Boardroom Wisdom or Stagnation: Examining Board Age and Firm Performance in French Companies

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ABSTRACT

The study aims to investigate the effect of the age of the board of directors on firm performance of nonfinancial French firms. Firm performance is measured as a natural logarithm of Tobin's Q (market-based measure). The sample covers the period from 2005 to 2023. Results of the study indicate that the board of director's age has a significant negative effect on firm performance and this effect is more obvious for firms having more growth opportunities. The results remain unchanged after employing alternative measures of firm performance, namely, market-to-book value of equity. Findings suggest that growing firms need quicker decisions and increasing age is facing major cognitive decline, resulting in delayed decisions and reluctance to make bold decisions that lead to lower firm performance.

1 Introduction

Over the past two decades, drastic changes have been witnessed to the composition of the corporate board of directors. The rise of institutional shareholder activism and major corporate governance reforms have enhanced directors' independence and accountability. Faced with a reduced supply of qualified independent directors, firms had to rely on a pool of old director candidates. Another reason is increasing life expectancy in the developed and developing world, combined with decreasing birth rates, is expected to require longer work tenures. People are thus likely to remain in the workforce well into their old age. This is also the case for top managers and board directors to the extent that several U.S. firms have lifted the age limit for mandatory retirement (Masulis et al. 2022). The fact behind this is that the older population is increasing at a dramatic pace in the United States and becoming more diverse in terms of racial and ethnic composition (Korniotis and Kumar, 2011). Not only in the U.S. but also in Netherlands there is a new regulation that allows an increase in the retirement age of Dutch citizens to 67 years in 2024 (Rijksoverheid, 2012). Yet, firms may not have fully appreciated the effect of aging on job performance, and specifically the fact that aging is likely to impede the ability of decision-makers to carry out their duties effectively. The discrepancy in managerial behaviors and attitudes along their aging process can be attributed to the psychosocial effects (Rhodes, 1983).

In this paper, the objective is to examine the effect of board age on firm performance. This analysis is based on French firms covering the period from 2005 to 2023. While many studies on French markets usually focus solely on companies listed in the SBF 120 index, with a smaller number of observations, current research extends beyond this boundary by incorporating smaller and delisted firms to have a significantly larger sample of 3,306 observations. Moreover, additional information related to the board and CEO characteristics is collected from annual reports and necessary adjustments are made to check any changes in data like the presence of the female board of directors and changes in any other member.

A multifaceted approach is used to address concerns related to endogeneity. All explanatory variables are lagged, including lagged dependent variable, and entropy balancing is used to match firms with younger and older BODs (Hainmueller and Xu, 2013). This technique allows to balance covariates across the two groups, enhancing comparability and reducing bias in estimations. Moreover, quantile regression is used to explore whether the impact of BOD age varies at different points of the performance distribution or with the firm's growth opportunities.

The OLS regressions show that older boards are associated with significantly low firm performance. The results are the same also after lagging all independent variables and matching for firm characteristics including historical firm performance that is linked with current firm performance using entropy balancing. This suggests that the observed results remain consistent even after adjusting various factors that could potentially influence the findings. Entropy balancing minimizes biases and enhances comparability by ensuring balance across different groups. Hence, this ensures that the negative link between board age and firm performance is not because older boards are only associated with larger firms, which generally have a lower valuation ratio because of complexity.

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The results of quantile regression confirm a negative relationship between board age and firm performance. Specifically, the negative effect is more in higher quantiles indicating that older board of directors have a stronger negative effect in high-performance firms. High-performance firms demand more energy and time contribution from their management with quick action and adaptability, which might not be possible for older BODs. So, under high pressure and a constantly changing environment, the negative effect of the age of BODs becomes more apparent. Older BODs may find it harder to adapt quickly to rapidly changing environments. Hence, the experience of older BODs may not be enough to overcome the challenges of managing fast-growing businesses in today's dynamic world.

The current study makes significant contributions to both policy-making and academic research. From the academic perspective, this study contributes to the literature on the board of director's age effects on corporate performance as most of the previous research focuses more on other issues like gender diversity and the presence of the independent board of directors. Based on the 'theory mix' approach (resource dependence theory, human capital and social capital theories, and social psychological and organizational behavior theories), the current study also makes a theoretical contribution to existing literature. It shows that aging results in cognitive decline and psychological changes with increasing age hinder older board of director's abilities to meet new challenges and meet the heavy demands of boardroom duties. The current study confirms that the presence of older boards of directors on boards results in decreasing firm performance, particularly for high-growth firms, the negative effect is more noticeable as they are experiencing rapid changes, and lack of responsiveness from older board of directors increases the risk and firms fall behind.

Current study suggests that despite their experience, older BODs may face challenges in maintaining the necessary level of energy and innovation required to keep their firms competitive. This is particularly critical in today's business world where adaptability and creativity are key drivers of success. Studies by Singh-Manoux et al., (2012); Waelchli and Zeller., (2013); & Salthouse., (2000) support that aging brings adverse effects on not only physical abilities but also cognitive abilities and results in memory decline and poor problem-solving. Hence, implementing mandatory retirement policies will offer potential benefits.

The remainder of the paper proceeds as follows. Section 2 discusses theoretical background and hypothesis development. Section 3 outlines the sample used in this study and methodology. Section 4 presents and analyzes the results obtained. Finally, concluding remarks are presented in section 5.

2 Background, Literature Review and Hypothesis

Research on board members primarily focused on providing descriptive insights, yet main theoretical viewpoints have been employed to explain their potential influence on a company's performance (Dang, Bender & Scotto, 2014). The most frequently used theoretical framework in corporate governance studies is agency theory (1976). Over time, other theories such as resource dependence theory coupled with human and social capital theories have been applied to board studies (Dagsson, 2011). There is no single theory that directly anticipates the exact connection between board characteristics and firm performance.

Resource Dependence Theory

In 1978, Pfeffer and Salancik presented the resource dependency theory. According to this theory, the board of directors provides four main types of resources.

1) they create communication channels (Pfeffer & Salancik, 1978),

2) provide important resources such as advice and counsel (Dagsson and Larsson, 2011; Pfeffer & Salancik, 1978)

3) creation of legitimacy for the firm in the external environment (Pfeffer & Salancik, 1978; David et al., 2010)

4) they reduce environmental uncertainty and minimize transaction costs linked to interdependency with the external environment by creating networks between an organization and its surroundings (Lynall et al., 2003; Dagsson and Larsson, 2011; Pfeffer & Salancik, 1978).

Resource dependency theory provides us with a more appropriate theoretical framework to study the board of directors and firm performance (Carter et al., 2010). Boards contribute to increasing the reputation and legitimacy of firms (Lynall et al., 2003). It is also important that the board should be adjusted over time when the need arises (Dagsson and Larsson, 2011). Growing firms require more attention toward new investment opportunities and here main challenge faced by directors is increasing productivity and shifting into extension (Pugliese et al., 2014). Having more older board members can lose control over such uncertain situations and that will not be in favor of firms and can have a negative effect on firm performance.

