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Does a business education make for better innovative managers? An empirical examination of CEOs' business education, CEO duality and R&D investment intensity

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Abstract

This study aims to explore how chief executive officers (CEOs) business education influences their company's investment in Research and Development (R&D) taking into account the moderating impact of CEO duality. Risks related to investment in research and development might have an impact on CEOs who are responsible for improving management effectiveness and company value. Insufficient education among executives can hinder effective oversight. Findings from analyzing data from 1632 firm-year observations from 2015 to 2020 of companies listed on the Shanghai and Shenzhen Stock Exchanges reveal that CEOs with dual roles tend to prioritize R&D investments and innovation. Additionally, CEOs without a Master of Business Administration (MBA) or executive MBA education (EMBA) exhibit a greater willingness to take risks leading to more innovation and spending on R&D. This research emphasizes the need to consider CEOs' demographics, board structures and governance mechanisms to promote innovation in companies.

Keywords: Corporate governance, Research and development investment intensity, R&D, Innovation, CEO, Business education, CEO duality, MBA / EMBA, Moderating effect, China.

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1. Introduction

China witnessed substantial growth in research and development (R&D) in 2020 as the world's second-largest economy. The National Bureau of Statistics has highlighted that China's investment in R&D surpassed $418.2 billion in 2022 indicating a year-on-year increase of 10.1%. In 2022, China's total R&D spending accounted for 2.54% of its gross domestic product, a year-on-year increase of 0.11 percentage points. As companies expand in size, they face a growing need for both financial capital and effective management skills [1]. Thus, CEOs and top managers are granted considerable flexibility in determining the most suitable approach to fulfill the organization's strategic goals. This is even more pronounced in emerging markets. However, R&D investment carries inherent risks and a significant potential for failure [2]. According to Upper Echelons Theory, organizations reflect the personal characteristics of top managers [3]. In

addition, the level of individuals' proficiency does not solely rely on their company-specific experience but also on their overall managerial skills and prior education. Insufficient education among executives and board members can significantly impede their capacity to effectively oversee and govern the operations of a business [4].

Kao and Chen [2] studied CEO characteristics as a key driver of CEO discretion in deciding R&D expenditure and further emphasized the influence of these characteristics on R&D investment intensity. CEOs are hired to enhance management efficiency and their self-interests may diverge from the goal of enhancing firm value. The study by Harymawan et al. [5] focused on the relationship between CEO education level and CEO accounting expertise in the context of R&D investment intensity but did not thoroughly explore the impact of different types of CEO education and other attributes on R&D spending. Similarly, Kao and Chen [2] examined CEO attributes such as CEO duality, tenure, ownership, and their influence on R&D intensity for initial public offering (IPO) firms. However, they overlooked other attributes such as education in business. This study aims to address these gaps in the existing literature by investigating the effects of CEO duality on the relationship between CEO business education and R&D investment intensity. This is particularly important in light of Sannino et al.'s [6] proposition that professional management education contributes to better administrative practices within firms by attracting individuals with advanced organizational and rationalization skills. Furthermore, the various disciplines within the field of education have the potential to influence managers' proclivity towards increased expenditure on R&D leading to divergent preferences among individuals. Scholars argue that MBA programs may attract risk-averse and conservative students prioritizing analytical skills to minimize mistakes and losses. Consequently, MBA candidates might display less innovation and risk-taking tendencies compared to "self-made" executives [6].

Additionally, the upper echelons theory points out that the decision-making process of a company can be understood by considering the observable characteristics of the CEO such as CEO duality [7]. When the CEO also holds the position of chair of the board, there is a greater potential for agency problems and entrenchment resulting in higher agency costs due to information asymmetry [8]. This duality can lead to a conflict of interest as the CEO-cum-Chairman may prioritize personal gain over the interests of other stakeholders [9]. Consequently, CEO-cum-Chairman managed firms may exhibit a higher risk propensity compared to professional-CEO-managed firms [10]. Thus, CEO duality is an important factor influencing a CEO's capability and inclination to take certain actions [2].

