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Faculty of Business Economics

Master of Management

Master's thesis

CEO Tenure and R&D Expenditures: An Exploratory Study of the Moderating Effect of Board size and Board independency in Dutch firms

Emmanuela Gaelle Kenfack Touleu

Thesis presented in fulfillment of the requirements for the degree of Master of Management, specialization Strategy and Innovation Management

SUPERVISOR :

Prof. dr. Yannick BAMMENS

MENTOR :

Mevrouw Eline WIJNS

2022
2023

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CHAPTER 1

INTRODUCTION

1.1 Background

The ever increasing dynamic and complex nature of the global business environment has mounted pressure on firms of all sizes and sectors to gain a competitive edge by constantly evaluating their capacity to pursue innovation through Research and Development (R&D) (Teece, 2007). Now more than ever, the increasingly dynamic business landscape brought in part by the Covid-19 crisis, highlights the need for key actors in various industries to seek, discover and implement efficient ways in ensuring that managers remain or become proactive and fast in adapting to their changing business environments (Moran & Garcia, 2021). As the key decision makers, top level managers set the standards and ought to be on a constant lookout for new innovative strategies that will enable their organisation not only to survive but to thrive in the face of these rapid changes.

At the apex of the managerial echelon, lies the Chief Executive Officer (CEO)(Li &Yang, 2019). CEOs set the tone and align the organization towards the achievement of a desired vision and goals (Kotter,2017). As the organisations' key strategists, their degree of commitment to innovation is expected to directly reflect on the whole organisation (Hambrick & Mason,1984). Among many others, the extent to which CEOs can allocate the organization's resources towards innovation depends on various environmental, organisational and behavioural factors (Lampert & Tandon, 2008). The literature covering these factors is quite extensive and has gain the attention of many researchers in recent decades. Zooming in on managers' personal attributes offers not only a complementary outlook to the already existing body research, but also a direct link to CEOs as the primary source of R&D resource allocation (Hambrick & Fukutomi, 1991).

This research draws from an upper echelon perspective (Hambrick & Mason, 1984), to assert that CEOs' perceptions of their strategic challenges are profoundly influenced by their tenure in office (Souder, Simsek & Johnson, 2012). A CEO's tenure -defined by the time spent in leading an organization- can serve as a proxy for various underlying key cognitive aspects instrumental to the commitment of resources to innovation such as their; assessment of risk (Sanders, 2001), cognitive entrenchment (Dane, 2010), aptitude to learning and adaptation (Hambrick & Fukutomi, 1991), social skills (Goleman, 1998) and accumulation of tacit knowledge (Nonaka, 1994) etc. This multiplicity in proxy partially reveals the complex and multidimensional interaction CEO tenure might have with innovation partly accounts for lack of consensus on the relationship in CEO's tenure and innovation (Chen, 2013).

Having a clearer understanding of the factors that are likely to influence their decision making process is of importance and ought to be investigated. For instance, a CEO that is not willing to undertake significant risk, embrace change and put the organisation's interest at the forefront at any point of his tenure will have a lower propensity to pursue innovation (Cheng & Zheng 2014) . However, several research argue that among other, these behavioural aspects significantly change and depend on the CEO's tenure. Accordingly, the extent to which CEOs pursue change, under and depends on his tenure in the organisation.

For a competitive edge to be acquired and sustained in the current environment, innovation is the most natural path to follow. In the current competitive climate, the need for innovativeness cannot be addressed as a seasonal operation or purely as a singular strategy, but rather, it has to be adopted as a continuous process embedded in the organization's core values as culture. However, innovation can be a daunting task mostly due to the risky, time consuming, labour intensive and unpredictable tasks encountered in making incentive contracts (Holmstrom, 1989). Upper Echelons Theory (UET) and agency theory this study investigates the (Amabile, 1998; Bel 2010). Therefore, among many other aspects, there is a need to understand and study how various leadership traits and characteristics interact with innovation and firm performance at large.

1.2 Problem statement

According to a 2023 report from the Russel Reynolds CEO Global Turnover Index (2023) CEOs' turnover increased by 11.2 %, which is 13% higher than the last highest year (2018) prior to the pandemic. The surging rates of CEO turnover over in recent years is suggestive of the changing business environments. A high turnover of CEOs could have adverse consequences for a company strategic outlook by causing abrupt disruptions on the a company's organizational culture and stakeholder relations (Zhang & Rajagopan, 2011). Furthermore, new CEOs who underperform might be asked to leave to soon without a clear understanding and an in depth evaluation of the life cycle of a CEOs tenure and the corporate governance mechanisms that could help reduce unwanted managerial behaviours (Hambrick & Fukutomi, 1991) . Given the increasing demand for innovation outcomes in the last 3 years, R&D expenditures have gained relevancy as a determinant of future corporate performance which depends on assuming considerable degree of risks. In this regard, the current study anchors on the Hambrick and Masons's (1984) Upper Echelon theory and the Life Cycle Theory of Hambrick and Fukutomi (1991) to posit that different stages of a CEO's tenure is associated with risk taking behaviours that can be moderated with the adequate board structure. Given the 5th position of the Netherlands according to the WIPO's(World Intellectual Property Organization)(2022) Global Innovation Index, the current research see the Netherlands as suitable case study to potentially benchmark similar heavily innovation invested economies.

1.3 Research Objective

Given that an organization's strategic choice is largely determined by its top management (Hambrick & Mason,1984), this research sets out to inquire on how the tenure of top managers interacts with firm innovation in the context of managerial risk behaviour. (Chen and Zheng, 2014). Furthermore, the study also explores the supervisory role of the board of directors in mitigating managerial attitudes towards risk from an agency perspective .

To the best of the authors knowledge, this study is different in that it offers an exploratory perspective by combining various aspects found in individual previous similar research on the relationship between CEO tenure on R&D expenditures in that; 1. It uses R&D expenditures as a proxy for managerial risk taking behaviour; 2. It models the existing relationship between the CEO's tenure and risk taking behaviour as curvilinear; and finally 3.It explores the additional moderating

role of board size and board independency . The combination of all these differences within the context of Dutch firms will prove beneficial to the existing body of literature on corporate governance and innovation especially within the context of economies that view investment in innovation as key strategy for economic growth.