Human capital and social capital theories

The human capital theory was derived by Gary Becker and Theodore Schultz in the 1950s and the early 1960s, it includes personal skills, education, and experience which enhance individual cognitive and productive capabilities that can be used as a value-added tool for the organization (Becker, 1964).

According to human capital theory, diversity in director's gender results in having unique human capital (Carter et al., 2010). If human capital of corporate directors is influenced by gender, their skills, and expertise, it is reasonable to hypothesize that human capital can also be influenced by increasing age. This categorization is analyzed as more suitable than typical dependent and independent or insider or outsider approaches from agency

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theory while studying board composition from human capital perspective (Singh, 2007). It can affect performance both positively and negatively and an individual's human capital worth depends on the firm's specific internal and external circumstances (Carter et al., 2010).

1) Social capital creates value and facilitates the acts of individuals within a social framework (Dang et al., 2014). As social capital theory is applied to directors, it generally concerns three matters (Johnson et al., 2013):

2) connection of directors with other organizations

3) director's relationships with firm managers (Dang et al., 2014) social standing (Johnson et al., 2013)

These social relationships are assumed to influence the director's behavior and the behavior of the board also (Johnson et al., 2013). Human capital influences the expertise of the board and subsequently influences board performance. Social capital affects the connections and relationships of the boards, also impacting their performance (Singh, 2007). The performance of the board, in turn, has an influence on overall performance of the firm (Murphy and McIntyre, 2007).

Social psychological and organizational behavior theories

Murphy and McIntyre (2007) defined the board of directors as a team of individuals that work collectively for the development of the firm. It was argued that previous studies on individual board characteristics are not sufficient to address the theoretical foundation and there is a need to explore more the mechanism that converts characteristics into organizational outcomes. Dagsson et al, (2011) argued that the similarity-attraction theory is most relevant to board studies. This theory suggests that when individuals have similar viewpoints on social issues, they attract each other hence reducing the chances of conflicts. Murphy and McIntyre (2007) suggested that teams consisting of "like-mind" individuals tend to be less effective. Hence it can be predicted that having older players on boards can affect firm performance.

2.1 Role of the Board of Directors

The debate on the impact of board characteristics in the corporate world is not new. Board members being major governing body in any company captured the attention of many researchers over decade. Practitioners and scholars as well as policymakers, over last two decades debated on the role of board of directors as among one of the key pillars of corporate governance (Monks and Minow, 2008; Tricker, 2009). They have asserted that attributes of board of directors may influence decision-making process and subsequently affects firm performance (Korniotis and Kumar, 2011; Waelchli and Zeller, 2013). There are only a few research studies that analyzed the impact of increasing age of boards. Although it is advised that decision-makers vary to the degree in which they satisfy (Braybrooke and Lindblom, 1963), the influence of decision-makers age on cognitive decline affecting decision-making ability associated with old age has not been systematically investigated.

Board of directors plays an important role in the governance structure of organizations (Fama and Jensen, 1983). Frijns et al. (2016) argue that Boards work as corporate advisors and monitors and are involved in company's financing, investing, and strategic decision-making processes. Our main proposition is that a firm's performance will vary significantly with its Board of Directors characteristics, especially age, as BODs are the main governing body. An individual's age is expected to influence strategic decision-making perspectives and choices (Wiersema and Bantel, 1992). Hambrick and Mason (1984), suggested that management demographic characteristics such as age and management experience have an impact on organizational outcomes. Zajac and Westphal (1996), proposed that an individual's age is related to his or her openness to new ideas. This research aims to study this sensitive topic of increasing age of board members and related consequences that firms may expect increasing age can bring, by looking towards both the cost and benefits of retaining older boards.

2.2. Age and cognitive abilities

Age is one of the variables that need to be paid attention to, because of its association with cognitive decline, memory loss, short temper, less motivation, and losing interest. There are two different channels of the aging process that affect general intelligence. First, aging has adverse effects on attention and memory, which affects general intelligence (Baltes & Lindenberger, 1997). Second, sensory functioning declines with age which is associated with a lower level of intelligence. The decline in intelligence is more obvious after the age of seventy (Baltes & Lindenberger, 1997).

Medical research shows that cognitive ability declines as people get older, and more specifically the ability to absorb and process new information (Singh-Manoux et al. 2012). Age is not only associated with many physical, social, and psychological changes but also with shifting preferences of older individuals and declining cognitive abilities (Waelchli and Zeller, 2013). The obvious consequence of reduced cognitive ability is poor problem-solving (Salthouse, 2000). Older managers may thus resort to mental shortcuts and may be tempted to fall back onto tried-and-tested methods regardless of whether there might be better options.

Overall, the literature suggests that as individuals age, they face difficulty in handling complex information and aging also slows down their performance and decision-making ability. Here the question arises if the age of the Board of Directors affects a firm's performance. And current study aims to answer this question.

2.3 Age and Firm Performance

Regarding firm performance, BOD age is associated with both costs and benefits. On the positive side, older board of directors accumulate more experience and are well-reputed, they have sound knowledge of firms and have

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political ties and networks (Serfling, 2014; Li et al., 2017; Gupta, 2021). This helps them to avoid mistakes and be more concerned about decisions made as compared to younger BODs who make more aggressive decisions (Horváth and Spirollari, 2012) and lack strong industry connections.

On the other hand, because of possible cognitive decline (Waelchli and Zeller, 2013) and psychological changes (Baltes & Lindenberger, 1997), older BODs take more time to make decisions (Taylor, 1975) and adopt conservative policies (Serfling, 2014). Older managers also exhibit a strong preference for decision routines that they have honed over time and are less likely to embrace new paradigms (Miller, 1991).

Moreover, executives under heavy job demands are forced to take mental shortcuts and usually, they prefer to take actions based on their past experiences and decisions, which are normally based on their background and nature (Hambrick, D. C., 2007). In certain situations, these may not favor firms as firms are going through continuous changes in terms of technological changes and policies and practices. In this regard, Rose (2005) found that older boards were generally outperformed by younger boards, having the possibility that younger boards might be more innovative (Serfling, 2014), and willing to participate in the monitoring process (Ebner et al., 2006) and to accept changes.

Board of Directors have the greatest power and experience to influence firm's performance after giving years of their lives to the industry and they are central strategic decision makers, but according to medical research cognitive ability declines as people get older (Horn, 1968; Salthouse, 2000) and information processing ability of individuals slows down with weak memory and results in decline in older people's capability to perceive conditional probabilities (Spaniol & Bayen, 2005). So, it is believed that with age BODs become less interested in putting efforts for innovation. Finally, following Hambrick and Manson (1984), upper-echelon perspective, we assume that BODs become more rigid towards old policies and procedures and become risk averse. And most of their preferences are based on personal characteristics i.e., age, education, tenure, stock ownership, and experiences (Barker & Mueller, 2002).

