent literature investigating zodiac beliefs has emerged in the accounting and finance literature in recent years. It is divided into two distinct themes: one that examines the influence of the zodiac calendar on equity market returns and another that investigates the effect of the zodiac year of senior managers on corporate behaviour. Meisami (2013) pioneers the connection between equity market performance and zodiac signs, showing high returns in the Year of the Rat and low returns in the Year of the Snake in the Hong Kong market from 1964 to 2013. For the US stock market from 1950 to 2013, he finds below-average returns for the Years of the Snake and Rooster. However, Phoeng and Swinkels (2016), using US equity factor returns from 1927 to 2015, suggest that investment strategies that use zodiac signs are unlikely to generate superior returns.

Turning to corporate behaviour, Li et al. (2021) show that Chinese non-SOE chairpersons are influenced by Chinese zodiac beliefs, resulting in increased cash holding in their firms during their zodiac year. Similarly, Fisman et al. (2022) reveal a reduction in risk-taking behaviour in Chinese non-SOEs during the zodiac year of their chairpersons, as reflected in decreased R&D investment and acquisitions. Zeng et al. (2022) report similar findings in their study, indicating that senior managers in their zodiac year inhibit inefficient corporate investment in Chinese listed firms. Additionally, Teklay et al. (2024) find that CEO's zodiac year beliefs curtail risk-taking behaviour, mitigating overinvestment but aggravating underinvestment. Further, Dou et al. (2024) discover that lead engagement auditors' zodiac year beliefs positively affect audit quality. All the evidence consistently demonstrates that zodiac year beliefs can alter individuals' risk perceptions, aligning with a part of the proverb that says an individual should act more conservatively during their zodiac year. Surprisingly, however, there is a dearth of empirical research on the influence of zodiac beliefs on CSR performance, representing the most direct avenue of performing good deeds in a corporate context. Our study endeavours to address this void by examining the relationship between zodiac year and CSR. Our research complements the proverb's other half by addressing the notion of countering bad luck in zodiac years, which is equally significant.[1]

CSR offers a ground for investigating how irrational beliefs, such as zodiac years, affect business behaviour. This is because CSR coincides with the idea of averting the negative effects of the zodiac year through benevolent acts, such as donations, treating others (e.g. employees) better and ethical and honest conduct, all of which can potentially offset perceived bad luck. In addition, CSR can be used as a risk reduction strategy for firms, highlighting its multifaceted benefits. Unlike the aforementioned studies that have focused on the restraining effect of the zodiac year (i.e. a reduction in risk-taking), our study uses a distinct perspective to explore whether folklore can drive positive business outcomes.

2.3. Executives and CSR

Prior studies have extensively documented the positive outcomes that are associated with CSR, such as higher profitability and firm value (Flammer, 2015; Lys et al., 2015), lower cost of capital (Dhaliwal et al., 2011) and improved accuracy of analyst forecasts (Dhaliwal et al., 2012; Muslu et al., 2019). Financial gains are commonly cited as an incentive for firms to engage in CSR activities (Dimson et al., 2015). The burgeoning literature on CSR highlights the significance of corporate executives' heterogeneity in influencing CSR performance. Factors, such as executive demographic characteristics, for example, gender and age (Borghesi et al., 2014; Chen et al., 2019), and psychological traits, such as narcissism (Al-Shammari et al., 2019), materialism (Davidson et al., 2019) and confidence (McCarthy et al., 2017), influence CSR. These studies consistently highlight the influence of dominant characteristics of executives on CSR, leaving a gap in understanding the influence of recessive characteristics, such as a chairperson's zodiac year, which occurs every 12 years, on CSR. Therefore, our study relates to this strand of literature, providing insights into how the zodiac year effect can influence CSR practices. Given that CSR is more discretionary than other corporate decisions, it is better able to capture whether and how executive traits alter corporate outcomes.

2.4. Hypothesis development

We use the theoretical frameworks of upper echelons and stakeholder theories to investigate the association between a chairperson's zodiac year and firm CSR performance. Upper echelons theory posits that the values and cognitive orientation of top managers play a crucial role in shaping organisational decisions because managers possess decision-making authority rather than being mere agents of corporate policy (Hambrick & Mason, 1984). A wealth of empirical evidence substantiates the relevance of upper echelons theory in explaining CSR performance (e.g. Borghesi et al., 2014; Chen et al., 2019; Manner, 2010; Petrenko et al., 2016). According to upper echelons theory, CSR can be a result of managers' values and behaviours, not a reflection of a strategic business choice (Xu & Ma, 2022). Superstitions are a set of beliefs rooted in folk culture that can influence an individual's cognition and perceptions, subsequently shaping their behaviour (Fisman et al., 2022; Huang et al., 2020). Consequently, individuals adhering to superstitious beliefs may

[1] Despite substantial evidence that supports the relationship between religion and CSR performance (e.g. Du et al., 2016; Xu & Ma, 2022), it is important to note that religion and zodiac year culture are distinct, as is highlighted in Section 2.1.

integrate them into their decision-making process, thereby affecting CSR performance. Psychology and sociology studies have established that superstitions can significantly influence people's choices, optimism and attitudes (Darke & Freedman, 1997; Kramer & Block, 2008; Vyse, 1997). We posit that, during the zodiac year, the deeply ingrained Chinese zodiac culture may cause managers to perceive themselves as being at an elevated risk of encountering bad luck. To mitigate this perceived risk of bad luck, managers may engage firms in more CSR activities as they are viewed as virtuous and benevolent actions that generate positive karma and energy, aligning with the Chinese folk custom that 'doing good deeds can dispel misfortune and alleviate bad luck'.

Moreover, stakeholder theory asserts that managers are responsible for acknowledging and addressing the needs of all firm stakeholders and strategically balancing their interests (Freeman, 1984). CSR engagement, as an outcome of stakeholder management, facilitates a more equal and balanced resource allocation towards addressing the needs of investing and non-investing stakeholders (Harjoto & Laksmana, 2018). The authors show that CSR helps curb excessive risk-taking (i.e., over-allocating resources to shareholders) while also reducing excessive risk-avoidance (i.e. over-allocating resources to non-investment stakeholders). Therefore, CSR can serve as a control mechanism to mitigate firm risks, as corroborated by the existing literature (e.g. Filbeck et al., 2022; Harjoto & Laksmana, 2018; Jo & Na, 2012; Lee & Faff, 2009). We, therefore, propose that managers in their zodiac year may utilise CSR as a strategic tool to mitigate their perceived higher risks. This is because CSR can provide firms with 'insurance-like' protection (Godfrey et al., 2009), acting as a countervailing factor that rebalances the allocation of resources among stakeholders (Harjoto & Laksmana, 2018), thereby lowering risk levels. For example, CSR engagement can improve a firm's public image and strengthen its relationships with stakeholders, reducing the risk associated with financing costs (Dhaliwal et al., 2011). Furthermore, CSR can decrease political risk by reducing pollution and waste, enhancing energy efficiency, and ensuring compliance with regulatory standards (Lee & Faff, 2009; Sánchez, 2000). In line with the aforementioned arguments, our primary hypothesis for this study is developed as follows.