Chapter 1	**Introduction**
➢ This chapter provides the research background, the statement of the problem and research objective.	
Chapter 2	**Literature Review**
➢ The chapter discusses the related theories, research variables and empirical works used in the hypothesis development.	
Chapter 3	**Research Methodology**
➢ This chapter provides the model specification, instrumental variables, data sources, data cleaning and multiple nonlinear regressions employed.	
Chapter 4	**Results and Discussion**
➢ This chapter provides the results of tests and discusses the implications	
Chapter 5	**Conclusion**
➢ This chapter presents a summary of the research, economic implications, limitations of the study and proposals for future research	

Table1: Structure of thesis

CHAPTER 2

LITERATURE REVIEW

2.1. CEO tenure and R&D expenditures

There is a plethora of research covering the association between executive characteristics and firm innovation (Hambrick& Mason, 1984;Chen &Zheng, 2014; . Among these characteristics, CEO's tenure -defined as the length of time a CEO occupied in leadership- have increasingly gained prominence as a significant managerial attribute in strategic decision making (Hambrick & Fukutomi, 1999). CEOs' tenure in office have been associated with various cognitive abilities that could alter their response to risk (Sanders, 2001) such as their; cognitive entrenchment (Dane, 2010), aptitude towards learning and adaptation skills (Hambrick & Fukutomi, 1991) and social skills (Goleman, 1998), Tacit knowledge etc.; all of which are crucial to fuel the process of innovation.

Innovation, particularly at its early phases is often marked by degree of risk (Cheng &Zheng, 2014). During the early stages of innovation, top level managers are often tasked with the discretion of allocating an adequate budget for research and development (R&D) (Green 1995). R&D expenditures reflects the extent to which a firm has committed its resources in pursuit of innovative outcomes i.e. product development, product design, enhancement of processes, services, and other related technologies etc. (Midavaine et, al., 2016). However, because investments on innovation are plagued with significant risk (Mansfield, 1968), top management often keep an eye on the budget levels to regulate it based on their own preferences (Barker & Mueller, 2002).

CEOs hold the most power in the determining an organization's R&D budget, given that they reside at the core of strategic decision-making and sometimes could control the constituents of the leading strategic team (Zahra & Pearce, 1989). More specifically, Lawson, Samson and Roden (2012) argue that the ability to effectively capture the gains of innovation is dependent on the CEO's tenure in office. Also, a CEO's tenure in office may serve as an indication of certain cognitive inclinations (eg risk appetite, learning ability, tacit knowledge, people skills, networking capital etc) (Hambrick & Fukutomi, 1991) inherent in boosting inventive capacity (Wu, Levitas & Preim, 2005). In this light, the current study primarily explores the influence of a CEOs' tenure in office on firm innovation.

For the purpose of this study innovation as a performance measure is expressed by R&D expenditures which ideally captures the CEO's willingness to undertake risk (Chen & Zheng, 2014).

In the upcoming paragraphs, the relationship between CEO tenure in relation to R&D expenditures is explored by diving into the relevant theoretical perspectives an previous empirical works. Following that, further review is presented in the context of the various theoretical approaches on the moderating influence of board characteristics. Finally, the section concludes with a summary of the formulated hypotheses .

2.1.1 Upper Echelon Theory

This theory takes its roots from the behavioural firm theory (March & Simon, 1958; Cyert & March 1963), which suggest that firms are not singular goal units that primarily strives for profit maximization, rather, firms comprise of stake holders groups whose conflicting goals create a

competition for available resources in the form of aspiration levels (March & Simon, 1958). The goal of the firm in this context is to meet these aspiration levels -a process known as satisficing (Cyert & March 1963).

Satisficing requires CEOs to engage in information processing which is also a vital aspect when pursuing innovation (Kotte 1983; Love, Roper & Vahter, 2014). The Upper echelons theory (UET) (Hambrick& Mason, 1984) posit that Top Management Teams (TMT) and CEOs process information via individualized cognitive lenses and mental maps which influences how they make and consequently steer the organization's strategic direction (Dhir et.al, 2023). This underlines the importance of top management's mental filters and cognitive foundation as a premise in predicting prospective strategic outcomes (Hambrick& Mason, 1984; (Tripsas & Gavetti, 2000). Bounded rationality -the idea that a manager's decision making is constraint to their experiences and their interpretation of reality rather than an objective rationale- is the cognitive premise upon which the UET is founded.

The UET speculates that these cognitive lenses can be inferred by studying the demographic characteristics of managers. These cognitive biases are further amplified during decision making processes involving projects with high levels of uncertainty as is the case with innovation (Wu, Levitas, & Priem, 2005). As a result, it is important to get a clearer understanding of the cognitive structure prompting top management's inclination towards innovation by studying TMT's demographics.

A vast array of research building upon the initial work of Hambrick and Mason (1984) has been carried out in various organizational contexts relating innovation efforts for the most part, the UET has been explored in the light of intra-organizational attributes, by looking at managerial background and organizational governance and incentives (Ahuja, Lampert, & Tandon, 2008). As one of the most significant attribute of managerial background, previous studies have investigated CEOs' tenure as a predictor in the motivation to engage in innovative investments (Barker & Mueller, 2002;Chen & Zheng 2014 ; Li & Yang, 2019; Xu, Xu & Bai, 2022). Scholars find that CEOs tend to make less strategic changes as their tenure extends (Hambrick et al. 1999; Barker & Mueller, 2002). In this regard, Hambrick and Fukutomi (1991) argue that as CEOs get further established in their company over time, they become more rigid to changes and further commit to long-held paradigms. In the same light, Miller (1991) finds that CEOs with prolonged tenure get comfortable with established practices and therefore lose sight of their external environment, thereby failing to implement changes necessary to sustain the relevancy of the firm. All things equal, these limits the CEOs willingness to adapt to their environment and innovate (Bantel & Jackson, 1989).

The view that the CEO's tenure is negatively associated with innovation is supported by the agency theorists (Fama, 1980; Jensen & Mecklen). Given that CEO turnover is largely determined by the board's evaluation, CEOs who are retained tend to bargain in favour of less independent boards (Weisbach,1988). Fewer independent board would imply less objective CEO supervision and managerial compliance in the best interest of the shareholders (Fama & Jensen, 1983). As a result, a longer tenure in office result in further managerial power and entrenchment, thus facilitating the

protection of the CEO's private incentives in gaining control (Li, Yang, 2019). Furthermore, entrenched managers are less malleable and more likely to engage into empire building activities such as mergers and acquisition etc., to protect their private benefits as opposed to pursuing risky, yet lucrative innovation ventures.