It is worth noting that the influence of the USA followed by China as key players heavily impacted the overall global R&D figures. Without their contributions, global R&D would have experienced a decrease of -0.6% in 2020 compared with the actual growth of 3.3%. China increased spending by 9.6% according to the 2022 global innovation index. Similarly, business R&D would have declined by -1.6% instead of the observed 3.5% growth. The National Bureau of Statistics has highlighted that China's investment in research and development (R&D) surpassed $418.2 billion in 2022 indicating a year-on-year increase of 10.1%. According to the 14th five-year plan period (2021–2025), the anticipated annual growth rate of 7% was exceeded by this growth rate of 7.7% at constant prices [11]. Importantly, China's total R&D spending accounted for 2.54% of its gross domestic product in 2022, a year-on-year increase of 0.11 percentage points. Furthermore, enterprise spending on R&D played a significant role in China's overall R&D growth contributing to 84% of the country's total increase. According to Huaxia, this represents a notable increase of 4.6 percentage points compared with the previous year [12].

This global influence highlights the value of further investigating how the business education of CEOs is related to the intensity of R&D investment from the Chinese perspective. Furthermore, this study focused specifically on the unexplored aspect of the interaction between CEO duality and CEOs' business education which has been found to affect R&D by upper-echelons scholars [13].

The following section presents the literature state of the art on R&D investment, CEO education and CEO duality and accordingly develops the research hypotheses. The statistical methodology is explained in section 3 followed by a discussion of the results in section 4. The paper concludes with the implications and limitations of the study.

2. Literature Review and Research Hypotheses Development

2.1. Research and Development Investment (R&D)

R&D expenditure is a discretionary and high-risk investment strategy that serves as a key driver of future expansion and achieving a competitive edge contributing to the creation of value for firms [2]. Continuous innovation and the establishment of competitive advantages are essential with research and development activities serving as a means to achieve these goals for companies to achieve success in both the short- and long-term [14]. Several empirical studies have emphasized the significant impact of R&D investments on improving a company's innovation endeavors [1]. Companies can acquire new technology and knowledge, fostering the development of more efficient production methods and enabling the creation of new or improved products that attract and retain consumers resulting in increased profitability by investing in R&D [14]. Consequently, R&D becomes a strategic decision that bolsters a company's competitiveness and innovation capability [14, 15].

The way CEOs make decisions and their personal values have a significant impact on how a business makes decisions and plans its strategies. Previous research in organization theory and behavior has shown that CEOs have a key role in this process [15]. CEOs are usually experts in their specific roles providing a broad view and utilizing their knowledge, beliefs and skills developed through their experience [16]. When it comes to allocating funds for R&D projects, conflicts can arise between managers and shareholders due to differing preferences for time and attitudes towards risk [1].

2.2. CEO Business Education and R&D Investment Intensity

Factors such as education level and specialization have a powerful influence on individuals' cognitive frameworks, ultimately shaping their skills and preferences and influencing the outcomes of their decision-making processes [17, 18]. A recent study analyzed Saudi energy companies listed from 2009 to 2021. Al-Dubai [4] conducted research to test the hypothesis that a highly educated board influences financial risk disclosure. The results of the study indicate that education level has a positive effect on financial risk disclosure suggesting that education level plays a significant role in determining the extent of financial risk disclosure. Studies examining the impact of CEO educational background on firm performance were predominantly conducted prior to the financial crisis of 2008 [18]. However, in the aftermath of the crisis, this research focus has transitioned from board independence which has become extensively regulated to board quality, encompassing metrics such as educational qualifications, industry expertise and board members' age [19]. Limited research has been conducted regarding the impact of formal professional education on corporate outcomes with a particular focus on the MBA degree [3].

The educational background of individuals is a multifaceted and informative factor that reveals their knowledge, skills, socioeconomic status, motivation, cognitive style, risk tolerance and other underlying traits. Psychological research suggests that having diverse educational backgrounds among board members can improve firm performance especially when viewed through the lens of group composition theory [20]. The upper-echelon theory put forth by Hambrick and Mason [3] states that the educational backgrounds of managers significantly influence the outlook of organizations, corporate performance and strategic business models. However, previous research has primarily focused on investigating the influence of educational backgrounds on innovation without adequately considering the increasing levels of education in recent years.

An opposing perspective proposes that the degree primarily functions as a filtering mechanism for aligning individuals with suitable job roles, lacking substantial long-term effects on both the degree holder and the company while some speculation suggests that MBAs prioritize short-term performance over innovation and asset development [3]. This hypothesis is supported by the findings of Dahlin et al. [21] who argued that education has a substantial influence on information-processing theories which in turn shape individuals' possession of information, knowledge and skills. The significance of diverse educational backgrounds is particularly relevant in teams involved in complex cognitive tasks such as those related to long-term R&D investment.