Hypothesis 1. A firm's CSR performance increases during the zodiac year of its chairperson.

3. Data and model

3.1. Data and sample

We collect firm CSR data from Hexun (www.hexun.com) and all the other data from the China Stock Market and Accounting Research Database (CSMAR). Hexun CSR data provide a comprehensive source for evaluating CSR performance because they incorporate information from standalone CSR reports and annual reports, mitigating the risk of sample selection bias (Tang et al., 2019). Relying solely on a firm's CSR from either of these sources is cautioned against by Clarkson et al. (2020). In recent years, Hexun CSR has become the primary source of Chinese CSR research in the literature (e.g. Hu & Fang, 2022; Yi et al., 2021; Zhang et al., 2021; Zhao & Xiao, 2019). Further, Hexun publishes data on the five CSR dimensions (the weights towards the composite CSR index in parentheses), including shareholders (30%), employees (15%), suppliers and customers (15%), environment (20%) and society (20%), enabling more insightful analysis. The Hexun CSR index aligns with the social responsibility guidelines of the Shanghai and Shenzhen stock exchanges and is based on an unbiased CSR rating process, making it comparable with other reputable sources, such as the Kinder, Lydenberg, Domini Research & Analytics (also known as KLD) CSR database in the US (Guo & Lu, 2021).

Zodiac year data, demographic information about the corporate chairpersons and firm financial data are obtained from CSMAR. To ensure the accuracy of the zodiac year data, we manually crosscheck it against the RESSET database and web platforms, such as sina.com and cninfo.com.cn. Our sample spans the period from 2010 to 2020, starting from the year that Hexun CSR data were first available. After matching the two databases and excluding ST firms (special treatment firms that face serious financial risks) and firms from the finance industry, we have 24,418 observations for our main analysis. Appendix A defines the variables in detail.

3.2. Empirical model

We estimate the following ordinary least squares regression to test the relationship between the chairperson zodiac effect and firms' CSR performance.

$$\begin{aligned} FirmCSR_t = {} & \delta_0 + \delta_1 Zodiac_t + \delta_2 SIZE_t + \delta_3 ROA_t + \delta_4 LEVERAGE_t + \delta_5 OwnershipCon_t + \delta_6 CEODuality_t + \delta_7 SOE_t + \delta_8 Age_t \\ & + \delta_9 Gender_t + \delta_{10} Education_t + FirmFE + YearFE + \varepsilon_t \end{aligned} \quad (1)$$

where *FirmCSR* captures the firm's CSR performance. *Zodiac* is a dummy variable which is assigned a value of 1 if the firm chairperson is in his or her zodiac year and 0 otherwise. Following the existing literature, our analysis includes a variety of control variables at the firm and chairperson levels. Our firm-level control variables include the following. We first control for firm size (*SIZE*) because larger firms often have more resources to invest in CSR initiatives (Chen & Metcalf, 1980). We then control for firm profitability (*ROA*) because firms with high levels of ROA have greater resources to spend on CSR projects (Waddock & Graves, 1997). Following Roberts (1992), financial resources that a firm may devote to CSR may be constrained if it has a high ratio of debt to assets (*LEVERAGE*). High levels of leverage can also increase financial risk, making firms more vulnerable to external shocks and reducing their commitment to CSR. Ownership concentration (*OwnershipCon*), calculated as the sum of squares of shareholding by the largest shareholder, can affect a firm's ability to raise capital to invest in CSR initiatives (Ullmann, 1985). We also control for the government ownership stake in a firm (*SOE*). A conflict of interest between financial performance and social responsibility might arise when SOEs prioritise attaining political and social goals above maximising profits (Li & Zhang, 2010).

At the chairperson level, the following executive attributes are controlled. Following Adam et al. (2005), we use CEO duality (*CEODuality*) as a proxy to capture CEO power. *CEODuality* is a dummy variable that equals 1 if the CEO also serves as the chairperson of the board of directors and 0 otherwise. An older chairperson can be less receptive to change and innovative ideas, which could impede the adoption of cutting-edge CSR practices. Thus, the chairperson's age (*Age*) is controlled (e.g. Fisman et al., 2022; Li et al., 2021; Zeng et al., 2022). Empirical research evidence shows that firms that have more gender-diverse leadership teams tend to have higher levels of CSR performance (Lewis et al., 2014); therefore, the gender of the chairperson (*Gender*) is controlled. We also control for the chairperson's educational background (*Education*) because a higher level of education can provide a chairperson with a more comprehensive awareness of social and environmental concerns, leading to a higher level of CSR performance. To avoid any potential influence of outliers on our findings and to ensure the reliability of our results, all the continuous variables are winsorized at the 1 % and 99 % levels. Further, the standard errors are clustered at the firm and year levels.

4. Empirical results

4.1. Descriptive statistics

Panel A of Table 1 presents the summary statistics for the variables examined in this study. Our results show that the average *FirmCSR* is 23.88, and has a standard deviation of 15.05, indicating considerable variation in CSR performance across the sample. This result is consistent with findings from previous studies that have used Hexun CSR data (e.g. Zhao & Xiao, 2019). In terms of *Zodiac*, approximately 8.26 % of the chairpersons in our sample are in their zodiac year in a given year, indicating data reliability and sample representativeness, given that on average an individual has 1/12 (8.33 %) chance of being in their zodiac year. The mean statistics for *SIZE* reveal an average value of 9.58, reflecting large differences in firm size. Further, 30 % of the sample firm-year observations are SOEs. In terms of chairperson characteristics, the average age of a chairperson is 52 years. Notably, 95 % of the sample firms have male chairpersons. Our sample has 31 % of firm-year observations involving CEO duality.

Panel B of Table 1 reports the Pearson correlation coefficients for the variables. The results indicate a positive correlation between a firm's CSR performance (*FirmCSR*) and the zodiac year of its chairperson, suggesting that the level of a firm's CSR performance tends to increase when the chairperson is in their zodiac year, which preliminarily supports our hypothesis. In addition, we find that firm size (*SIZE*), profitability (*ROA*) and ownership concentration (*OwnershipCon*) exhibit a positive correlation with CSR performance (*FirmCSR*). However, we observe a negative correlation between firm CSR performance and both firm leverage and CEO duality. Moreover, our results indicate that SOEs are more likely to exhibit better CSR compliance, as evidenced by a positive correlation between *SOE* and *FirmCSR*. These findings are statistically significant at the 1% level, providing confidence in the model's reliability. In addition, the highest correlation value is 0.486 between leverage (*LEVERAGE*) and firm size (*SIZE*), which is well below the threshold of 0.80, mitigating any issues related to multicollinearity.