CEOs' tenure can also be perceived as a beneficial resource prompting the pursuit of more innovation as their tenure increase (Barney, 1991; Simsek, 2007). From a resource dependency perspective, another view is that with the progression of a CEO's tenure, accumulated experience, proficiency and familiarity with making strategic decisions improves the CEOs ability to adequately process information and engage into 'reasonable risk taking behaviour' (Sitkin & Pablo, 1992; Carpenter, Pollock, & Leary, 2003). According to this view, an executive's experience represent a form of tacit knowledge capital that specifically reduces the wrongful evaluation of risk relative to a potential output (Simsek, 2007). Simply put, the experience acquired in handling strategic decisions reduces a CEO's probability of overestimating or underestimating the potential risks associated with an innovative venture. This will result in; (1) improved selection capabilities by identifying risky projects with the most likely hood of success out of the existing portfolio of risky projects;(2) higher ability to asses and justify the undertaking of risky projects that would have been perceived as overly risky in the absence of experience; (3)Enhancement in the ability to successfully execute these projects (Simsek, 2007).

The mixed findings in literature relating CEO tenure to R&D investment is suggestive of a further need to review the underlying assumptions both from a conceptual and empirical standpoint. For instance and Jackson (1989) however . However, a significant number of studies (Simsek, 2007;Portharla & Amirishetty, 2021) found that the association between CEOs' tenure and innovation is not supported by linear tests.

2.1.2 The life cycle theory

Hambrick and Fukutomi (1991) build upon the UET and argue that the assumption that CEOs have the same concerns and follow the same pattern of activities throughout their tenure is overly simplistic. Instead, they describe TMT decision making as a process which is contingent upon the season of their tenure in office. The 5 seasons model are characterised by

1.Response to mandate: The initial phase of new hired CEOs often characterised by bold moves especially the attempt of fixing previous poor performance ser by predecessors.

2. Experimentation: At this stage the newly hired CEO experiments with various strategic possibilities to identify the best organizational fit.

3. Selection of an Enduring Theme: This stage is marked by a reinforcement of previous successful strategic initiatives.

4.Convergence: At this stage, the CEO become more entrenched and rigid to the enduring theme. This stage is marked by increasing risk as CEOs who are entrenched are more likely to miss out on strategic opportunities.

5. Dysfunction: As the final stage of the 5 season model, this phase is marked by intensified rigidly help paradigms. At this stage the strategic position of the CEO can only result reduced performance and organization stagnation.

Hambrick and Fukutomi's (1991) 5 season model helps in understanding the behaviour of top managers relative to the tenure in office. Recognizing these stages can prove instrumental in the structuring of board around top management. This theory further imprints on the mixed and non-linear propositions as revealed by some similar studies (Simsek, 2007; Portharla & Amirishetty, 2021; Yeoh & Hooy, 2022). To further inquire on this inferred nonlinearity relating a CEO's Life Cycle and his tenure as posited by Hambrick and Fukutomi's (1991) 5 seasons model, this study posits that;

H1: CEO's tenure follows a curvilinear relationship with its firm's R&D expenditure.

2.1.3 The Agency theory

The agency theory of Jensen and Meckling (1976) addresses the complexities that arises between principal and agents due to the decision-making powers that are bestowed by the principal upon the agents. Within the corporate context, the principals are the owners/shareholders of the firm meanwhile the agents are the managers who have been delegated with the power to make decisions on the owners' behalf. The underlying issues arise from the resulting conflicts that are encountered when each party pursue their self-interests (Yeoh & Hooy, 2020). The two main sources of conflict in this dynamic evolve from; (1) the misalignment of goals and (2) Information asymmetry (Jensen & Meckling, 1976). Information asymmetry is manifested in the form of adverse selection (lack of information on managerial inherent qualities) and moral hazard (lack of knowledge regarding managerial actions) (Chakravarty & Zajac, 1984). This theoretical underpinning is most relevant in the context of understanding managerial attitude towards risk taking and performance. In the context of a CEO's tenure, top management by feel more or less enabled depending on how much affluence they have gathered on the basis of their tenure to pursue their own interests at the expense of the shareholders (Simsek, 2007). This theory also highlights the important role of boards as conflict mitigators on the organization front (Fama & Jensen, 1983).

2.2 The moderating effects of board characteristics

According to the agency theory, (Fama & Jensen, 1983; Jensen & Meckling, 1976) boards have a pivotal role in the regulation of corporate misconduct. Their oversight serve as a practical tool in minimizing the principal-agent problem as often observed in corporate governance.

2.2.1 Board independence

According to the NYSE (2019) report an "Independent director is one who the board affirmatively determines has no materiality relationship with the company either directly or as a partner, shareholder, or officer of an organization that has a relationship with the company."

Independent directors are primarily charged with the task of monitoring and providing useful resources in decision making, as such, they occupy a significant role in the pursuit and process of innovation (Hillman & Dalziel 2003; Kor, 2006). Independent boards primarily advocate in the best interests of shareholders (Mecklinh, 1976) and facilitate access to external resources valuable in the strategic decision making (Kor, 2006). Independent boards are often From an agency theory perspective, independent boards are less likely to succumb to the pressure of 'powerful' managers and exercise greater vigilance in decision making. Hence, the presence of independent boards help to reduce the effects of the idiosyncrasies created by potential TMT misconduct. In this regard, we posit that;

H2: Board independence negatively moderates the curvilinear relationship between a CEO's tenure and R&D expenditures through the alleviation of agency costs.

2.2.2 Board size

Within the context of corporate governance, the agency theory posits a nuanced relationship between board size and effectiveness (Yermack, 1996). A board with a larger number of members may foster a rich multiplicity of perspectives, enhancing the depth and breadth of its strategic considerations. Conversely, such enlargement may precipitate coordination difficulties, thereby decreasing the effectiveness of supervision through decreased consensus among boards.In similar light, a smaller boards may benefit from increased cohesion and agility in decision-making at the expense of diverse opinion. (Yermack, 1996; Eisenberg, Sundgren, & Wells, 1998).In the context of risk assessment of projects, the current study leans on the agency to theory to posit that a larger board would lead to; Higher expenses and agency costs, Challenges in communication and coordination; Poor ability in reaching a consensus (Morán & Cabeza-García, 2021)

H3: Board size positively moderates the curvilinear relationship between a CEO's tenure and R&D expenditure through the increase of agency costs.