Critics argue that MBA programs in business education often attract risk-averse individuals and prioritize analytic skills for avoiding mistakes rather than fostering innovation or risk-taking abilities [17]. According to Gottesman and Morey [22], the association between CEO education and firm performance was investigated. The data used for this analysis comprised companies listed on the NYSE as of January 1, 2000. The findings revealed that companies led by CEOs possessing MBA or law degrees did not demonstrate superior performance compared with companies led by CEOs without graduate degrees. However, when CEOs possess an MBA or EMBA background, organizations can benefit from a wider range of expertise and perspectives leading to an improved capacity to absorb new information and ultimately contributing to increased investment in R&D. Studies have shown that managers with MBA degrees are indeed involved in strategic change despite the criticism of MBA programs for promoting risk-averse managers [23]. Research conducted by Grimm and Smith [23] on 27 class-I railroads revealed that the level of education did not have a statistically significant impact on strategic change. Firms implementing strategic changes had a higher proportion of MBA graduates than firms that did not pursue such changes. According to Barker III and Mueller [17] the prevailing pattern of results indicates that highly educated CEOs exhibit a preference for increased R&D spending implying a greater openness to innovative strategies. However, when considering education more broadly, it is important to examine the specific fields of study as there may be differences in the ability to cultivate managers who are receptive to greater R&D investment. Based on the previous discussion, the second hypothesis can be formulated as follows:

Hypothesis 1: CEOs' business education (MBA/EMBA) impacts R&D investment intensity.

2.3. CEO Duality and R&D Investment Intensity

There is a noticeable lack of studies on CEO duality which only began to gain attention in the 1980s while extensive research and scholarly articles have widely addressed the topic of corporate governance [24]. The existence of CEO duality where the CEO also acts as the firm's board chair has been the subject of numerous studies consistently revealing various challenges and potential conflicts. According to Baliga et al., the importance of examining CEO duality stems from its presumed impact on organizational performance and corporate governance [25]. The theory of agency underscores the significance of separating key roles in organizations and supporting the idea of having an independent chairman who is not an executive [26, 27]. Research has shown that when the CEO also serves as the chairman, the CEO's influence tends to be stronger leading to less effective oversight by the board and potentially compromising its ability to perform its oversight duties [26-28]. This blending of managerial and oversight functions gives rise to agency issues leading to information asymmetry and higher costs of agency [8]. Furthermore, when the positions of chairman and CEO are held by the same individual, there is a risk that personal preferences may be pursued without adequate checks, potentially fostering overconfidence and a willingness to take higher risks [27]. As a result, companies where the CEO also serves as chairman are more inclined to invest in R&D as executives may not be as concerned about negative repercussions and may have a preference for riskier actions that may not align with shareholder interests [27].

Contrary to prevailing arguments, stewardship theory posits that CEO duality is beneficial as it views managers as trustworthy stewards of the firm's resources [29, 30]. This perspective renders monitoring unnecessary and allows CEOs to have increased control and influence over decision-making processes. CEO duality offers several advantages, including unified command, better knowledge about the organization and the industry in which it operates, obligation and the ability

to attract and retain top executives [29]. Proponents argue that this clear-cut leadership facilitates effective strategy implementation leading to superior firm performance [25]. In addition, R&D expenditure plays a crucial role in driving future growth and competitive advantage [2]. It is considered a discretionary and high-risk investment strategy that contributes to value creation for firms. Continuous innovation and the establishment of competitive advantages are essential for both short- and long-term success with research and development activities serving as a means to achieve these goals [14]. Adopting the stewardship perspective, CEOs with increased control and influence over decision-making processes can realize the importance of R&D investment and allocate firms' resources accordingly. This alignment of the organization's strategic vision with R&D investment fosters a culture of innovation which is crucial for long-term success [9, 27, 31, 32].

A choice influenced by their personal traits and educational backgrounds improving CEOs' strategic decision-making can be accomplished by empowering them to invest in research and development [33]. This study suggests that CEOs with less education might lack the necessary technical expertise in R&D which could impede their strategic decision-making. However, the knowledge gap for CEOs with lower educational levels can be addressed by using CEO duality where the chairman's experience favorably affects R&D investment decisions leading to a more comprehensive decision-making process. Therefore, the following hypotheses are proposed:

Hypothesis 2: CEO duality positively impacts R&D investment intensity.

Hypothesis 3: CEO duality has a positive moderating effect on the relationship between CEO business education and R&D investment intensity.