4.2. Main results

The results of our regression analysis for hypothesis (H1) are presented in Table 2. The first two columns report our results using firm and executive-level controls, respectively, while Column (3) reports the results with all control variables included. Our analysis consistently shows a strong positive relationship between *Zodiac* and *FirmCSR* across all the regression models, with the coefficients of *Zodiac* remaining stable across these specifications. These findings suggest that a firm's CSR performance increases during the zodiac year of the chairperson. The results are not only statistically significant but also hold economic significance. Our baseline results in Column (3) show that firms' CSR performance is 0.431 higher in the chairperson's zodiac year than in the chairperson's non-zodiac year. This economic significance can also be interpreted as a 2 % increase (calculated as 0.431/23.88 following Custódio and Metzger (2014)) in CSR performance during the chairperson's zodiac year compared to the mean. Our results, therefore, support Hypothesis 1, suggesting that chairpersons respond to the threat of bad luck during their zodiac year by increasing CSR performance. Engaging in good deeds, such as CSR, can be perceived as a strategy employed by chairpersons that aligns with stakeholder theory and aims to strengthen relationships with firm stakeholders. This strategic approach helps alleviate the negative effects of bad luck and the increased perceived risk associated with their zodiac year. Our findings indicate that the superstitious beliefs held by senior managers influence CSR, implying that their cognitive foundation and perceptions play a key role in shaping their comprehension of pertinent information. This association resonates with the upper echelons theory, which acknowledges that senior managers often navigate complex internal and external environments when making corporate decisions (Hambrick & Mason, 1984). In this context, the study extends the prior findings related to upper echelons theory beyond the personal traits of senior managers to include their folk cultural beliefs, thereby enhancing both the depth and practical applicability of the theory.

In terms of the control variables, our findings largely confirm those that have been reported in the existing literature, as was discussed in Section 3.2. Our study reveals that firm CSR performance is positively associated with firm size (*SIZE*) and profitability (*ROA*) and negatively related to the chairperson's age and CEO duality. Overall, our regression model has strong predictive power with adjusted R^2 ranging from 48 % to 56 %, and all the F-test results examining the joint significance of all explanatory variables are strongly significant, highlighting the validity of our models. Moreover, the Variance Inflation Factors (VIF) values are 1.27, 1.02 and 1.23 for Columns (1) to (3) of Table 2, respectively. These values are consistently below 10 in all cases, indicating a low likelihood of multicollinearity.

Table 1
Summary statistics and correlation Matrix.

Panel A: Summary Statistics

Variable	*N*	Mean	SD	25 %	Median	75 %	Min	Max
FirmCSR	24,418	23.88	15.05	16.63	21.97	27.17	−3.960	74.35
Zodiac	24,418	0.0826	0.275	0	0	0	0	1
SIZE	24,418	9.579	0.569	9.171	9.491	9.885	8.412	11.75
ROA	24,418	0.0395	0.0670	0.0160	0.0404	0.0703	−0.363	0.205
LEVERAGE	24,418	0.408	0.208	0.239	0.396	0.561	0.0491	0.875
OwnershipCon	24,418	0.139	0.116	0.0514	0.103	0.194	0.00720	0.560
CEODuality	24,418	0.308	0.461	0	0	1	0	1
SOE	24,418	0.303	0.460	0	0	1	0	1
Age	24,418	52.32	7.267	48	52	56	34	84
Gender	24,418	0.950	0.219	1	1	1	0	1
Education	24,418	3.448	0.943	3	4	4	1	5

Note. This table reports the summary statistics. All the variables are defined in Appendix A.

Panel B: Pearson Correlation Matrix

	FirmCSR	Zodiac	SIZE	ROA	LEVERAGE	OwnershipCon	CEODuality	SOE	Age	Gender	Education
FirmCSR	1										
Zodiac	0.014***	1									
SIZE	0.295***	−0.015***	1								
ROA	0.421***	0.001	−0.016***	1							
LEVERAGE	−0.036***	0.002	0.486***	−0.374***	1						
OwnershipCon	0.167***	0.004	0.195***	0.132***	0.027***	1					
CEODuality	−0.060***	0.004	−0.190***	0.048***	−0.157***	−0.050***	1				
SOE	0.137***	−0.013**	0.348***	−0.067***	0.282***	0.211***	−0.303***	1			
Age	0.057***	−0.030***	0.135***	0.064***	−0.034***	0.041***	−0.133***	0.022***	1		
Gender	0.009	0.0003	0.036***	−0.011**	0.022***	−0.001	−0.010*	0.058***	0.052***	1	
Education	0.058***	−0.002	0.180***	−0.047***	0.124***	−0.002	−0.022***	0.221***	−0.167***	0.033***	1

Note. This table reports the Pearson correlation matrix of the variables used in our main regression model. All the variables are defined in Appendix A. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 2
Chairperson's Zodiac Year effect on CSR.

Variable	(1)	(2)	(3)
	Firm Controls	Executive Controls	All Controls
	FirmCSR	FirmCSR	FirmCSR
Zodiac	0.285***	0.274**	0.431***
	(0.0478)	(0.109)	(0.0661)
SIZE	8.919***		9.051**
	(1.982)		(2.893)
ROA	68.09***		70.32***
	(4.740)		(5.041)
LEVERAGE	−3.555*		−2.170
	(1.615)		(1.236)
OwnershipCon	1.588*		−0.537
	(0.815)		(1.434)
CEODuality	−0.494*		−0.557***
	(0.223)		(0.132)
SOE	0.0940		−0.0617
	(0.778)		(1.029)
Age		−0.00237	−0.0384**
		(0.00773)	(0.0137)
Gender		−0.207	−0.293
		(0.706)	(0.334)
Education		−0.109	−0.119
		(0.0940)	(0.217)
Constant	−56.97**	29.65***	−55.75*
	(17.13)	(0.831)	(24.55)
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
N	24,418	24,418	24,418
Adjusted R-squared	0.543	0.482	0.557
F-statistics	58860.45	185.62	29785.30
Prob > F	0.0000	0.0000	0.0000

Note. This table reports the results of the effect of a firm's chairperson's zodiac year on CSR. The dependent variable is *FirmCSR*. *Zodiac* is a dummy variable that takes a value of 1 if the chairperson of the firm is in a zodiac year, and 0 otherwise. All other variables are defined in Appendix A. Robust standard errors clustered by firm and year are in parentheses. The last two rows present the F-test results, which test the joint significance of all explanatory variables in the respective model.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

4.3. Zodiac year effect over time

The influence of bad luck that is attributed to one's zodiac year is generally confined to that specific year. However, it is interesting and intuitive to investigate whether the zodiac year effect is as short-term as expected. Corporate chairpersons may take precautionary measures to lessen its adverse impact by reacting early or extending their efforts. This investigation holds significant importance for firms and their stakeholders because it provides insights into the timing and duration of the zodiac year effect.