The afore mentioned hypotheses are summarised as below:

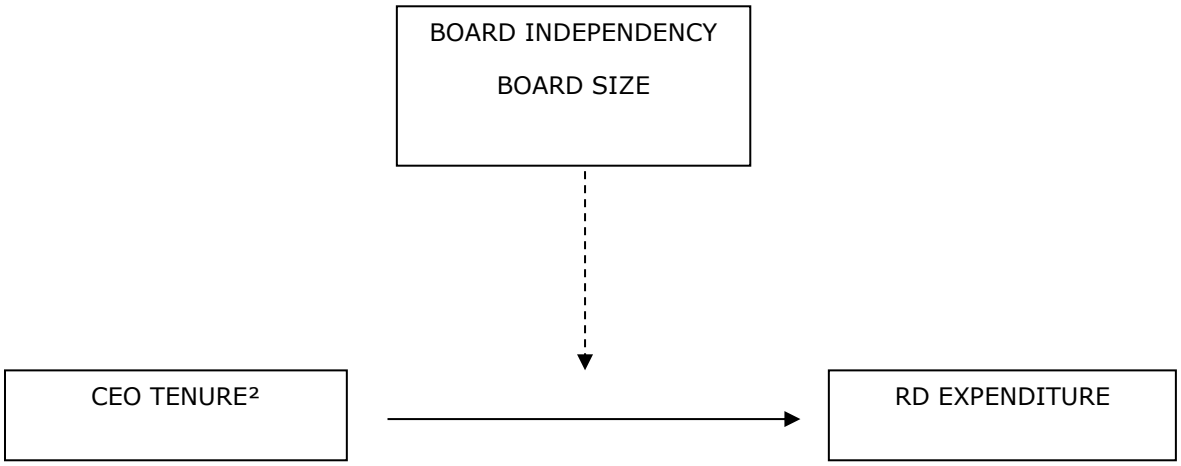

Figure 1: Summary of hypotheses

Where ⟶ denotes the multiple linear regression estimation of the CEO's tenure on the company's- R&D expenditure, and ---> the moderating effects of board size and board independence ratio.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Data

The current study analysis employs a cross sectional data of 81 private and public listed Dutch companies to investigated the hypotheses. In 2022, the Netherlands ranked 5th in the WIPO's(World Intellectual Property Organization)(2022) Global Innovation Index. Its' advance innovation ecosystem that support investments in transformative growth makes it suitable case study for this research. To isolate the effects the COVID-19 crisis, this study primarily focuses on the pre-crisis period of 2018 for R&D expenditures.

A total of 300 CEOs and BODs demographic data were initially obtained from BoardEX - a reliable data base and one of the leading sources in the field of TMT research. However, after screening for R&D expenditures and other firm performance related variables in annual reports, the final combined data set consisted of total 82 companies. The independent and control variables are collected with a lag period of 1 year (2017) considering that R&D budgets collecting for the year 2018 are decided a year prior to been incurred (Bednář, & Halásková, 2018).

3.2 Measures and Control Variables

Innovation efforts measured by R & D expenditures is the dependent variable and is expressed as total amount in thousands of euros (000) spent on R&D activities. However, after conducting a series of robustness checks (see appendices) by altering between its logarithmic form and the R&D intensity (calculated as R&D expenditures/Total sales) (Lin et al., 2011) the logarithmic form of R&D expenditures (Clausen, 2009; Balsmeier, 2017) was considered as the ideal independent variable for this study. Furthermore, given that normality is a core assumption of OLS regressions (Pool, 1971), computing the logarithmic form of R&D expenditures was beneficial in that it helped to normalize the extreme values of the R&D distribution. This is particularly true giving that R&D expenditures may significantly vary as per the firm size, inflation (especially in the case of multinational firms) or industry etc.

The independent variable is the CEO's Tenure and is measured as the total amount of time (in years) spent holding the position of CEO at a given company. This variable is however squared computed as (Tenure× Tenure) to test for the assumption of a curvilinear relationship as seen in H1.

The moderating variables board size and board independency ratio are also obtained from BoardEX. Board size reflect the total number of Directors sitting on the board in the year 2017. The board independency ratio is computed from Boardex as the;

$$Board\ Independency\ ratio = \frac{\textbf{Total number of external directors on board}}{\textbf{Total number of board of directors}}$$

The literature on corporate governance have found an array of variables to significantly affect a firm's performance. In this light, control variables are included to isolate the main effects of CEO tenure on R&D expenditures, improve the internal validity of the estimation model and to allow for

possible generalisations (Field, 2013; Shadish, Cook & Campbell, 2002). As a result the following control variables are added to our model;

CEO Age: This reflects the CEO's age measured in years.

Firm Age: This is a company's total number of years in operation from its year of inception as at the fourth quarter of 2017.

Firm Size: The total number of registered employees working for a particular firm during the year 2017.

Firm Performance: Measured by return on Assets (ROA) and computed as *Net Income/Total Assets.* It measures the profitability of a firm relative to its total assets.

Firm Leverage: Measured by *Total Debt/Total Equity*, reflects how the source of financing of a company's total asset is distributed. A higher value is indicative of more debt financing compared to equity financing. From an agency theory perspective high leverage may be a source of better managerial discipline and performance through cash flow commitments, increased monitoring by creditors and takeover threats (Jensen, 1986).

Industry: This variable is proxied by the American Standard Industrial Classification (SIC) codes. Companies are categorized by industries and business activity using a standardized 4 in some cases 5 digit code. The first 2 digits are generic and represent major business sectors, while the last digits are refined to specific business activities. For the purpose of simplification and coding, this study only considers the first 2 industry digits. This is the only categorical variable in the current analysis.

3.3 Model Specification and Regression Analysis

The current study uses a multiple linear regression analysis with the inclusion of control variables to estimate the Beta coefficients of the models ins each hypotheses. However, the validity and power of the estimation results is dependent on a set of assumptions that will improve the reliability of the results obtained. Normality in the distribution of residuals and the absence of perfect multicollinearity among independent variables (IV) are important assumptions to hold as in their absence the standard errors of the regression tests will be biased and unreliable.

Normally distributed residuals imply that residual terms of the model vary randomly and have mean value of zero. Normality of residuals is an important assumption in regression analyses as it essential in validating the power of t-tests as it indicates that a model is correctly specified and that it can adequately capture the variations in the data. Furthermore, the presence of a perfect linear relationship (multicollinearity) among the IVs would complicate the measurement of the isolated effects of each IV on the dependent variable. This study checks for normality via a graphical diagnostic of the residuals in model 1 below. For the same model, multicollinearity is primarily checked through a pairwise correlation analysis and it is complemented by looking at the value of the variables' Variance Inflation Factors (VIF) .