Furthermore, Older BODs are hesitant to change their investment behavior (Bertrand & Schoar, 2003; Eaton & Rosen, 1983; Li et al., 2014; Serfling, 2014) and prefer to use the rule of thumb. When it comes to risk-taking, agency theory suggests that managers are reluctant to engage in risky projects due to their welfare (Fama and Jensen, 1983). Particularly, senior BODs show more reluctance towards taking risky decisions. Concerning board age, empirical evidence as well as conventional wisdom suggests that risk-taking decreases with an individual's age. Further, as people age, flexibility decreases, whereas resistance to change and rigidity increases.

Based on the above arguments, it is hypothesized that:

Hypothesis 1: There is a negative effect of the age of the board of directors on firm performance.

To what extent does the age of the members of the board of directors relate to a firm's performance? Whether age a factor in retaining and selecting the board of directors? These are some of the questions that are of interest in this research.

It is believed that adding more experienced members (board members) increases the firm's performance but on the other hand, it weakens their decision-making ability because of declining cognitive abilities associated with the increasing age of individuals. Subsequently, an important research question becomes – to what extent do these issues impact the relationship between the age of boards of directors and firm's performance. Age is also associated with lower motivation in individuals (Waelchli and Zeller,2013). It is also argued that having members from different ages would improve connection to different segments. And the fact that older board of directors have more life experiences.

Another argument is that older managers are likely to have developed successful routines which they may be tempted to apply in the belief that they will retain their effectiveness. However, the routines of older managers are more likely to be outdated. As time passes, the lenses through which managers look at problems are more likely to become outdated and turn into a liability.

Lastly, older people exhibit greater risk aversion (Wiersema and Bantel, 1992). This may be related to their decreasing ability to comprehend how the environment is changing, giving rise to the impression that the task is more complex. However, risk-taking is integral to performance and firms are unlikely to succeed by relying on safe strategies. Based on this literature, we hypothesize a negative relation between the age of the Board of Directors and firm performance and believe that this negative effect is high in firms those having more growth options.

Hypothesis 2: The negative effect of the board of director's age on firm performance is high in firms with more growth options.

The argument for the negative effect on firm's performance is based on the idea that the cost of consuming cognitive resources is increasing with age. However, the organization's context can also influence that cost. In a rapidly changing environment, there is a lot more information to acquire and analyze. Figuring out the implications of new technological developments requires more cognitive effort. Psychology literature supports the fact that increasing age results in low cognitive abilities and decline of memory, we expect there will be a negative relationship between older boards of directors and firm performance.

3 Data and Methodology

3.1 Sample formation

To examine the effect of the board of director's age on firm performance, this study uses a sample of all nonfinancial

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French firms listed on Euronext Paris covering the period from July 2005 to June 2023. Firms closing their account at the end of July N up to June N+1 are allocated to year N. In the sample selection process, delisted firms have been intentionally included due to mergers and acquisitions (e.g., Alcatel Lucent, Lafarge, Rhodia). This deliberate inclusion expands the scope of our study by incorporating companies that have experienced significant structural changes like mergers or acquisitions. The inclusion of delisted firms provides support in not only increasing the sample size but also helps to avoid relying too heavily on small firms, whose performance and organizational behavior can be strongly driven by idiosyncratic factors. This characteristic of our sample distinguishes our research from other studies by acknowledging and incorporating firms that have been excluded by focusing solely on currently listed firms.

Financial information including stock price information required to measure firm performance is obtained from Refinitiv. Yearly information from the firm's balance sheet has been used for the whole sample because most firms provide audited financial statements annually during our sample period. Information on corporate boards is hand-collected. It has been collected manually from the firm's annual reports (document de reference). This study includes both boards of directors (conseils d'administration) and supervisory boards (conseils de surveillances). Realistically, board variables (i.e., number of directors and number of independent directors) are observed at the closing of the fiscal year, subject to any necessary arrangements when board characteristics are subsequently provided at a later date, namely the reporting date. The final sample consists of 3,306 observations. After collecting both datasets (Governance data and financial data), they are merged through the ISIN (International Securities Identification Number) codes and corresponding years.

3.2 Methodology

Scholars who specialize in corporate governance have different opinions regarding the most appropriate measure of firm performance. The performance of the firm can be measured in different ways. Most research used either accounting-based measures like ROA, ROE, and P/B ratio or market-based measures like Tobin's Q to measure firm performance. The predominant firm performance indicator widely used in corporate governance studies is Tobin's Q (Marinova et al. 2016) because it can be seen as a good proxy for competitive advantage (Campbell Mínguez-Vera, 2008). Furthermore, in empirical research, Tobin's Q has been extensively used as a proxy for firm performance. For example, Carter et al. (2003); McIntyre, Murphy & Mitchell (2007). Dagsson and Larsson (2011); Nakano & Nguyen (2011); Yasser (2012); Terjesen & Francisco (2016) among others used Tobin's Q as a measure of firm performance. It indicates the firm's expected performance. Due to the frequent turnover of board members across different years, it is hard to derive results based on past performance, as Tobin's Q is based on future expectations, therefore, it is argued that Tobin's Q is the most suitable firm performance measure for this study consistent with previous studies e.g., Carter et al. (2003); Nakano & Nguyen (2011); Bosch (2014).

Tobin's Q is the ratio of the market value of a firm to the replacement cost of its assets. It is calculated as:

$$Total\ Value\ of\ Asset - Book\ Value\ of\ Equity + Market\ Value\ of\ Equity / Total\ Assets$$

In this study, a log transformation of Tobin's Q is applied to mitigate the high skewness to the right of Tobin's Q. So, the main dependent variable is LNQ.

The main predictor variable is Board age. It is measured as the mean age of all board members, rather than providing the age of individual boards of directors. Nakano, M., & Nguyen, P. (2011) defined average age as among one of the observable characteristics of board members, based on the idea that age has a negative effect on risk-taking whereas risk-taking is essential in firm performance.

Following recent corporate board literature several control variables related to board characteristics and firm characteristics are included that may affect firm performance. Among board characteristics, BRD_TYPE (Board type) represents two-tiered boards (management and supervisory board) and unitary boards. BRD_SIZE (Board size) represents the number of directors at year-end. BRD_GENDIV_EXCL is measured by the Board gender diversity ratio, excluding employee directors. AFEP_INDEP is measured as the ratio of independent directors excluding employee representatives.

CEO characteristics include CEO_CHAIR (Duality), a dummy variable that represents 1 if the CEO is chairman of the board and 0 otherwise. CEO_TOP represents if the CEO graduated from a top school i.e., HEC, ESSEC, ESCP, IEP, ENA. Similarly, CEO_TENURE represents the number of years since the CEO was appointed. CEOs having long tenure are better able to resist pressure and are less inclined than newly appointed CEOs to yield to stakeholder pressure.