Table 3 shows the lead–lag analysis of the relationship between CSR performance and the zodiac year effect. Columns (1) to (4) replicate the main analysis by using *Zodiac* to predict CSR performance for the two years before ($FirmCSR_{t-1}$ and $FirmCSR_{t-2}$) and the two years after ($FirmCSR_{t+1}$ and $FirmCSR_{t+2}$) the zodiac year. The results reveal interesting findings. First, they show that the zodiac year effect has no significant predictive power for CSR performance straight after the zodiac year *t*, as is indicated by the insignificant results of CSR at $t+1$ and $t+2$ reported in Columns (3) and (4). Second, as shown in Column (2), the analysis reveals that firm CSR performance in the year before the zodiac year ($FirmCSR_{t-1}$) is significant, but there is no significant zodiac effect in CSR at year *t*–2 in Column (1). Nevertheless, the zodiac year of a chairperson (*Zodiac*) is more strongly associated with $FirmCSR_t$ than $FirmCSR_{t-1}$ (coefficient of $FirmCSR_t$ is 0.431, $p < 0.01$; coefficient of $FirmCSR_{t-1}$ is 0.340, $p < 0.1$). Taken together, the results suggest that the effect of a chairperson's zodiac year is relatively short-term, starting from the year before the zodiac year, becoming more pronounced in the zodiac year before disappearing at the conclusion of the zodiac year. It is worth noting that chairpersons proactively take measures to alleviate the detrimental effects of their zodiac year by performing good deeds even before entering that particular year. This crucial finding is not observed by Zeng et al. (2022), who conclude a null early zodiac effect when examining inefficient firm investments. Our results highlight the significance of exploring diverse strategies to counterbalance the potential negative effects of the zodiac year, and show that when it comes to doing good, executives demonstrate an early initiation.

4.4. Endogeneity: PSM and PSM-DiD

Although the exogeneity of the phenomenon of a chairperson's zodiac year makes the existence of reverse causality highly unlikely, and we have controlled for various fixed effects to account for unobserved factors, endogeneity concerns may remain. To address this

Table 3
Lead and lag effects of Chairperson's Zodiac Year on CSR.

Variable	Lead Effects		Lag Effects	
	(1)	(2)	(3)	(4)
	$FirmCSR_{t-2}$	$FirmCSR_{t-1}$	$FirmCSR_{t+1}$	$FirmCSR_{t+2}$
Zodiac	0.26	0.340*	−0.0116	0.322
	(0.138)	(0.156)	(0.285)	(0.220)
SIZE	10.58***	9.600**	8.196**	7.358**
	(2.705)	(2.827)	(2.875)	(2.677)
OwnershipCon	−0.547	−0.446	0.127	0.642
	(2.755)	(2.092)	(1.556)	(2.751)
ROA	75.55***	71.89***	70.78***	69.40***
	(6.327)	(5.137)	(5.020)	(5.267)
CEODuality	−0.499***	−0.521**	−0.389	−0.318
	(0.133)	(0.167)	(0.206)	(0.247)
LEVERAGE	−2.944*	−2.389	−1.208	−1.331
	(1.289)	(1.265)	(1.393)	(1.436)
SOE	0.0889	−0.0208	−0.152	−0.249
	(0.331)	(0.772)	(1.255)	(1.317)
Age	−0.0303	−0.0391*	−0.0543***	−0.0534***
	(0.0305)	(0.0170)	(0.0133)	(0.0119)
Gender	−0.163	−0.168	−0.362	−0.390*
	(0.710)	(0.398)	(0.218)	(0.190)
Education	−0.337	−0.251	−0.0424	−0.0805
	(0.404)	(0.298)	(0.198)	(0.281)
Constant	−70.32**	−60.78**	−46.12	−36.86
	(21.49)	(23.58)	(24.67)	(22.29)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
N	18,513	21,383	20,794	17,880
Adjusted R-squared	0.574	0.564	0.552	0.533
F-statistics	8138.13	8786.35	26209.87	18568.30
Prob > F	0.0000	0.0000	0.0000	0.0000

Note. This table reports the results of the lead and lag effects of the zodiac year of chairpersons on CSR. The dependent variable is *FirmCSR*. All other variables are defined in Appendix A. Robust standard errors clustered by firm and year are in parentheses. The last two rows present the F-test results, which test the joint significance of all explanatory variables in the respective model.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

issue, the study adopts a propensity score matching (PSM) method and a PSM-DiD (difference-in-differences of the matched samples using PSM) framework to investigate the impact of the chairperson's zodiac year on CSR.

The PSM technique addresses the endogeneity concerns that result from self-selection bias (Rosenbaum & Rubin, 1985). Similarly to Li et al. (2021), we classify those firms in a chairperson's zodiac year into the treatment group, then match to comparable control firms whose chairperson is not in a zodiac year by all the firm-level characteristics included in Equation (1). In the matching process, a propensity score indicating the likelihood of receiving the treatment is calculated for each firm. Then, we employ nearest neighbour matching without calliper to match the control and treatment firms on a one-to-one basis, as suggested by Mishra (2014). This gives us a total of 2018 pairs of matched firms. We perform a balance test to ensure that the PSM matching is satisfactory. The balance test results are provided in Appendix B. The main results of the matched sample are presented in Column (1) of Table 4, showing that our main results hold after controlling for endogeneity.

Then, we take the first instance of a chairperson's zodiac year during the sample period as a shock to firm CSR performance and examine the impact using a PSM-DiD method. We argue that when there is a change to a chairperson's perception of bad luck, it is likely to pose a significant shock because of their chief role in shaping firm practices. Our PSM-DiD set-up takes a staggered approach because of the varying occurrence of the zodiac year, which recurs every 12 years for different firms. However, it differs from the standard DiD approach typically used to measure policy shocks with lasting effects, because the zodiac effect is short-term. Thus, performing PSM ensures more comparable control and treatment groups. We conduct the following analysis:

$$FirmCSR_t = \delta_0 + \delta_1 POST + \delta_2 Controls + FirmFE + YearFE + \varepsilon_t \quad (2)$$

where *POST* is 1 for those firms that experience a chairperson's zodiac year for the first time after the shock and 0 otherwise. The empirical results are presented in Column (2) of Table 4. We find that the coefficient of *POST* is positive and significant (coefficient is 2.188, $p < 0.01$), indicating that the change of the chairperson presents a positive shock to the firm's CSR performance.