The null hypothesis for the Beta estimates is given as; H0: β = 0. Rejecting the null hypothesis would imply that the Beta coefficients are statistically different from zero. The regression models employed in this study are specified as below:

$$Model\ 1: Y = \beta 0\ +\ \beta 1X1\ + \cdots + \sum_{i=0}^{n} \beta nXn +\ \varepsilon$$

$$Model\ 2:\ Y = \beta 0\ +\ \beta 1\boldsymbol{X1} -\ \beta 2\boldsymbol{X1^2} + \cdots + \sum_{i=0}^{n} \beta n\boldsymbol{Xn} +\ \varepsilon$$

$$Model\ 3: Y = \beta 0\ +\ \beta 1\boldsymbol{X1} -\ \beta 2\boldsymbol{X1^2} + \beta 3\boldsymbol{X3} + \beta 4\boldsymbol{X4} - \beta 5\boldsymbol{X1} * \boldsymbol{X3} + \beta 6\boldsymbol{X1} * \boldsymbol{X4} + \cdots + \sum_{i=0}^{n} \beta n\boldsymbol{Xn} +\ \varepsilon$$

Where by:

Y =Logarithmic form of R&D expenditures in year t+1

β0= Intercept

β= Coefficient of independent variables

X1= CEO Tenure

X2= CEO Tenure²

X3 = Board Independence

X4= Board Size

βn= The control variables where n is equal to the number of control variables

ε= The residual term

The moderating effects of board independence and board size can be analysed by testing the beta coefficients of the interaction terms β5 and β6 denoted in model 3 above.

CHAPTER 4

RESULTS

4.1 Empirical results

4.1.1 Descriptive statistics

Descriptive statistics are presented in table 1 below. On average, firms in our data set spent approximately 248 million euros on R&D activities in 2018, however this value is affected by extreme values giving the standard deviation of 701 million euros. CEO's in 2017 averaged an age of 48.54 and a tenure of 5.2 years in office. The average total number of directors sitting on board for that year was 5, half of which were independent. Firms have been operating for an average time of 57 years, yielding an average profit of 1.2% and hiring an average of 21,000 employees. Debt seems to have been the major source of financing the firm's activities, with an average of 2.97 euro of debt to every 1 euro of equity accounting for the firm's assets. Finally the industry with the highest mode in the data set had the SIC identifier 28 representing companies producing manufacturing chemical and allied products.

4.1.2 Correlation analysis

The Pearson's correlation matrix presented in table 1 illustrates the strength and direction of a linear association between 2 set of variables (Godfrey, 1980). The results below show that R&D expenditures has a positive and moderate association with the size of boards(0.465) and firms (0.694) at a 5% significance level. Board size associates weakly with the CEOs' age at a 10% significance level, and moderately with the size of the firm (0.401) and the ratio of independent directors(0.534) at a 5% significance. Performance as denoted by ROA has a weak and negative association with the firms leverage (-0.219) at 10% level of significance. No further association was denoted between the remaining set of variables. The lack of correlation between the dependent independent variables was a primary indicator of a possibility of no linear association between these variables. However, further tests are conducted to unravel the nature of this interaction. The correlation matrix also reveals a low likelihood for the presence multicollinearity among the variables given the absence of highly correlated independent variables.

4.1.3 Multicollinearity tests

Multicollinearity tests were conducted to determine if the linear association among the dependent variables was significantly high, which is undesirable. The coefficient tables of the Variance Inflation Factors (VIF) and tolerance factors were inspected. The presence of multicollinearity is when the tolerance value is below 0.1 and a VIF not exceeds 10. The variables in all regressions had a lowest tolerance value of 0.5 and a maximum VIF value of 1.8 indicating there was no multicollinearity. However, in model 2 and 3 the variable Tenure (Model (2;3) VIFs = (10.152; 10.715); Tolerance (0.099;0.093)) and Tenure² (model (2;3) VIF = (9.753; 10.589); Tolerance (0.103;0.094)) indicate the presence of multicollinearity . This is how ever not alarming as tenure and tenure² are specified in the same models and will naturally show a high degree of association. .

N= 81	Mean	Std. Deviation	R&D expenditures (000)	CEO Tenure	Board size	Independent Director Ratio	Firm Age	Firm Size	ROA	D/E	Industry codes (SIC)
R&D Expenditures (000€)	248621.650	701931.116									
CEO Tenure (year)	5.255	5.410	0.059								
Board size	5.050	2.958	.465**	-0.014							
Independent Director Ratio	0.523	0.437	0.145	0.077	.534**						
Firm Age (years)	56.860	58.179	0.087	-0.100	0.102	-0.107					
Firm Size (#employees)	21311.280	52292.013	.694**	0.109	.401**	0.115	0.032				
ROA	0.012	0.181	0.064	0.213	-0.083	-0.042	0.190	0.090			
D/E	2.971	5.846	0.046	-0.013	0.093	-0.096	0.029	0.043	-.219*		
Industry (SIC)	48.540	22.745	-0.050	0.018	-0.076	-0.122	-0.052	-0.048	0.066	0.074	
CEO Age	48.510	24.980	0.124	0.052	.275*	.221*	-0.015	0.113	0.201	-0.035	-0.025

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2: Descriptive statistics and Pearson's correlations matrix

4.1.4 Scattered Plots

As a next step in examining the nature of association between the Y (R&D expenditure) and X (CEO Tenure) variables, a scattered plot diagram is generated. The natural log of R&D expenditures was used for further analyses to reduce the skewness and impact of extreme values of R&D expenditures, the independent variables. The graph below provide a visual idea on the nature of interaction of the deterministic relation between the afore mentioned variables. In light of the hypotheses formulated in this research, a curvilinear and linear line is plotted across the scattered diagram to see which has the best fit in comparison.