3. Materials and Methods

3.1. Research Model and Measurements

This study explores the impact of CEO duality as a corporate governance mechanism on the relationship between CEO's business education and R&D investment intensity focusing on the moderating role not previously studied in Kao and Chen [2] and Harymawan et al. [5]. Model 1 is proposed as a means of testing them to address the direct impact hypotheses 1, 2, and 3. Furthermore, I put forth model 2 to examine the moderating role of CEO duality hypotheses.

Model (1):

$$RD = \alpha_0 + \beta_1(Duality)_{it} + \beta_2(CEObizedu)_{it} + \beta_3(Fsize)_{it} + \beta_4(Leverage)_{it} + \beta_5(Fage)_{it} + \beta_6(Sector)_{it} + \mu_i + \varepsilon_{it}$$

Model (2):

$$RD = \alpha_0 + \beta_1(Duality)_{it} + \beta_2(CEObizedu)_{it} + \beta_3(DualXCEObizedu)_{it} + \beta_4(Fsize)_{it} + \beta_5(Leverage)_{it} + \beta_6(Fage)_{it} + \beta_7(Sector)_{it} + \mu_i + \varepsilon_{it}$$

In this study, the dependent variable is RD which is the *R&D* investment intensity. The independent variables include CEO business education (*CEObizedu*) while the moderating variable is CEO duality (*Duality*), and *DualXCEObizedu* is the interaction term of CEO duality and business education. The control variables comprise the firm's size (*Fsize*), leverage (*Leverage*), age (*Fage*), and sector (*Sector*). Table 1 presents definitions for the variables.

Table 1.
Variable definitions and measurements.

Variables	Acronym	Measurement
Dependent variable:		
Research and development investment intensity	RD	Ratio of R&D investment to operating income X 100
Independent variables:		
CEO business education	CEObizedu	The dummy variable assumes the value 1 if the CEO has an MBA/EMBA and 0 otherwise.
Moderating variables:		
CEO duality	Duality	The dummy variable assumes the value 1 if the chairman of the board and CEO were the same person and 0 otherwise.
Control variables:		
Firm's size	Fsize	The natural logarithm of the total assets of the firm at the end of the current period.
Firm's leverage	Leverage	The ratio of the firm's total liabilities to total assets at the end of the current period.
Firm's age	Fage	Year of establishment
Firm's sector	Sector	Industry dummy variables, according to the 2012 industry classification of the China Securities Regulatory Commission.

This study investigated the growing interest shown by Chinese corporations, the second-largest economy in the world using data collected by Wang et al. [1] from companies listed on the Shanghai and Shenzhen Stock Exchanges between 2015 and 2020 with an emphasis on companies operating in sectors that are recognised for their significant.

4. Results and Discussion

Table 2 presents a comprehensive analysis of companies based on the business education and duality of their CEOs. The analysis was derived from data collected from 1,632 companies. Among these companies, it was observed that 668 (41%) have CEOs who also hold the position of Chairman of the Board indicating a duality role. The remaining 964 companies (59%) did not have CEOs fulfilling both roles. Furthermore, the table delves into the business education aspect of the CEOs within these companies. Of the total sample, 1,484 companies have CEOs without any business education, accounting for the majority (91%). Among this group, 40% have CEOs with a dual role while the remaining 60% do not possess this duality. In contrast, only 148 companies have CEOs with business education. Interestingly, the majority (51%) of these CEOs do not have a duality role while the remaining 49% serve in both capacities.

The absence of CEO duality contrasts with research conducted in other Asian countries such as Malaysia where Sundarasen et al. [9] found a CEO duality prevalence of 56% in their study sample. Although CEO duality can empower executives by balancing board authority and enhancing their abilities, its influence on organizational outcomes has produced mixed results [34].

Table 2.
Descriptive of companies with CEO business education and duality.

	Duality	%	No duality	%	Total	%
Companies with no CEO business education (MBA/EMBA).	595	40	889	60	1,484	100
Companies with CEO business education (MBA/EMBA).	73	49	75	51	148	100
	668	41	964	59	1632	100

Table 3 presents statistics of the continuous variable of the current study revealing the mean, standard deviation, minimum and maximum values of R&D investment to be 7.20, 6.09, 1.01, and 38.8, respectively. These findings demonstrate the varying levels of R&D investment among the sampled firms. Remarkably, these results differ from those of a study by Harymawan et al. [5]. Their research focused on Indonesian companies and reported the mean, minimum and maximum values of R&D as 0.283, 0.000 and 8.286, respectively. Such disparities in R&D raise intriguing questions about potential influencing factors. For China, the results were almost similar to those reported by Wang et al. [1] where the mean, minimum, and maximum values of R&D were 6.972, 1.09 and 40.06, respectively.