5. Further analyses

Our main results show a positive association between the zodiac year of a chairperson and a firm's CSR performance, as measured by a composite CSR index. However, the impact of the zodiac year effect may vary depending on CSR dimensions, firm characteristics

Table 4
PSM and PSM-DiD results.

Variable	(1)	(2)
	PSM	PSM-DiD
	FirmCSR	FirmCSR
Zodiac	0.614***	
	(0.120)	
Post		2.188**
		(0.795)
SIZE	7.125***	8.687
	(0.696)	(7.951)
ROA	72.11***	75.19***
	(4.333)	(10.53)
LEVERAGE	−3.982*	−2.400
	(1.919)	(6.228)
OwnershipCon	−0.229	1.923
	(5.449)	(29.33)
CEODuality	0.957**	1.609
	(0.384)	(2.503)
SOE	1.755	2.857*
	(5.000)	(1.333)
Age	−0.0465*	−0.168***
	(0.0232)	(0.0187)
Gender	1.123	−0.687
	(0.713)	(1.105)
Education	−0.315*	−0.152
	(0.171)	(1.102)
Constant	−38.97***	−48.90
	(7.455)	(62.35)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
N	3852	3791
Adjusted R-squared	0.545	0.825
F-statistics	4974.63	2470.61
Prob > F	0.0000	0.0000

Note. This table reports the PSM and PSM-DiD regression results of the effect of a firm's chairperson's zodiac year (*Zodiac*) on CSR (*FirmCSR*). We treat the first instance of a chairperson's zodiac year during the sample period as a shock. *POST* is 1 for those firms that experienced a chairperson's zodiac year for the first time after the shock, and 0 otherwise. The dependent variable is *FirmCSR*. All the variables are defined in Appendix A. Robust standard errors clustered by firm and year are in parentheses. The last two rows present the F-test results, which test the joint significance of all explanatory variables in the respective model. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

(e.g. corporate property rights, compliance with environmental standards) and public concern.

5.1. CSR dimensions and zodiac year effect

CSR is a multifaceted notion that includes responsibilities to various stakeholders, and we propose that beliefs in the zodiac year may influence stakeholders differently. To address this issue, we re-estimate Equation (1) using various CSR dimensions that represent different stakeholder groups, namely, shareholder responsibility, employee responsibility, consumer responsibility, environmental responsibility and social responsibility, as measured by Hexun.

Table 5 reveals interesting results. The zodiac year effect has a significant and positive impact on employee, customer, environmental and social stakeholder groups; however, no such effect is observed in the shareholder group. The results suggest that firms prioritise responsibilities to other stakeholders over shareholders. In other words, activities such as employee safety and wellbeing, product quality and customer service, environmental protection and social giving dominate profit-generating during a chairperson's zodiac year. Putting more effort into engaging with non-shareholders can enhance the firm's reputation. For example, corporate donations can convey a positive image of a firm, thereby generating reputation capital (Godfrey et al., 2009; Sánchez, 2000) and potentially reducing public and regulatory scrutiny (Brammer & Millington, 2005). This positive public image can help firms mitigate the costs of adverse events and counteract the perceived bad luck that is associated with the zodiac year. The findings precisely reflect the traditional de-emphasis on material goals and the emphasis on accumulating virtue and kindness during the zodiac year.

5.2. Government-affiliated firms

We posit that the relationship between the zodiac year effect and CSR performance may be influenced by a firm's relationship with

Table 5
Effect of Zodiac on CSR dimensions.

Variable	(1)	(2)	(3)	(4)	(5)
	Shareholder Responsibility	Employee Responsibility	Customer Responsibility	Environmental Responsibility	Social Responsibility
Zodiac	0.116	0.0530***	0.0953***	0.114*	0.0630**
	(0.0874)	(0.00854)	(0.0174)	(0.0584)	(0.0311)
SIZE	2.736***	1.581**	1.602*	1.877	1.229***
	(0.211)	(0.636)	(0.718)	(1.086)	(0.0586)
ROA	57.24***	−0.0615	−0.334*	−0.610**	14.33***
	(4.112)	(0.141)	(0.137)	(0.199)	(0.325)
LEVERAGE	−4.795***	0.921***	0.842**	0.974**	−0.104
	(0.277)	(0.232)	(0.316)	(0.321)	(0.193)
OwnershipCon	3.687**	−1.215*	−1.586***	−2.033***	0.501
	(1.016)	(0.538)	(0.218)	(0.358)	(0.349)
CEODuality	0.0529	−0.0827	−0.160***	−0.142**	−0.219***
	(0.0417)	(0.0519)	(0.0380)	(0.0426)	(0.0250)
SOE	−0.873***	0.100	0.255	0.281	0.150
	(0.126)	(0.213)	(0.295)	(0.297)	(0.177)
Age	−0.00956	−0.00765*	−0.00750	−0.00929	−0.00351*
	(0.00952)	(0.00328)	(0.00809)	(0.0103)	(0.00190)
Gender	−0.147	−0.0175	0.0741	−0.174	−0.0352
	(0.143)	(0.0438)	(0.0872)	(0.122)	(0.0694)
Education	−0.0470	−0.0128	−0.0107	0.0122	−0.0364
	(0.0602)	(0.0266)	(0.0524)	(0.0547)	(0.0223)
Constant	−12.18***	−11.08*	−11.80*	−13.81	−6.859***
	(2.578)	(5.399)	(5.644)	(8.797)	(0.579)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
N	24,418	24,418	24,418	24,418	24,418
Adjusted R-squared	0.790	0.510	0.404	0.415	0.484
F-statistics	17057.56	9006.62	79224.44	4225.84	2216.29
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Note. This table reports the regression results for the five CSR dimensions on a chairperson's zodiac (*Zodiac*) and the control variables. Robust standard errors clustered by firm and year are in parentheses. All other variables are defined in Appendix A. The last two rows present the F-test results, which test the joint significance of all explanatory variables in the respective model. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

the government. Firms with stronger political connections possess more resources to devote to CSR, enabling them to tackle perceived bad luck by using CSR as a mechanism. Another potential explanation is that chairpersons working for politically connected firms may experience a higher opportunity cost associated with perceived bad luck during the zodiac year. These chairpersons might be more concerned about their (political) careers and reputation. However, in firms with fewer political connections, executive performance tends to be greatly evaluated using the profitability of the firm. To test our predictions, we include an interaction term between the chairperson's zodiac year (*Zodiac*) and the binary variables that indicate government-affiliated firms, measured by SOEs (*SOE*) and firms that receive government environmental subsidies (*GovEnvSub*). The results are reported in Columns (1) and (2) in Table 6. We find that the positive effect of zodiac year on CSR performance is more pronounced in SOEs and firms with government environmental subsidies, as indicated by the significant and positive interaction terms of *Zodiac* × *SOE* (coefficient is 0.356, $p < 0.01$) and *Zodiac* × *GovEnvSub* (coefficient is 0.886, $p < 0.01$). The results support our conjectures about political connections in the context of the zodiac effect.