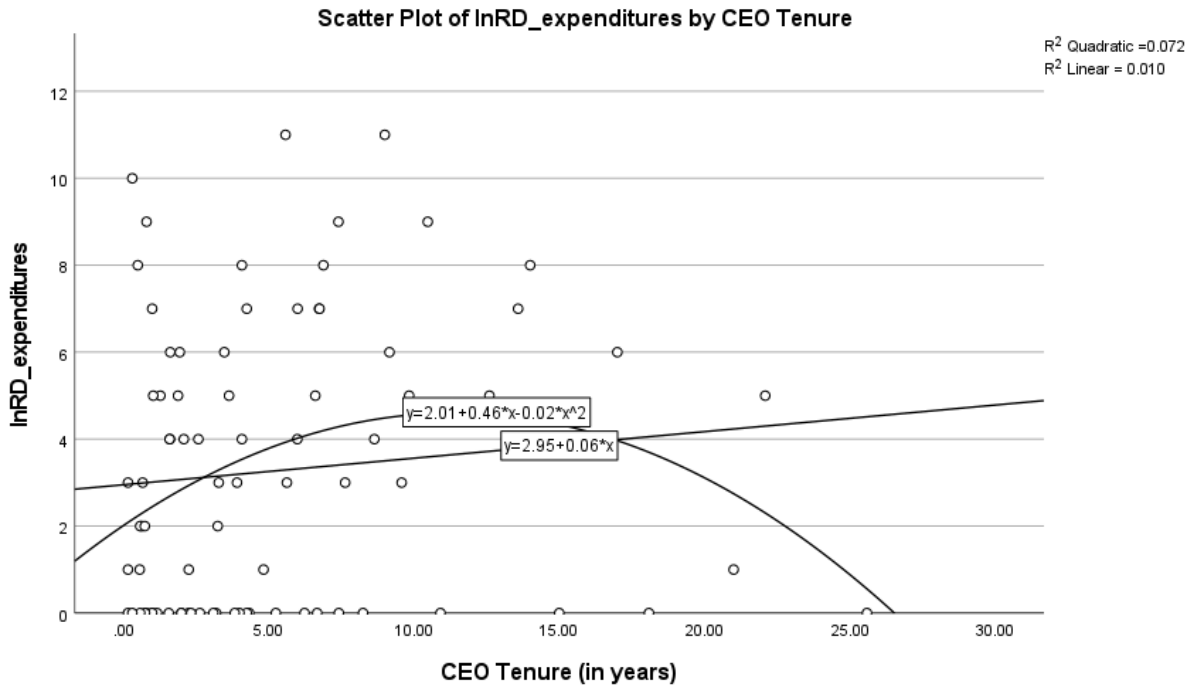

Figure 1: Scattered plot of log R&D expenditures by CEO tenure.

Firstly from the diagram above in Figure 3, we can observe that most variables are clustered around lower tenure years as suggest by the mean tenure of (5.2 years). Despite the log transformation, the skewness persist due to the presence of extreme years in tenure. Interestingly enough a majority of the extreme tenure values do not report high R&D expenditures. Same cannot be said for lower years of a CEO's tenure which portrays both extremely high and low levels of R&D expenditures. In general there is no clear linear or curvilinear pattern that is observable, however, the absence of high values of expenditure for longer tenured CEOS may be more suggestive of a curvilinear relationship in comparison to linearity.

4.1.5 ANOVA

The overall significance of the model is determined by the results of the ANOVA tests. This test investigates whether the mean of the combined IVs does not significantly differ from that of the independent variable. With a p=values of less than 5%, all 4 models reject the null hypothesis. As such, the combined effect of the variation in independent variables significantly accounts for the

variation in the dependent variable. With all models validated, the next step consist of interpreting the regression results.

4.1.5 Regression results.

The current research primarily investigates the relationship between CEO tenure and RD expenditures. The following null hypotheses were tested on the coefficient of the relevant betas:

H01: CEO's tenure does not follow a significant curvilinear relationship with its firm's R&D expenditure.

H1: CEO's tenure do not follow a curvilinear relationship with its firm's R&D expenditure.

H02: Board independence has no significant negative moderation on the curvilinear relationship between a CEO's tenure and R&D expenditure through the alleviation of agency costs.

H2:Board independence negatively moderates the curvilinear relationship between a CEO's tenure and R&D expenditure through the alleviation of agency costs.

H03: Board size has no significant positive moderation on the curvilinear relationship between a CEO's tenure and R&D expenditure through the increase of agency costs.

H3: Board size positively moderates the curvilinear relationship between a CEO's tenure and R&D expenditure through the increase of agency costs.

Table 3 below summarizes the impact of the dependent variables tenure and tenure² on the logarithmic form of R&D investments. Model 1 serve as a control model and only regresses the control variables on the R&D investments. Similar to the correlation results, the size of the firm(B=0 2.155E-05,t=4.18, $p<0.01$) is the only variable that significantly affects the percentage change in R&D expenditure. Thought the effect is minimal as denoted by the B coefficient, it overall impact on R&D investment is positive and statistically different form zero. Model 1 investigates the linear relationship of CEO's tenure (B=0.004, t=0.069, $p>0.1$) on the R&D expenses and find no significance that there is a linear association between the afore mention variables. Model 2 investigates the current's study's H1 by testing for coefficient of tenure²(B=0 -0.005, t=-0.065, $p>0.1$) and find that there is not enough evidence to reject H01 and therefore conclude that a CEO's tenure do not follow a curvilinear relationship with its firm's R&D expenditure. Model 3 investigates the combined moderating effects of board size and board independency on the hypothesized curvilinear relationship between a CEO's tenure and the firm's R&D. The results of model 3 find no sufficient evidence of to reject H02 and H03 and conclude therefore that; Board independence has no statistically significant negative moderating effect on the curvilinear relationship between a CEO's tenure and R&D expenditure through the alleviation of agency costs. Similarly, we conclude that there is not enough statistical evidence of board size positively moderating the curvilinear relationship between a CEO's tenure and R&D expenditure through the increase of agency costs.

Throughout all the regression estimations, the size of the firm is consistently significant as a positive predictor of the percentage change in R&D expenditures. In this vein, an increase in the size of boards by one director ($t=0.748$, $t=2.069, p<0.05$) increases R&D expenditures by 0.7% under the assumption that the CEO's tenure is curvilinearly related to R&D expenditures.

Variable	Model 0	Model 1	Model 2	Model 3
Intercept	9.805*** (10.88)	9.785*** (10.237)	9.643** (9.797)	9.643** (9.797)
Control Variables				
CEO Age	0.011 (0.967)	0.009 (0.961)	0.000 (0.834)	0.000 (-0.042)
Firm Size	2.155E-05*** (4.18)	2.155E-05*** (4.129)	2.072E-5*** (3.842)	1.530E-5*** (2.617)
Firm Age	-0.003 (-0.704)	-0.003 (-0.681)	-0.003 (-0.559)	-0.004 (-0.884)
ROA	0.031 (0.020)	0.013 (0.020)	0.139 (0.084)	0.645 (0.392)
Industry effect	-0.013 (-1.092)	-0.025 (-1.092)	-0.014 (-1.174)	-0.015 (-1.279)
Firm Leverage	-0.025 (-0.535)	-0.025 (-0.535)	-0.020 (-0.414)	-0.019 (-0.402)
Main Effects				
CEO Tenure		0.004 (0.069)	0.101 (0.634)	0.045 (0.284)
CEO Tenure²			-0.005 (-0.065)	-0.001 (-0.138)
Board size				0.748** (2.069)
Independent director ratio				-0.015 (0.963)
Moderating Effects				
CEO Tenure*Board size				-0.012 (-0.035)
CEO Tenure * Independent director ratio				-0.015 (-0.047)
Adjusted R² (%)	16.8	15.7	15	20.6
F-statistics	3.69***	3.121***	2.761***	2.732***

Note: ***,**,* denotes value for alpha implies significance at a level of 1%, 5% and 10 % respectively.