Among firm characteristics LNAGE, the natural log of the firm age is measured by the number of years since the firm was founded. LNTA represents the natural log of total assets. The ratio of fixed assets, measured as property, plant, and equipment to total assets (PPE/TA). A natural log of research and development expenditure to total assets incremented by one unit (LNRD) is used. Finally, the baseline model of firm performance includes the year (YEAR) and industry (INDUS) effects and can be written as:

(1)

$$LNQ = \alpha + \beta_1\, Board\ Age + \beta_2\, Board\ Type + \beta_3\, Board\ Size + \beta_4 AFEP + INDEP + \beta_5\, BRD + GENDIV - EXCL + \beta_6\, CEO\ Chair + \beta_7 CEO\ Top + \beta_8 CEO\ Tenure + \beta_9 LNTA + \beta_{10}\ LNAGE + \beta_{11} wPPE\text{-}TA + \beta_{12} LNRD + \beta_{13} wDEBT\text{-}TA + \gamma YEAR + \varphi INDUS + \mathcal{E}$$

This model is first estimated using Ordinary Least Squares (OLS) regressions with clustered standard errors by firms.

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This technique reveals the average conditional effects of explanatory variables. However, this method might obscure potential heterogeneity in the relationship between BOD characteristics and firm value. The effect of some of the focal variables is conditional on the environmental change firms are facing. It is important to test this contingent effect by interacting each focal variable with LNQ, representing the firm's growth. Since LNQ also appears on the left-hand side of the equation, this specification is incorrect in this scenario. Thus, in this case the appropriate method to use is quantile regression.

Furthermore, in alternative specifications, additional control measures have been introduced by either lagging all the explanatory variables on the right-hand side or incorporating the lagged dependent variable to control for individual firm characteristics.

4 Empirical Results

4.1 Descriptive statistics

Table 1 presents the summary statistics of the variables used in this study. The average board age is 57.9 years with an interquartile range of 6.13 years. The youngest BOD age averages 41.09 years, while, on the other hand, the oldest BOD averages 76 years. French board size averages about 10.17 members which is very much consistent with the board size in Japan as reported by Nakano and Nguyen (2011). Figures are also consistent with US firm boards indicated by Coles et al. (2008); Van et al., (2010). The board size in our sample is also in line with the study of Cavaco et al. (2016), where they reported board size for French firms averaged 9.29 in 2016. Benaguid et al., (2023) found an average French board size of 13 members but they used a very small sample size of 53 French firms. CEO age ranges from maximum of 85 years to a minimum of 29 years, averaging 55.96 years. The average CEO tenure is 10.15 years that is close to the study of Zhang (2010) who found a CEO tenure of 8 years for U.S. industrial firms, whereas a most recent study of Desir et al., (2023) found a CEO tenure of 7.44 years for U.S. firms.

Table 2 reports the pairwise correlations between the variables with a star indicating significance at 1% level. Notably, there is a strong correlation of nearly 50% between CEO age and CEO tenure. However, it's crucial to recognize that these variables capture different aspects and should not be considered interchangeable. For instance, larger and older firms often have CEOs with notably shorter tenures, even though these CEOs are generally older. All measures of board's age are negatively correlated with firm performance measure LNQ, thereby providing univariate support to first hypothesis. Board gender diversity excluding employees and CEO chair is positively correlated with firm performance, ultimately supporting that inclusion of more females on boards increases firm performance, as supported by Benaguid et al., (2023) who found a positive impact of board gender diversity on CSR performance for French firms listed on SBF 120 index.

Moreover, board gender diversity excluding employee directors is negatively correlated with board age shows that inclusion of females on boards reduces average age of board of directors. As female directors are relatively of lower age as compared to their male counterparts. According to Kervin (1992), correlations exceeding 0.7 are typically regarded as indicative of multicollinearity issues. Notably, correlation results show robust correlations, such as 0.98 between board age and board age excluding directors representing employees, 0.95 between board age and board age excluding CEO and 0.96 between board age excluding directors representing employees and board age excluding CEO.

Table 1. Descriptive statistics

	Mean	Std dev	Min	Max
LNQ	0.2986	0.4651	-1.3421	3.4603
BRD_AGE	57.9708	4.5993	41.09	76
BRD_AGE_XEMPL	58.2998	4.6902	41.09	76
BRD_AGE_XCEO	58.4397	5.1336	30.005	82.33
BRD_TYPE	0.189	0.3916	0	1
BRD_SIZE	10.169	3.820	3	23
BRD_GENDIV_EXCL	0.3140	0.1602	0	0.75
AFEP_INDEP	0.4988	0.2115	0	1
CEO_AGE	55.9603	8.0259	29	85
CEO_CHAIR	0.5172	0.4998	0	1
CEO_TOP	0.4993	0.5000	0	1
CEO_TENURE	10.1522	9.5405	0	53
LNTA	21.5552	2.4375	14.1154	28.6107
LNAGE	3.773	0.7465	1.0986	5.8805
wPPE_TA	0.1786	0.1718	2.8001	0.799
LNRD	0.5283	0.9129	0	4.7934
wDEBT_TA	0.2553	0.1696	0	0.7249

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Table 2. Correlation between explanatory variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LNQ	1	1.0000																
BRD_AGE	2	-0.0765*	1.0000															
BRD_AGE_XEMPL	3	-0.0888*	0.9844*	1.0000														
BRD_AGE_XCEO	4	-0.0697*	0.9559*	0.9694*	1.0000													
CEO_AGE	5	-0.0467*	0.2472*	0.2556*	0.0822*	1.0000												
BRD_TYPE	6	-0.0191	0.1775*	0.1662*	0.1500*	-0.054*	1.0000											
BRD_SIZE	7	-0.1468*	0.1367*	0.1925*	0.1722*	0.1142*	-0.136*	1.0000										
AFEP_INDEP	8	0.0374	0.3120*	0.3269*	0.3261*	0.0309	0.1651*	0.1819*	1.0000									
BRD_GENDIV_EXCL	9	0.0814*	-0.0973*	-0.074*	-0.091*	0.0984*	-0.0175	0.0249	0.1001*	1.0000								
CEO_CHAIR	10	0.0236	-0.137*	-0.137*	-0.160*	0.2178*	-0.494*	-0.0299	-0.130*	-0.119*	1.0000							
CEO_TOP	11	0.0133	0.0891*	0.1088*	0.1291*	-0.0085	0.0137	0.2141*	0.0912*	-0.0224	0.0436	1.0000						
CEO_TENURE	12	0.0135	0.0760*	0.0564*	-0.0345	0.4929*	0.0361	-0.200*	-0.092*	0.0763*	0.2939*	-0.135*	1.0000					
LNTA	13	-0.2574*	0.2029*	0.2478*	0.2348*	0.0903*	-0.0028	0.7126*	0.2825*	0.0385	-0.085*	0.3119*	-0.207*	1.0000				
LNAGE	14	-0.1757*	0.1802*	0.2032*	0.1853*	0.0961*	0.0193	0.3390*	0.0763*	0.0882*	-0.055*	0.1185*	-0.085*	0.4300*	1.0000			
wPPE_TA	15	-0.0583*	0.0137	0.0154	0.0095	0.0291	-0.0298	0.0706*	-0.0151	-0.0200	-0.0352	0.0054	-0.075*	0.0702*	0.0888*	1.0000		
LNRD	16	0.3712*	0.0808*	0.0748*	0.0773*	0.0333	-0.088*	-0.101*	0.1467*	-0.0421	0.0307	-0.097*	-0.080*	-0.205*	-0.119*	-0.123*	1.0000	
wDEBT_TA	17	-0.0821*	-0.0333	-0.0338	-0.0161	-0.084*	0.0307	0.0308	0.0236	0.0578*	-0.0401	0.0421	-0.075*	0.0671*	-0.0130	0.3672*	-0.200*	1.0000