5.3. High CSR concern industries

Prior studies have shown that the public tends to pay more attention to firms operating in industries with higher levels of CSR concern (Clarkson et al., 2008). This may result in adverse effects on these firms, such as stricter bank lending requirements and customer resistance to their products (He et al., 2013). The chairpersons of these firms, especially during their zodiac year, might express greater concern about these unfavourable consequences, perceiving them as bad luck. Therefore, we expect the positive zodiac year effect on firm CSR to be stronger in firms operating in industries with higher levels of CSR concern. Following Clarkson et al. (2008) and He et al. (2013), we define firms that operate in intensely regulated or pollution-prone environments, such as mining, paper and printing, petroleum, chemicals, rubber and plastics, metals and non-metals, utilities and social services, as the high CSR concern group, which takes a value of 1 and 0 otherwise. We re-estimate Equation (1) by including an interaction term of *Zodiac* × *CSRConcern* to test our proposition. Column (3) of Table 6 presents the empirical evidence. As expected, the zodiac year effect is more prominent in firms from the high CSR concern group (coefficient of *Zodiac* × *CSRConcern* is 0.931, $p < 0.01$). The negative relationship between *CSRConcern* and *FirmCSR* is moderated by the zodiac year effect, suggesting that the strength of zodiac year effect is greater in firms with higher levels of CSR concern.

Table 6
Further analyses.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	SOE	GovEnvSub	CSRConcern	EnvViolation	ISO14001	ISO9001	BaiduHazeIndex	BaiduPollIndex
	FirmCSR	FirmCSR	FirmCSR	FirmCSR	FirmCSR	FirmCSR	FirmCSR	FirmCSR
SOE	−0.0934							
	(1.025)							
Zodiac × *SOE*	0.356***							
	(0.0594)							
GovEnvSub		−0.118						
		(0.0854)						
Zodiac × *GovEnvSub*		0.886***						
		(0.105)						
CSRConcern			−1.601***					
			(0.377)					
Zodiac × *CSRConcern*			0.931***					
			(0.173)					
EnvViolation				−3.014***				
				(0.307)				
Zodiac × *EnvViolation*				6.930***				
				(1.217)				
ISO14001					3.256***			
					(0.155)			
Zodiac × ISO14001					2.012***			
					(0.229)			
ISO9001						2.777***		
						(0.155)		
Zodiac × ISO9001						0.552*		
						(0.324)		
BaiduHazeIndexD							0.873***	
							(0.0977)	
Zodiac × *BaiduHazeIndexD*							0.673***	
							(0.176)	
BaiduPollIndexD								0.947***
								(0.141)
Zodiac × *BaiduPollIndexD*								0.535**
								(0.259)
Zodiac	0.326	0.221*	−0.0464	0.389***	−0.0213	0.296***	0.0388	0.147
	(0.196)	(0.0909)	(0.105)	(0.0690)	(0.0863)	(0.0944)	(0.103)	(0.153)
Constant	−55.74*	−55.78*	−53.33***	−49.65***	−51.00***	−50.82***	−55.01***	−54.89***
	(24.54)	(24.57)	(4.146)	(4.390)	(4.534)	(4.312)	(4.273)	(4.284)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	23,988	23,987	24,418	24,043	24,043	24,043	24,418	24,418
Adjusted R-squared	0.557	0.557	0.556	0.560	0.563	0.562	0.557	0.557
F-statistics	6679.76	7178.40	4081.20	5642.41	3712.08	3965.90	4074.92	4058.36
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note. This table reports the results of whether the effects of the zodiac year of a chairperson on CSR are influenced by various firm characteristics. The dependent variable is *FirmCSR*. All the variables are defined in Appendix A. Robust standard errors clustered by firm and year are in parentheses. The last two rows present the F-test results, which test the joint significance of all explanatory variables in the respective model.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

5.4. Commitment to environmental compliance

Further, we investigate whether firms' commitment to environmental compliance affects the strength of the zodiac year effect on CSR performance. We propose that firms with past environmental violations (*EnvViolation*), as well as those certified with ISO14001 and ISO9001 (i.e. these firms demonstrate their commitment to environmental and sustainable practices), are more likely to attract greater regulatory attention. This increased scrutiny may raise concerns about violating environmental regulations and losing certification, which can be amplified by superstitious beliefs in the zodiac year, leading to a greater zodiac year effect for these firms. We take a similar approach to that mentioned previously and report the results in Columns (4) to (6) of Table 6. These reveal that the coefficients for the interaction terms between *Zodiac* and *EnvViolation*, *ISO14001* and *ISO9001* are all positive and significant, confirming our conjecture.

5.5. Regional public environmental concern

Stakeholder theory suggests that a firm is responsible to its various stakeholders, including the public, who may exert power to

affect management decisions about CSR (Freeman, 1984). In 2015, the Law of the People's Republic of China on Environmental Protection marked a significant milestone by introducing a legal framework for public access to environmental information and participation in environmental protection. This has signalled a significant shift towards citizen engagement in environmental issues in China. Thus, firms facing greater levels of public concern about environmental protection are more likely to commit to better environmental practices in order to mitigate scrutiny from both the public and government. In line with this, we conjecture that the zodiac year effect is greater for firms operating in regions with higher levels of public concern about the environment. This may be attributed to the belief that the perceived bad luck associated with the zodiac year is intensified with high levels of public concern.

We proxy public concern about environmental issues using two measures: the Baidu indices on haze and pollution at the provincial level.[2] These indices are matched to each firm using their headquarters' geographical location. The indices represent real-time provincial internet search volumes on haze and pollution and thus capture public attention. Haze and air pollution are the two most focused metrics used to assess firms' environmental protection efforts in China. In accordance with the Law of the People's Republic of China on Prevention and Control of Air Pollution 2015, governments above the county level should incorporate air pollution prevention and control into national economic and social development planning and increase financial investment in air pollution prevention and control (Chapter I, Article 5).

Next, we determine the median values of the two Baidu indices and create two dummy variables *BaiduHazeIndexD* and *BaiduPollIndexD,* using the median values. We set the values to 1 (0) to reflect high (low) levels of public environmental concern for each firm. Then, we perform a similar interaction test and present the results in Columns (7) and (8) of Table 6. As expected, the results show that the coefficients of the interactive terms are positive and significant, indicating that the positive effect of the zodiac year on CSR performance is reinforced in firms with a high level of public environmental concern.