Table 3 : Multiple linear regression results predicting the percentage change in R&D Expenditures (lnR&D)

Table 4 : Summary of hypotheses relative to regression results

Hypothesis	Regression Weights	β	t-statistic	p-value	F-Statistics	Results
Control	Linear	0.007	0.069	0.945	3.121	Not accepted
H1	Non linear	-0.208	-0.649	0.520	2.761	Not accepted
H3	Moderator (Board size)	0.005	-0.035	0.157	2.732	Not accepted
H4	Moderator (Board age)	0.183	1.429	0.972	2.732	Not accepted

4.1.6 Discussions

The empirical findings of this study does not provide enough evidence to support the curvilinear assumption of CEO tenure and R&D intensity consistent with Hambrick and Fukutomi's (1991) life cycle theory. Furthermore, there is not enough evidence in supporting the agency effects of board size and independence on the risk taking behaviour of CEOs as suggested by (Chen & Zheng, 2014). In contrast to some previous studies (Green, 1955; Midavaine et. al, 2016; Cheng & Zheng, 2014) that found significant results, the current study propose that there is no significant relationship between a CEO's tenure and the amount of R&D spent by a company. In light of the empirical results, the discussions heavily inclines on the limitations of the current study which are further discussed in the next chapter.

CHAPTER 5

CONCLUSION

This study aimed at investigating how the tenure of CEO's interacted with R&D expenditures in the context of managerial risk behaviour (Chen and Zheng, 2014). Furthermore, the study also explored the supervisory role of the board of directors in mitigating managerial attitudes towards risk from an agency perspective using Netherlands as a case study. The mixed findings existing in the literature coupled with the propositions made in Hambrick and Fukutomi's (1991) Life cycle theory led to the proposition of a linear-curve relationship between a CEO's tenure and R&D expenses.

Descriptive, correlation, graphical and multiple regression analyses were conducted to explore the nature of interaction between the variables of interest. The descriptives showed the data was skewed to the left suggesting the presence of extreme values to the right. With the exception of R&D expenditures and the size of boards, the correlation matrix did not reveal any prior association between the dependent, independent and moderating variables. CEO's age was positively associated with Furthermore, R&D expenditures only correlated with the size of the firm among the control variables, this observation was consistent in the regression results in all 4 models. Besides the theoretical importance of board size, this results could be a statistical indication of the extreme values of the firm size and R&D expenditures relative to other values pulling other variables in the distribution. To help normalize the distribution, regression analyses were performed on the log transformation of the R&D expenditures (ln RD) this helped normalize the distribution of residual terms thus holding the core assumption of normal distribution in regression analysis. All four models suggest that the CEO's time in office have no significant influence over the percentage of R&D spent by a firm.

5.1 Study Limitations

This study was limited by a number of factors including;

Data challenges: The sample size used in this study is considerably small relative to the set of independent/control variables. Under such conditions, the statistical power of the regression t-tests may have been to low to detect any effects of the change in CEO's tenure on the R&D expenditures (Cohen, 1988). In the same light, the high variability resulting from the extreme values due to different company size may have blurred any potential trace of the effects on CEO Tenure on R&D

expenditures (Lohr, 2019). Furthermore, small samples pose more challenges in accounting for control variables, potentially leading to insignificant results (Pearl, 2009). Finally, given that the life cycle theory is anchored upon the passing of time, using cross sectional may be improper as it would ignore the time effect.

Theoretical context: The Situational Theory of leadership posit that leaders adapt to their environments and therefore a manager cannot be simply place din a behavioural box on the basis of their expected performance (Hersey & Blanchard, 1960). In contrast, Hambrick and Fukutomi's (1991) life cycle theory models human behaviour in a somewhat deterministic view that may not be fitting of the 21st century managerial approach. Hence the assumption that the tenure of a CEOs will adequately reflect on managerial behaviour towards risk taking initiatives may be fairly grounded. Furthermore, given that Hambrick and Masons' (1984) UET is premised upon the behavioural goal of the firm which is to satisfy conflicting stakeholder interests, it is only fair to assume that a CEO's decision making process is significantly affected by his close team members. In this regard, looking at the whole TMT rather than a single individual might offer a more complete picture in testing our hypotheses.

Geographical and structural contexts: The advance innovation ecosystem that exist in the Netherlands is suggestive of various mechanism supporting R&D expenses other than direct company funds. For instance according to the (WIPO, 2022) Netherlands ranked 10th in innovation inputs and 6th on outputs between the year 2020 and 2022) of which the government is a big contributor. Furthermore, well-built innovation ecosystems are characterized by significant collaboration that sometimes manifest in the form of incubator spin-offs which are not necessarily classify as R&D expenditures under general accounting rules for the parent firm. More to that, the structural dynamics of R&D investments in most heavily innovation invested countries widely consists of collaborative networks and separate R&D facilities which can be hardly captured by simply looking at R&D expenditures spent in a year. As such, given that most of the investments made on R&D are allocated for several years, looking at a single year alone might sometimes be misleading. These considerations render looking solely at yearly R&D expenditures inadequate for countries with well subsidised and interwoven innovation financing schemes.

Measurement variable: The decision of R&D expenditures is a function of numerous interwoven corporate factors. This may pose challenges in using a it as a proxy for single managerial risk taking behaviour as not all TMTs have the managerial 'power' to influence the pursuit of innovation on the sole basis of the risk profile. Instead, a better measurement of managerial behaviour can be captured by constructing induvial risk profiles collectible via survey distributions.

5.3 Recommendations for future research

The primary aim of the current research was to explore the nature of interaction between a CEO's tenure in office relative to how much was spent in R&D by looking at the potential moderating role of board size and board independency. Given the numerous contextual limitations, it is important to mention this study tilts more towards exploration rather than the generalization of results.