Table 3.
Descriptive statistics of the continuous variables.

Variables	Mean	S.D.	Minimum	Maximum
RD	7.200	6.085	1.01	38.8
Fsize	22.176	1.070	20.306	25.968
Leverage	0.375	0.167	0.050	0.785
Fage	13.077	5.245	7	28

The Pairwise Correlation Coefficients Matrix (see Table 4) demonstrates the relationships between R&D investment and CEO education level along with other independent and control variables. The results indicate a positive correlation between R&D investment and CEO duality at a 1% level of significance. Furthermore, the analysis reveals a significant negative correlation between R&D investment and CEO business education and all control variables except the sector which justifies their inclusion in the regression models. No high correlations were observed between the independent variables indicating that multicollinearity is not a major concern. The Variance Inflation Factor (VIF) is also estimated yielding values below 1.5 for all variables in the post-estimation test further supporting the absence of multicollinearity.

Table 4.
Pairwise correlation coefficient matrix.

RD	RD	duality	CEObizedu	Fsize	Leverage	Fage	Sector	VIF	1/VIF
	1								
Duality	0.084***	1						1.04	0.96
CEObizedu	-0.064***	0.054**	1					1.01	0.99
Fsize	-0.142***	-0.068***	-0.010	1				1.48	0.68
Leverage	-0.273***	0.005	-0.043*	0.511***	1			1.37	0.73
Fage	-0.056**	-0.184***	-0.022	0.358*	0.235***	1		1.19	0.84
Sector	0.448***	0.002	-0.067***	-0.047*	-0.023	0.001	1	1.01	0.99
Mean VIF								1.18	

Note: * p<0.10, ** p<0.05, *** p<0.01.

Table 5 displays the results of various tests conducted in this study, including the Hausmans's specification test, the Wooldridge test for autocorrelation in panel data and the Modified Wald test for groupwise heteroskedasticity. The analysis suggests that using the fixed-effects model is recommended for all four models. Additionally, tests conducted reveal the presence of autocorrelation and heteroscedasticity issues within the data. The study utilized a Prais-Winsten regression with panel-corrected standard errors (PCSE) model to examine the hypotheses based on previous research with comparable circumstances [8, 35].

Table 5.
Hausman, autocorrelation, and heteroskedasticity tests.

		Hausman's specification test		Wooldridge test for autocorrelation in panel data		Modified Wald test for groupwise heteroskedasticity	
#	Model variables	chi2	Prob>chi2	F(1, 271)	Prob > F	chi2 (272)	Prob>chi2
1	Duality	46.73	0.0000	21.080	0.0000	7.7e+07	0.0000
2	CEObizedu	45.86	0.0000	22.113	0.0000	2.4e+08	0.0000
3	Duality CEObizedu	47.44	0.0000	22.087	0.0000	5.5e+07	0.0000
4	Duality CEObizedu DualX CEObizedu	48.7	0.0000	23.812	0.0000	7.7e+07	0.0000

Note: Duality = CEO duality, CEObizedu = CEO business education and DualX CEObizedu = Interaction term of duality and CEObizedu .

The results from models 1, 3, and 4 in Table 6 show that CEO duality has a positive impact on R&D investment intensity at a 1% level of significance while CEO business education has a significant negative impact at a 5% level of significance in models 2 and 3. The findings suggest that CEOs with dual roles tend to prioritize R&D investment, supported by previous research such as Kao and Chen [2]. CEOs in dual roles have a unique perspective that allows them to focus on long-term company goals leading to a strategic alignment of R&D investment for fostering innovation and long-term success by holding both management and governance responsibilities [9, 27, 31, 32].

In model 2, the presence of a CEO with a business education or *CEObizedu* has a significant negative impact on R&D investment intensity. This suggests that CEOs with a business background are more likely to prioritize activities and strategies other than R&D. These findings align with Barker III and Mueller's [17] research which indicates that MBA programs attract risk-averse individuals who prioritize analytical skills to avoid errors rather than fostering innovation and risk-taking abilities. As a result, self-made executives may exhibit more innovative and risk-taking tendencies than those with business education backgrounds [6].

Table 6.
Prais-Winsten regression, heteroskedastic panels corrected for standard errors.