**** p<0.01, ** p<0.05, * p<0.1*

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4.2 OLS Regression Models

Table 3 presents the OLS regression results of LNQ. In models 1-3, performance variables are regressed on BOD, board level, and firm characteristics. This model specifically analyzes the relationship between BOD age and the performance metrics while controlling for other factors such as board type, board independence, board gender diversity, financial metrics, and other relevant variables. Then, the lagged dependent variable is included among the regressors (models 4-6). Including the lagged dependent variable in a regression model is a common method to control autocorrelation. Regression results for the first model show that a one-unit increase in board age is associated with a decrease of approximately 0.0099 units in LNQ, and this effect is statistically significant at the 0.05 level. For board age excluding employees and board age excluding CEO a one-unit increase in board age is associated with a decrease of 0.0114 and 0.0081 units respectively. The inclusion of lagged dependent also confirms the significant negative impact of age on performance measure. Model 4-6 shows results of lagged dependent, it shows a one-unit increase in board age is associated with a decrease of approximately 0.0022 units in LNQ. It indicates that as the average age of the board increases, firm performance as measured by the Q ratio and its lagged value decreases. The positive and significant coefficients of LNRD highlight the importance of research and development in enhancing firm performance. This effect is consistent across all models.

4.2.1 Alternative Performance Measure

We check the robustness of our findings to alternative performance measures as the dependent variable. We employ the natural logarithm of market-to-book value as the dependent variable. Table 3.1 below presents the results using OLS analysis. Consistent with the previous findings of LNQ, for market-to-book value, a one-unit increase in board age causes a decrease of approximately 0.0122 units. Companies with a high average age of board of directors appear to have lower market-to-book value.

This consistently negative effect supports the first hypothesis that board age has a negative impact on firm performance and suggests that older BODs tend to be associated with lower firm performance. The consistency of the negative coefficients across different models and the statistical significance of these coefficients strengthen the support for hypothesis H1. It suggests that the negative relationship between BOD age and firm performance is robust and holds even after controlling for other relevant factors such as board characteristics, firm size, industry sector, and financial metrics. Board type and board size have positive but not significant effects indicating that the type of board and its size do not have a substantial effect on firm performance in these models.

Overall, results suggest that the presence of older BODs causes a decrease in firm performance. To verify this claim, a regression analysis using a matched sample, including the lagged dependent variable is conducted.

4.3 Matched sample analysis

To conduct analysis, first, the sample is divided based on the median age of the board of directors. This division created two distinct groups: a treated group, consisting of a high BOD age group, and a control group, comprising of low BOD age group. Once these groups are established, all the board and firm characteristics are balanced across the two BOD age groups using a statistical technique known as entropy balancing, developed by Hainmueller and Xu (2013), to ensure that the distribution of each variable (both from treated and control group) is similar. This outcome is attained by reweighting observations of the control group (low BOD age group).

Unlike propensity score matching, entropy balancing has several advantages. Firstly, it reduces the risk of losing observations if an appropriate match cannot be found in the control group or if an observation from the treated group is dropped due to lack of a suitable match. This ensures that all available data is utilized, thus maximizing the statistical power and sample size. Secondly, post-matching propensity score matching may result in similar distributions of variables across the control group and treated groups, there is no guarantee of achieving identical distributions. However, on the other side entropy balancing minimizes differences between groups in variable distributions, though perfect balance is not always achieved.

Being a vital methodological tool in research, its importance cannot be underestimated. Especially when examining the relationship between BOD age and firm performance, it's crucial to consider potential biases introduced by endogenous selection. For example, if older BODs work with firms with specific characteristics associated with lower firm performance, there will be a negative relationship that doesn't necessarily indicate causation (that older BODs are responsible for poor firm performance). Results presented in Table 4 show that the characteristics of firms having older BODs are different from those managed by Younger BODs. A clear difference in the past performance of the firm can be seen. While the size of firms with older BODs (10.68) is larger than those with younger BODs (9.67). Board gender diversity is relatively low. CEO age is also relatively high as compared to firms having younger BODs. These relationships explain why older BODs are associated with lower firm performance. Following the reweighting method applied to observations in the control group, the differences in the characteristics of variables become very small. The OLS regression with matching (Table 4.1) suggests that board age has a constantly negative impact on firm performance. Board age excluding employees and excluding CEO also show a negative relationship, supporting the main effect.

Further, an entropy balancing sample is used to run weighted regressions using model specifications including lagged dependent. The results are presented in Table 5. The effect of BOD age is very close to the result of an unbalanced sample. This statement suggests that after applying a balancing technique or addressing sample imbalances, the estimated coefficients in the regression model, as well as their statistical significance, do not

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Table 3. Effect of BOD's age on LNQ