6. Additional robustness checks

6.1. CEO zodiac and number of zodiac year instances

Our main analysis uses the zodiac year of a chairperson as the primary measure to examine the zodiac year effect, following reputable studies in this field (Fisman et al., 2022; Li et al., 2021; Zeng et al., 2022). We also employ two alternative measures to ensure the reliability of our results. The first measure uses the zodiac year of the CEO. We focus on the CEO because the existing literature shows that CEO attributes play an important role in shaping corporate decisions (e.g. Bertrand & Schoar, 2003). We replace *Zodiac* with *CEOZodiac* while keeping all other variables constant to re-run Equation (1). Column (1) of Table 7 reports the results. We document a consistent zodiac year effect using *CEOZodiac*. The coefficient of *CEOZodiac* (0.357) is significant at the 5% level, indicating that firm CSR performance increases during the zodiac year of a CEO although the magnitude of the effect is slightly weaker than the zodiac year effect of a chairperson, as reported in the main results (coefficient = 0.431, $p < 0.01$).

The second alternative measure is *ZodiacCount*, which captures the number of times that a firm experiences a chairperson's zodiac year. In our sample, a firm can experience up to four instances of a chairperson's zodiac year. In Column (2) of Table 7, our analysis reveals similar results (coefficient of *ZodiacCount* is 0.312, $p < 0.05$), suggesting that the more frequently a firm encounters a chairperson's zodiac year, the higher its level of CSR. Each chairperson zodiac year instance increases the firm CSR score by 0.312 on average. Overall, our findings provide corroborative evidence of the positive effect of senior managers' zodiac year on firms' commitment to CSR.

6.2. Other robustness checks

Further, we check the robustness of our results by including industry, chairperson and region fixed effects to control for any unobserved factors at the associate dimensions. The results presented in Panel A of Table 8 demonstrate that our main findings remain unchanged.

Finally, we perform two versions of placebo tests to further address causality and endogeneity concerns. The first placebo test randomly shuffles the zodiac year of the chairperson across each firm within the same year (i.e. over the cross-section). In this case, if the zodiac effect is not spurious, we should find it insignificant. In the second test, we randomly shuffle the zodiac year of the chairperson within each firm across different years (i.e. over time-series). Again, the zodiac year effect should disappear if it is not a result of data snooping. Our results in Panel B of Table 8 for the two placebo tests are insignificant, lending extra confidence to our results.

7. Conclusion

This study seeks to understand whether and how superstition plays a crucial role in explaining CSR performance. Specifically, we focus on the impact of the zodiac year beliefs of corporate chairpersons and how this influences the CSR performance of Chinese listed firms. The belief that the Chinese zodiac year brings bad luck and influences human behaviour decisions has been deeply rooted in

[2] Baidu is the most significant search engine in China in which Google has a very limited scope of service. The Baidu haze index tracks the severity of haze according to Baidu search data, including weather, air quality monitoring and satellite imagery, while the pollution index considers multiple pollutants.

Table 7
CEO Zodiac Year effects and number of Zodiac years.

Variable	(1)	(2)
	FirmCSR	FirmCSR
CEOZodiac	0.357**	
	(0.127)	
ZodiacCount		0.312**
		(0.105)
SIZE	9.095**	9.051**
	(2.916)	(2.882)
ROA	71.16***	70.27***
	(4.726)	(5.075)
LEVERAGE	−2.519	−2.175
	(1.303)	(1.216)
OwnershipCon	−0.791	−0.483
	(2.648)	(1.421)
CEODuality	−0.373**	−0.556***
	(0.134)	(0.131)
SOE	−0.199	−0.0649
	(1.064)	(1.029)
Age	−0.0347**	−0.0386**
	(0.0111)	(0.0137)
Gender	0.00532	−0.266
	(0.173)	(0.334)
Education	0.460***	−0.121
	(0.118)	(0.218)
Constant	−58.65*	−55.71*
	(24.56)	(24.49)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
N	23,758	23,989
Adjusted R-squared	0.556	0.557
F-statistics	29785.30	25724.34
Prob > F	0.0000	0.0000

Note. This table reports the results of zodiac effects on CSR using alternative measures for zodiac. Column (1) reports the results of the effects of the CEOs in their zodiac year on CSR. Column (2) reports the results of the effects of the number of chairperson's zodiac years that a firm has on CSR. The dependent variable is *FirmCSR*. All the variables are defined in Appendix A. Robust standard errors clustered by firm and year are in parentheses. The last two rows present the F-test results, which test the joint significance of all explanatory variables in the respective model. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Chinese culture for centuries. We find that during the zodiac year of a chairperson, a firm's CSR performance increases. This can be attributed to the chairperson's desire to engage in benevolent acts and to mitigate risks, thereby seeking to offset potential negative influences. More importantly, the zodiac year effect is short-term, beginning one year before the zodiac year and disappearing at the conclusion of the zodiac year, consistent with Chinese zodiac year culture. Further, our study reveals that the positive relationship between a chairperson's zodiac year and CSR performance benefits various CSR stakeholder groups and is more pronounced in SOEs, as well as in firms that receive government environmental subsidies, have higher levels of environmental violations, and face greater levels of public environmental and CSR concern. Our findings are robust to sensitivity tests.

Our study has several implications. First, it sheds light on the influence of superstitious cultural beliefs in shaping organisational behaviour and performance. Understanding the connection between zodiac year beliefs and CSR performance can inform firm strategic planning initiatives. Firms can strategically allocate resources during the chairperson's zodiac year to optimise firm CSR and proactively address potential risks. Given the short-lived zodiac year effects, it is vital for management to adeptly account for this short-term CSR determinant to ensure a continuous commitment to CSR, fostering long-term sustainability and impact.

Second, cultural values tend to persist, implying that insights gained from this study could have enduring consequences. As such, our study warrants significant attention from practitioners and regulators. Policymakers should take into account the impact of cultural beliefs, such as zodiac year superstition, on corporate behaviour. This consideration may necessitate the development of customised oversight mechanisms designed to foster responsible and ethical business practices in specific cultural contexts. By highlighting the positive impact of aligning CSR activities with zodiac year beliefs, firms can enhance investor confidence and attract socially responsible investors who value the cultural sensitivity of firm behaviour. Although the country chosen for the study is China, superstitions are widespread worldwide; thus, our findings are likely to resonate in other countries. Future research could explore the generalisability of our findings by conducting cross-national studies in various cultural contexts.

Third, from a theoretical perspective, our study extends upper echelons theory by highlighting the influence of the cyclical characteristics of senior managers on corporate outcomes in addition to their biological (e.g. gender, age) and psychological (e.g. hubris, narcissism) traits. Specifically, we demonstrate the significance of the zodiac year, a recessive cyclical characteristic, in

Table 8
Additional robustness checks.