IVs	Model (1)	Model (2)	Model (3)	Model (4)
Duality	0.889***		0.920***	1.075***
CEObizedu		-1.357**	-1.412**	-0.482
DualXCEObizedu				-2.009
Fsize	-0.168	-0.173	-0.173	-0.179
Leverage	-4.361***	-4.352***	-4.425***	-4.372***
Fage	0.009	-0.008	0.007	0.011
Sector	Included			
_cons	10.57***	11.53***	10.85***	10.76***
N	1632			
R-sq	0.254	0.254	0.258	0.260
Wald chi2(18)	289.86	291.78	295.58	297.06
Prob > chi2	0.0000	0.0000	0.0000	0.0000

Note: ** p<0.05, *** p<0.01 dependent variable: R&D = R&D investment intensity
Independent variables: Duality = CEO duality, CEObizedu = CEO business education
Moderating variable: DualXCEObizedu = interaction term between duality and CEObizedu,
Control variables: Fsize = Firm's size, leverage = Firm's leverage, Fage= Firm's age, sector = firm's sector.

The study also supports the conclusions drawn by Gottesman and Morey [22] which suggest that firms led by CEOs with MBA degrees do not outperform firms led by CEOs without graduate degrees. The notion that CEOs with advanced degrees like MBA or EMBA are naturally more intelligent and effective managers has been challenged by this research. Surprisingly, the study reveals that CEOs without such educational backgrounds tend to be more prone to taking risks leading to higher levels of innovation and increased investment in R&D. Furthermore, the analysis did not support the idea that CEO duality influences the relationship between CEOs' education and R&D investments as the interaction term was

found to be insignificant. Therefore, it appears that the interaction between these two variables has a limited influence on R&D investment intensity indicating that a company's decision to invest in R&D is not significantly impacted by their combined effect. However, CEO duality and CEO business education may still have significant individual effects on R&D investment intensity. CEO duality could affect R&D investment through power concentration while CEO business education might directly influence strategic decision-making. Nevertheless, when these effects are combined, they do not interact significantly. The insignificance of the interaction term also suggests that other unanalyzed factors may play a more dominant role in influencing R&D investment intensity. It is crucial to consider other demographic characteristics at the individual-level such as CEO education level and CEO age or at the firm level such as ownership structure to gain a better understanding of the relationship.

5. Implications of the Study

The research findings indicate that CEOs with a background in business education tend to have a more cautious approach regarding taking risks. However, being overly cautious might impede an organization's ability to innovate. It's crucial for organizations to understand this potential downside and strike a balance between managing risks effectively and nurturing a culture of innovation. Achieving this balance involves clearly communicating innovation goals, fostering a risk-friendly environment and leveraging diverse viewpoints within the leadership team. Moreover, research suggests that companies looking to boost their R&D investment could benefit from a CEO serving dual roles. This highlights the importance of board structure and governance mechanisms in promoting decision-making that prioritizes innovation. When shaping their governance frameworks, organizations should carefully weigh the pros and cons of CEO duality while adhering to legal mandates.

6. Limitations and Future Studies

This research delves into the impact of CEO education and duality on business highlighting the need for further examination of how CEO age influences their decision-making. Studies have shown that older CEOs tend to prefer conservative strategies with limited growth potential [6] emphasizing the importance of investigating how CEO traits affect a company's R&D investment compared to rivals. Education plays a crucial role in shaping individuals' information-processing abilities particularly for teams handling intricate tasks like long-term R&D [13, 22]. The impact of company management education level is a subject of considerable interest. Even when considering factors such as corporate strategy, ownership structure, and other firm-level factors, the CEO's traits still significantly affect R&D investment, as highlighted by Barker III and Mueller [17]. Therefore, it is crucial to investigate additional corporate governance mechanisms such as ownership structure to gain deeper insights. In addition, exploring its influence on various CEO or firm-level characteristics would be a worthwhile pursuit given the documented role of CEO duality.

7. Conclusion

This study aims to answer the question "Does a business education make for better innovative managers?" For answering this question, I examined the relationship between CEOs' business education and MBA/EMBA on R&D investment intensity taking into consideration the unexplored moderating impact of CEO duality. The research analyzed data from 1632 observations of different listed firms on the Shanghai and Shenzhen Stock Exchanges between 2015 and 2020. The findings indicate that having a CEO with a dual role within the company positively impacts R&D investment intensity. In addition, I found that CEOs with business education are less risk-taking and tend to have a negative influence on innovation as proxied by R&D investment intensity. This study also investigated how the relationship between CEO business education and R&D investment intensity is affected by CEO duality. This moderation effect is not statistically significant suggesting that CEO duality and CEO business education may still have significant individual effects on R&D investment intensity.

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