	LNQ		LNQ		LNQ		LNQ_L1		LNQ_L1		LNQ_L1	
	(1)		(2)		(3)		(4)		(5)		(6)	
BRD_AGE	-0.0099	**					-0.0022	*				
	(0.0047)						(0.0012)					
BRD_AGE_XEMPL			-0.0114	**					-0.0026	**		
			(0.0047)						(0.0012)			
BRD_AGE_XCEO					-0.0081	*					-0.0017	**
					(0.0042)						(0.0011)	
CEO_AGE					-0.0049						-0.0015	
					(0.0022)						(0.0005)	
BRD_TYPE	0.0844		0.0873		0.0825		0.0201		0.0209		0.0197	
	(0.0698)		(0.0695)		(0.0688)		(0.0153)		(0.0154)		(0.0152)	
BRD_SIZE	0.0069		0.0076		0.0086		0.0014		0.0016		0.0019	
	(0.0061)		(0.0062)		(0.0061)		(0.0015)		(0.0015)		(0.0014)	
AFEP_INDEP	0.0816		0.0901		0.0776		0.0163		0.0186		0.0151	
	(0.0833)		(0.0825)		(0.0831)		0.0230)		(0.0229)		(0.0227)	
BRD_GENDIV_EXCL	0.2197		0.2122		0.2274	*	0.0210		0.0193		0.0246	
	(0.1335)		(0.1333)		(0.1345)		(0.0422)		(0.0421)		(0.0426)	
CEO_CHAIR	-0.0046		-0.0054		0.0043		0.0026		0.0023		0.0054	
	(0.0408)		(0.0406)		(0.0412)		(0.0100)		(0.0099)		(0.0104)	
CEO_TOP	0.1229	***	0.1244	***	0.1247	***	0.0341	***	0.0345	***	0.0346	
	(0.0403)		(0.0404)		(0.0406)		(0.0105)		(0.0105)		(0.0105)	
CEO_TENURE	0.0001		0.0001		0.0017		0.0003		0.0003		0.0008	
	(0.0019)		(0.0019)		(0.0022)		(0.0004)		(0.0004)		(0.0005)	
LNTA	-0.0307	**	-0.0298	**	-0.0293	**	-0.0063	**	-0.0061	**	-0.0058	**
	(0.0129)		(0.0129)		(0.0128)		(0.0031)		(0031)		(0.0030)	
LNAGE	-0.0463		-0.0446		-0.0429		-0.0016		-0.0012		-0.0005	
	(0.0322)		(0.0322)		(0.0322)		(0.0073)		(0.0073)		(0.0074)	
wPPE_TA	-0.2127		-0.2152		-0.1951		-0.0117		-0.0124		-0.0056	
	(0.1352)		(0.1352)		(0.1362)		(0.0312)		(0.0313)		(0.0321)	
LNRD	0.1024	***	0.1023	***	0.1053	***	0.0234	***	0.0235	***	0.0245	***
	(0.0331)		(0.0330)		(0.0333)		(0.0086)		(0.0086)		(0.0085)	
wDEBT_TA	-0.0359		-0.0384		-0.0484		-0.0292		-0.0297		-0.0333	
	(0.1841)		(0.1836)		(0.1841)		(0.0436)		(0.0436)		(0.0440)	
constant	1.1878	***	1.2406	***	1.2759	***	0.2079	**	0.2238	**	0.2423	**

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	(0.3626)	(0.3590)	(0.3384)	(0.0919)	(0.0907)	(0.0877)
F value	9.58	9.51	8.99	171.72	170.29	166.00
Adjusted R2	0.2830	0.2856	0.2869	0.7910	0.7911	0.7913
N observations	3,306	3,306	3,306	3,306	3,306	3,306

change significantly compared to the estimates obtained from the original, unbalanced sample. In other words, the relationships between the independent and dependent variables, as captured by the coefficients, and their significance levels remain consistent even after adjusting for any sample imbalances. This indicates that the observed associations between the variables are robust and not heavily influenced by potential biases in the sample composition.

Table 3.1. Effect of BOD's age on other firm performance measuree

	LN_MKT_BOOK		**LN_MKT_BOOK**		**LN_MKT_BOOK**	
	(1)		(2)		(3)	
BRD_AGE	-0.0122					
	(0.0079)					
BRD_AGE_XEMPL			-0.0149	**		
			(0.0078)			
BRD_AGE_XCEO					-0.0119	*
					(0.0071)	
CEO_AGE					-0.0022	
					(0.0042)	
BRD_TYPE	0.1237		0.1282		0.1228	
	(0.1159)		(0.1155)		(0.1151)	
BRD_SIZE	0.0196		0.0205		0.0204	
	(0.0184)		(0.0184)		(0.0184)	
AFEP_INDEP	0.2567		0.2731		0.2638	
	(0.1782)		(0.1777)		(0.1801)	
BRD_GENDIV_EXCL	0.2236		0.2102		0.2117	
	(0.2874)		(0.2869)		(0.2871)	
CEO_CHAIR	0.0343		0.0321		0.0357	
	(0.0770)		(0.0768)		(0.0786)	
CEO_TOP	0.1090	*	0.1116	*	0.1130	*
	(0.0671)		(0.0671)		(0.0673)	
CEO_TENURE	-0.0000		0.0001		0.0004	
	(0.0039)		(0.0038)		(0.0045)	
LNTA	-0.0563		-0.0551	*	-0.0549	
	(0.0344)		(0.0343°		(0.0343)	
LNAGE	-0.0838		-0.0812		-0.0822	

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	(0.0610)		(0.0611)		(0.0607)	
wPPE_TA	-0.4504	*	-0.4548	*	-0.4521	*
	(0.2686)		(0.2696)		(0.2746)	
LNRD	0.1047	**	0.1046	**	0.1053	**
	(0.0485)		(0.0483)		(0.0488)	
wDEBT_TA	0.2498		0.2472		0.2466	
	(0.3235)		(0.3232)		(0.3249)	
constant	1.6459	**	1.7576	***	1.7063	***
	(0.7035)		(0.6880)		(0.6823)	
F value	9.21		9.21		8.85	
Adjusted R2	0.2093		0.2111		0.2101	
N observations	3,187		3,187		3,187	

4.4 Analyzing the role of firm performance

The next question that needs to be answered here is whether the effect of BOD age varies with the level of firm performance. Given the conditioning factor explained earlier, quantile regression is the best method to be used here. One advantage of quantile regression is that it is less influenced by outliers and non-normally distributed errors (Koenker, 2005). Thus, the current study estimates the effect of BOD age together with CEO and firm characteristics at the 25th, 50th, and 75th quantile. The firms with low growth opportunities often possess lower quantiles, while higher quantiles represent firms with more growth opportunities.

The findings presented in Table 6 show that the effect of BOD age is significantly more negative at the upper quantile of 0.75 as compared to lower quantile of 0.25. This negative effect is further confirmed by inter-quantile regression at higher level of firm performance. The stronger negative effect of BOD age on high-growth firms implies that the drawbacks of having older BODs are more pronounced for growth firms compared to their mature counterparts. This may be because of the key significance of BOD's responsiveness to new paradigms within these growth-oriented firms (Miller, 1991).

The effect of the CEO Chair is conditional on the quantile for which it is estimated. CEO chair shows no significant impact on firm performance at a lower quantile. However, the effect is high at median and higher quantiles for high-growth firms. For example, the decrease in LNQ is approximately 4.5% at the 75th percentile, which is 4 times higher than the effect suggested by the OLS regression. R&D investments are positive and effective at the median and higher quantiles of firm performance, as compared to lower quantiles. This indicates that firms having high valuation ratios benefit more from R&D expenditures.