Variable	Panel A: Different Fixed Effects			Panel B: Placebo Tests	
	(1)	(2)	(3)	(4)	(5)
	FirmCSR	*FirmCSR*	*FirmCSR*	*FirmCSR*	*FirmCSR*
Zodiac	0.471***	0.148**	0.501***	−0.263	−0.224
	(0.0961)	(0.0607)	(0.0505)	(0.139)	(0.246)
Constant	−56.26***	−1.620	−56.89***	−55.58*	−54.02***
	(12.19)	(3.223)	(8.619)	(24.50)	(4.121)
All controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Firm fixed effects				Yes	Yes
Industry fixed effects	Yes				
Chairperson fixed effects		Yes			
Region fixed effects			Yes		
N	23,988	24,418	23,988	23,988	24,418
Adjusted R-squared	0.370	0.599	0.365	0.557	0.557
F-statistics	91151.26	9800.80	14441.13	26934.64	351.73
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000

Note. This table reports the results of the robustness checks. Columns (1)–(3) present the main results from the different fixed effects models. Column (4) reports the results of the placebo test of randomly shuffling the zodiac year of chairpersons across each firm within the same year. Column (5) reports the results of the placebo test of randomly shuffling the zodiac year of chairpersons within each firm over different years. The dependent variable is *FirmCSR*. All the variables are defined in Appendix A. Robust standard errors clustered by firm and year are in parentheses. The last two rows present the F-test results, which test the joint significance of all explanatory variables in the respective model.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

explaining corporate behaviour. Understanding the zodiac year effect on CSR performance can help firms tailor their CSR strategies and initiatives to align with the cultural and belief systems of their stakeholders, leading to enhanced stakeholder engagement, reputation, and organisational performance.

Declaration of generative AI in scientific writing

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Appendix A. Variable Definitions

Variable	Definition	Source
FirmCSR	Dependent variable. A firm's CSR score from the Hexun data set. The maximum CSR score is 100. A firm can receive a negative CSR score if its CSR concern points exceed its CSR strength points.	Hexun
Zodiac	Independent variable. A dummy variable. Chairperson in his or her zodiac year = 1, otherwise = 0.	CSMAR and manually checked against RESSET, sina.com and cninfo.com
ZodiacCount	Number of times that a firm experiences a chairperson's zodiac year.	CSMAR
CEOZodiac	A dummy variable. CEO in his or her zodiac year = 1, otherwise = 0.	CSMAR
SIZE	Firm size measured as the natural logarithm of total assets.	CSMAR
ROA	Firm performance measured as net income divided by total assets.	CSMAR
LEVERAGE	Leverage measured as total liabilities divided by total assets.	CSMAR
OwnershipCon	Ownership concentration measured as the sum of squares shareholding of the largest shareholder.	CSMAR
CEODuality	CEO is chairperson of the board = 1, otherwise = 0.	CSMAR
SOE	State-owned enterprise = 1, otherwise = 0.	CSMAR
Age	Age of the chairperson in years.	CSMAR
Gender	Chairperson's gender is male = 1, otherwise = 0.	CSMAR
Education	Chairperson's education level: vocational diploma = 1, tertiary diploma = 2, bachelor = 3, master = 4, PhD = 5.	CSMAR
GovEnvSub	Government environmental subsidies. Firms have environmental subsidies = 1, otherwise = 0.	CSMAR
EnvViolation	Environment violations. Firms have environmental violations = 1, otherwise = 0.	CSMAR
CSRConcern	Following Clarkson et al. (2008), high level of CSR concern group = 1, otherwise = 0.	CSMAR
ISO14001	A dummy variable. Firms have ISO14001 certification = 1, otherwise = 0.	CSMAR

(*continued on next page*)

(*continued*)

Variable	Definition	Source
ISO9001	A dummy variable. Firms have ISO9001 certification = 1, otherwise = 0.	CSMAR
BaiduHazeIndexD	The Baidu haze index measures public environmental concerns by province. A province is considered to have a high level of public environmental concerns if its haze index is above the median value of the sample. For firms in provinces with a high level of public environmental concerns, *BaiduHazeIndexD* = 1, otherwise = 0.	Baidu.com
BaiduPollIndexD	The Baidu pollution index measures public social and environmental concerns by province. A province is considered to have a high level of public environmental concerns if its pollution index is above the median value of the sample. For firms in provinces with a high level of public social and environmental concerns, *BaiduPollIndexD* = 1, otherwise = 0.	Baidu.com

Appendix B. Balance Tests

Variable	Unmatched (U)	Mean		% bias	% reduction of bias	*t*-test		V(T)/V(C)
	Matched (M)	Treated	Control			*t*	$p > \|t\|$	
SIZE	U	9.5456	9.5815	−6.4		−2.71	0.007	0.96
	M	9.5456	9.5479	−0.4	93.5	−0.13	0.894	1.03
ROA	U	0.03987	0.03943	0.6		0.28	0.78	1.06
	M	0.03987	0.03965	0.3	49.4	0.11	0.916	1.15*
LEVERAGE	U	0.40725	0.40767	−0.2		−0.09	0.931	1.03
	M	0.40725	0.41701	−4.7	−2219.5	−1.48	0.14	1.01
OwnershipCon	U	0.14281	0.13904	3.2		1.39	0.164	1.08
	M	0.14281	0.14248	0.3	91.2	0.09	0.929	1.10*
CEODuality	U	0.31169	0.30719	1		0.42	0.674	
	M	0.31169	0.30525	1.4	−42.9	0.44	0.658	
SOE	U	0.28692	0.30482	−3.9		−1.68	0.094	
	M	0.28692	0.28394	0.7	83.4	0.21	0.834	
Age	U	51.562	52.389	−11.4		−4.9	0	0.99
	M	51.562	51.727	−2.3	80	−0.72	0.469	0.97
Gender	U	0.94797	0.94969	−0.8		−0.34	0.735	
	M	0.94797	0.95045	−1.1	−44.1	−0.36	0.72	
Education	U	3.441	3.4491	−0.9		−0.37	0.714	1
	M	3.441	3.4197	2.3	−165.3	0.73	0.466	1.06

* If the variance ratio is outside [0.92; 1.09] for U and [0.92; 1.09] for M.

This table presents the differences in the means between the subsamples of firms that have zodiac year (treated) and non-zodiac year of chairpersons. The results show the standardised deviations (% bias) of the variables after matching is significantly reduced. The *t*-test results show the differences between the treated and control samples after matching are all insignificant, indicating that the matching effect is effective. All the variables are defined in Appendix A.

Data availability

The authors do not have permission to share data.

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