The quantile regression result shows that BOD age plays a more important role than the effects suggested by OLS. Significantly, these phenomena are more pronounced in high-growth firms (whose importance in the economy is expected to rise in the future) as compared to low-growth firms (who are expected to experience diminished economic impact). These results are consistent with the hypothesis of a declining ability of older BODs to carry out complex tasks and welcome more innovative strategies that are required by high-growth firms. Moreover, growth-oriented firms require more time and effort from BODs. In this regard, older BODs are less likely to benefit firms because of their decreasing cognitive abilities (Singh-Manoux et al., 2012) and lack the stamina and energy to implement new strategies and deal with innovation (Child,1974). Furthermore, since they are less concerned about future growth, this ultimately results in affecting firm performance negative.

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Table 4. Comparison of matched and unmatched samples using entropy balancing

	Treatment group			Control group before matching			Control group after matching		
	Mean	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**
LNQ_L1	0.261	0.172	1.910	0.348	0.271	1.763	0.261	0.171	1.293
LNTA	22.080	6.134	-0.109	21.040	5.225	0.124	22.080	5.069	-0.018
LNAGE	3.894	0.492	0.071	3.657	0.593	0.143	3.894	0.491	0.135
wPPE_TA	0.179	0.028	1.492	0.178	0.031	1.348	0.179	0.024	1.097
LNRD	0.575	0.777	1.553	0.483	0.884	2.140	0.575	0.845	1.695
wDEBT_TA	0.249	0.026	0.611	0.262	0.032	0.416	0.249	0.026	0.443
BRD_TYPE	0.241	0.183	1.209	0.138	0.119	2.096	0.241	0.183	1.209
BRD_SIZE	10.680	14.790	0.086	9.670	13.900	0.346	10.680	13.120	0.162
AFEP_INDEP	0.556	0.042	-0.131	0.444	0.041	0.224	0.556	0.049	0.225
BRD_GENDIV_EXCL	0.297	0.026	-0.275	0.330	0.024	-0.627	0.297	0.026	-0.431
CEO_AGE	56.770	59.460	-0.014	55.180	68.020	0.124	56.770	57.940	0.153
CEO_CHAIR	0.465	0.249	0.140	0.568	0.246	-0.274	0.465	0.249	0.140
CEO_TOP	0.563	0.246	-0.253	0.438	0.246	0.250	0.563	0.246	-0.253
CEO_TENURE	10.220	88.710	1.256	10.090	93.310	1.460	10.220	98.930	1.600
IND_1	0.044	0.042	4.469	0.038	0.037	4.823	0.044	0.042	4.469
IND_2	0.077	0.071	3.179	0.060	0.056	3.721	0.077	0.071	3.179
IND_3	0.210	0.166	1.423	0.191	0.154	1.575	0.210	0.166	1.424
IND_4	0.178	0.147	1.682	0.138	0.119	2.103	0.178	0.147	1.682
IND_5	0.128	0.112	2.222	0.110	0.098	2.489	0.128	0.112	2.222
IND_6	0.117	0.104	2.378	0.197	0.158	1.522	0.117	0.104	2.378
IND_7	0.093	0.085	2.795	0.098	0.089	2.698	0.093	0.085	2.795
IND_8	0.042	0.041	4.543	0.041	0.039	4.660	0.042	0.041	4.543
IND_9	0.029	0.029	5.563	0.070	0.065	3.379	0.030	0.029	5.561

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Table 4.1. Effect of BOD's age on firm performance with matching

	LNQ		LNQ		LNQ	
	(1)		(2)		(3)	
BRD_AGE	-0.0098	*				
	(0.0053)					
BRD_AGE_XEMPL			-0.0116	**		*
			(0.0054)			
BRD_AGE_XCEO					-0.0093	
					(0.0048)	
CEO_AGE					-0.0031	
					(0.0023)	
BRD_TYPE	0.0184		0.0198		0.0176	
	(0.0682)		(0.0679)		(0.0678)	
BRD_SIZE	0.0025		0.0032		0.0035	
	(0.0064)		(0.0064)		(0.0064)	
AFEP_INDEP	0.0635		0.0677		0.0643	
	(0.0857)		(0.0852)		(0.0852)	
BRD_GENDIV_EXCL	0.2161		0.2102		0.2124	
	(0.1575)		(0.1574)		(0.1585)	
CEO_CHAIR	-0.0293		-0.0283		-0.0253	
	(0.0453)		(0.0449)		(0.0458)	
CEO_TOP	0.1077	***	0.1086	***	0.1101	***
	(0.0390)		(0.0390)		(0.0392)	
CEO_TENURE	0.0013		0.0013		0.0021	
	(0.0020)		(0.0021)		(0.0024)	
LNTA	-0.0294	**	-0.0290	**	-0.0284	**
	(0.0129)		(0.0128)		(0.0128)	
LNAGE	0.0105		0.0114		0.0126	
	(0.0435)		(0.0432)		(0.0432)	
WPPE_TA	-0.2339		-0.2368		-0.2273	
	(0.1614)		(0.1614)		(0.1657)	
LNRD	0.0752	***	0.0747	***	0.0763	***
	(0.0309)		(0.0309)		(0.0314)	
WDEBT_TA	-0.1012		-0.1035		-0.1114	
	(0.2008)		(0.1995)		(0.2025)	

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CONSTANT	1.0450	***	1.1342	***	1.1444	***
	(0.4286)		(0.4225)		(0.3946)	
F VALUE	10.85		10.75		10.39	
ADJUSTED R2	0.2538		0.2571		0.2563	
N OBSERVATIONS	3,306		3,306		3,306	

Table 5. Effect of bod's age on firm performance with matching including lagged dependent

	LNQ		**LNQ**		**LNQ**	
	(1)		(2)		(3)	
BRD_AGE	-0.0019	*				
	(0.0011)					
BRD_AGE_XEMPL			-0.0025	**		
			(0.0012)			
BRD_AGE_XCEO					-0.0018	*
					(0.0011)	
CEO_AGE					-0.0012	**
					(0.0005)	
BRD_TYPE	0.0018		0.0021		0.0016	
	(0.0121)		(0.0121)		(0.0121)	
BRD_SIZE	-0.0002		-0.0002		0.0002	
	(0.0013)		(0.0012)		(0.0012)	
AFEP_INDEP	0.0138		0.0149		0.0136	
	(0.0196)		(0.0195)		(0.0193)	
BRD_GENDIV_EXCL	-0.0209		-0.0221		-0.0207	
	(0.0435)		(0.0433)		(0.0435)	
CEO_CHAIR	0.0001		0.0002		0.0016	
	(0.0081)		(0.0081)		(0.0082)	
CEO_TOP	0.0248	***	0.0251	***	0.0254	***
	(0.0089)		(0.0089)		(0.0091)	
CEO_TENURE	0.0003		0.0003		0.0006	
	(0.0004)		(0.0004)		(0.0005)	
LNTA	-0.0061	**	-0.0060	**	-0.0058	**
	(0.0028)		(0.0028)		(0.0028)	

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LNAGE	0.0042		0.0044		0.0050	
	(0.0071)		(0.0071)		(0.0071)	
WPPE_TA	0.0149		0.0142		0.0195	
	(0.0305)		(0.0307)		(0.0315)	
LNRD	0.0187	***	0.0186	***	0.0195	***
	(0.0072)		(0.0072)		(0.0072)	
WDEBT_TA	-0.0610	**	-0.0615	*	-0.0654	**
	(0.0329)		(0.0329)		(0.0333)	
CONSTANT	0.2310	**	0.2551	***	0.2717	***
	(0.1005)		(0.0982)		(0.0974)	
F VALUE	274.51		273.88		266.09	
ADJUSTED R2	0.7923		0.7925		0.7926	
N OBSERVATIONS	3,306		3,306		3,306	

Table 7. Effect of BOD's age on LNQ at various quantiles

	Quantiles						**Inter-quartile**	
	25th		50th		75th		75th - 25th	
	(1)		(2)		(3)		(4)	
BRD_AGE	-0.0037	**	-0.0090	***	-0.0109	***	-0.0072	
	(-2.60)		(-4.34)		(-4.45)		(-3.03)	
BRD_TYPE	0.0198		0.0331	**	0.0263		0.0064	
	-1.19		(1.67)		(0.98)		(0.27)	
BRD_SIZE	-0.0032	*	0.0002		0.0099	***	0.0131	
	(-1.53)		(0.13)		(3.00)		(4.65)	
AFEP_INDEP	0.0506	*	0.1089	***	0.1622	***	0.1116	
	(1.99)		(3.56)		(4.84)		(2.59)	
BRD_GENDIV_EXCL	0.0367		0.0762		0.3222	***	0.2854	
	(0.62)		(1.68)		(3.42)		(2.71)	
CEO_CHAIR	0.0072		-0.0302	*	-0.0452	*	-0.0524	
	(0.50)		(-1.89)		(-2.48)		(-2.06)	
CEO_TOP	0.0307	*	0.0740	***	0.1033	***	0.0726	

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	(2.59)		(3.74)		(8.10)		(3.89)
CEO_TENURE	-0.001		0.0001		-0.0004		-0.0003
	(-0.07)		(0.12)		(-0.24)		(-0.30)
LNTA	0.0008		-0.0125	**	-0.0405	***	-0.0413
	(0.20)		(-4.54)		(-5.65)		(-7.28)
LNAGE	-0.0224	**	-0.0402	***	-0.0721	***	-0.0496
	(-2.69)		(-4.15)		(-4.45)		(-2.92)
wPPE_TA	-0.1517	***	-0.1890	***	-0.1284	**	0.0232
	(-2.25)		(-3.31)		(-1.84)		(0.31)
LNRD	0.0588	***	0.0894	***	0.1462	***	0.0874
	(5.29)		(6.24)		(6.00)		(4.46)
wDEBT_TA	0.0157		-0.0432		-0.0772		-0.0930
	(0.26)		(-0.87)		(-1.31)		(-1.44)
constant	0.0284	***	0.9882	***	1.8192	***	1.5342
	(2.83)		(7.50)		(8.41)		(6.78)
Pseudo R2	0.0970		0.1516		0.2065		0.2065 | 0.0970
N observations	3,306		3,306		3,306		3,306

*t-statistics between brackets are based on bootstrapped standard errors. ***, **, * indicate statistical significance at the 1%, 5% and 10% level.*

5 Conclusion

Board age constitutes a vital yet often overlooked demographic characteristic within corporate governance literature. It is possibly because of two reasons. One is that data about board characteristics specifically board age is not available in most of the databases except a few (BoardEx for US firms) and it needs to be collected manually from annual reports. Secondly, annual reports are published quarterly, semi-annually, and annually so keen observation is required to collect data while minimizing chances of error.

Another important reason is that there can be both positive and negative effects of boards on firm performance. Being the most experienced members, they can benefit the firm (Wang & Yin, 2021), while, on the other hand, increasing age results in cognitive decline, affecting memory and resulting in other psychological and physical declines (Mutter, Strain, & Plumlee., 2007; Pachur et al., 2009; Korniotis and Kumar., 2011; Singh-Manoux et al., 2012; Waelchli and Zeller., 2013; Serfling., 2014).

The current study investigated this sensitive issue of board age and its impact on firm performance using a sample of French companies. Data on board and CEO characteristics is manually collected after ensuring measures to minimize chances of error. The inclusion of lag-dependent variables in regression and using entropy balancing for matching while matching for younger and older boards shows that older board members face challenges in adapting to rapidly evolving business environments and are reluctant to make bold decisions. Consequently, more presence of older BODs on boards may hinder quick decision-making and delay the implementation of forward-thinking initiatives, ultimately reducing firm performance. Waelchli and Zeller (2013) found similar results for small and medium-sized companies in Switzerland. Horváth and Spirollari (2012) provide similar findings in the case of US firms.

The typical reason lying behind this is cognitive decline associated with increasing human age especially when they cross age above 60 this decline becomes more obvious (Horn., 1968; Salthouse., 2000; Deary et al., 2009) and Cornelis et al., 2019). The main concern induced by aging is cognitive decline which reflects the ability to absorb and process new information (Deary et al. 2009; Cornelis et al. 2019). While it is perceived that older board of directors being in the upper tail of their

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age group in terms of intellectual abilities (Masulis et al. 2022), these psychological changes with increasing age hinder their abilities to meet new challenges and to meet the heavy demands of boardroom duties. Wang & Yin (2021) documented that older members have fewer career concerns than their younger counterparts. Korniotis and Kumar (2011) show that older board of directors influences the decision-making process and needs more time to make decisions.

Waelchli and Zeller (2013) show that older BODs consider tasks complex which ultimately hinders a firm's performance. Results of quantile regression support these arguments. Our results are also robust to different performance measure of market-to-book value. Our results are consistent with the arguments of regulators and scholars, who have argued about the consequences of increasing age and related cognitive declines.

Results of current research suggest that the age of board members is particularly important in deciding the performance of firms. Having older board of directors on boards have both positive and negative effects. On one side firms benefit from the experience and connections of older BODs, on the other side, their reluctance to accept change and changing market conditions and cognitive decline hinder firm performance.

The implication of our results is that shareholders are more concerned about their investments in firms and shareholder activism started this debate, and in France mostly for public limited companies (Société Anonym-SA) directors are appointed by shareholders in an ordinary general meeting, and they generally have no direct authority over the board once it is appointed. So the appointment of the board of directors should be carried out with utmost diligence, ensuring that each board member supports company's vision and brings the necessary expertise. The decline in physical and mental strength is not uniform across the population. Some may remain active and full of energy despite their old age while other may bear the signs of premature aging. Retaining the latter would involve a considerable risk.

A solution to this is a provision should be made about the retirement of directors under an age limit and preventing or restricting the appointments of directors over a given age like retirement policies are set for CEOs. Cline and Yore (2016) show that the implementation of mandatory retirement policies represents an effective form of firm governance designed to mitigate the underperformance of older managers.

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