For more accurate results, further research can be carried within various context such as; (1) By comparing similar hypotheses and differentiating between small and large firms to eliminate the size effects created by extreme values; (2) Performing a panel analysis instead of simply a cross sectional to allow for more data, better fit with the theoretical assumptions thereby improving the generalizability of results. (3) Using other second level risk taking measures such as the Debts/Equity ratio and volatility in stock return or primary level such as surveys on risk profiles can be used as proxies in future research. In case innovation performance is the variable of interest, the inclusion of other measuring factors such as patent filling, collaborative partnerships, engagement with startups and external innovators and number of R&D employees etc. would be more suitable in capturing a more holistic picture of innovation efforts. Making these changes might produce more consistent results.

This study sheds further light to the existing body of literature on corporate governance and innovation as it highlights the importance of considering statistical, geographical, structural and theoretical contexts in the inference of managerial behaviour relative to a firm performance. The outcome of this study offers relevant guidelines to avoid potential pitfalls that might be encountered in future academic and managerial research especially in the context of economies which view investment in innovation as a primary strategy for economic growth.

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Appendices

Appendix 1: Comparison of log transformation of R&D expenditures with raw values.

Descriptive Statistics

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
lnRD	81	9.8887	2.61301	-.247	.267	-.120	.529
R&D expenditures	81	248621.65	701931.116	4.455	.267	22.540	.529
Valid N (listwise)	81						

Appendix 2 : SPSS results model 0

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	D/E, Firm Age, CEO Age, Industry codes (SIC), Firm SIze, ROA[b]	.	Enter

a. Dependent Variable: lnRD

b. All requested variables entered.

Model 0 Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.480[a]	.230	.168	2.38360	1.898

a. Predictors: (Constant), D/E, Firm Age, CEO Age, Industry codes (SIC), Firm SIze, ROA

b. Dependent Variable: lnRD

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	125.792	6	20.965	3.690	.003[b]
	Residual	420.433	74	5.682		
	Total	546.225	80			

a. Dependent Variable: lnRD

b. Predictors: (Constant), D/E, Firm Age, CEO Age, Industry codes (SIC), Firm SIze, ROA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	9.805	.902		10.875	<,001		
	CEO Age	.011	.011	.101	.967	.337	.946	1.057
	Firm SIze	2.158E-5	.000	.432	4.182	<,001	.975	1.025
	Firm Age	-.003	.005	-.074	-.704	.484	.950	1.053
	ROA	.031	1.592	.002	.020	.984	.859	1.164
	Industry codes (SIC)	-.013	.012	-.113	-1.092	.278	.977	1.023
	D/E	-.025	.047	-.056	-.535	.594	.933	1.071

a. Dependent Variable: lnRD

Appendix 3: Model 1 output

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	CEO Tenure, D/E, CEO Age, Industry codes (SIC), Firm Age, Firm SIze, ROA[b]	.	Enter

a. Dependent Variable: lnRD

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.480[a]	.230	.157	2.39979	1.894

a. Predictors: (Constant), CEO Tenure, D/E, CEO Age, Industry codes (SIC), Firm Age, Firm SIze, ROA

b. Dependent Variable: lnRD

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	125.820	7	17.974	3.121	.006[b]
	Residual	420.405	73	5.759		
	Total	546.225	80			

a. Dependent Variable: lnRD

b. Predictors: (Constant), CEO Tenure, D/E, CEO Age, Industry codes (SIC), Firm Age, Firm SIze, ROA

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	9.785	.956		10.237	<,001		
	CEO Age	.011	.011	.101	.961	.340	.946	1.057
	Firm SIze	2.155E-5	.000	.431	4.129	<,001	.967	1.034
	Firm Age	-.003	.005	-.073	-.681	.498	.928	1.077
	ROA	.005	1.646	.000	.003	.997	.814	1.229
	Industry codes (SIC)	-.013	.012	-.113	-1.084	.282	.977	1.023
	D/E	-.025	.048	-.057	-.534	.595	.932	1.073
	CEO Tenure	.004	.052	.007	.069	.945	.924	1.082

a. Dependent Variable: lnRD

Appendix 4: Model 2 output

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	CEO Tenure squared, Firm SIze, Firm Age, D/E, Industry codes (SIC), CEO Age, ROA, CEO Tenure[b]	.	Enter

a. Dependent Variable: lnRD

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.485[a]	.235	.150	2.40941	1.935

a. Predictors: (Constant), CEO Tenure squared, Firm SIze, Firm Age, D/E, Industry codes (SIC), CEO Age, ROA, CEO Tenure

b. Dependent Variable: lnRD

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	128.247	8	16.031	2.761	.010[b]
	Residual	417.978	72	5.805		
	Total	546.225	80			

a. Dependent Variable: lnRD

b. Predictors: (Constant), CEO Tenure squared, Firm SIze, Firm Age, D/E, Industry codes (SIC), CEO Age, ROA, CEO Tenure

Coefficients Model 2[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	9.643	.984		9.797	<,001		
	CEO Age	.009	.011	.090	.834	.407	.919	1.089
	Firm SIze	2.072E-5	.000	.415	3.842	<,001	.913	1.096
	Firm Age	-.003	.005	-.061	-.559	.578	.902	1.109
	ROA	-.139	1.668	-.010	-.084	.934	.799	1.251
	Industry codes (SIC)	-.014	.012	-.124	-1.174	.244	.949	1.054
	D/E	-.020	.048	-.045	-.414	.680	.905	1.105
	CEO Tenure	.101	.159	.208	.634	.528	.099	10.152
	CEO Tenure squared	-.005	.007	-.208	-.647	.520	.103	9.753

a. Dependent Variable: lnRD

Appendix 4: Model 3 output

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Zscore: Board size, CEO Tenure, Industry codes (SIC), D/E, Firm Age, CEO Age, MTenureBIndp, Firm SIze, ROA, Zscore: Independent Director Ratio, MTenureBsi, CEO Tenure squared[b]	.	Enter

a. Dependent Variable: lnRD

b. All requested variables entered.

V

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.570[a]	.325	.206	2.32809	1.841

a. Predictors: (Constant), Zscore: Board size, CEO Tenure, Industry codes (SIC), D/E, Firm Age, CEO Age, MTenureBIndp, Firm SIze, ROA, Zscore: Independent Director Ratio, MTenureBsi, CEO Tenure squared

b. Dependent Variable: lnRD

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	177.666	12	14.806	2.732	.004[b]
	Residual	368.559	68	5.420		
	Total	546.225	80			

a. Dependent Variable: lnRD

b. Predictors: (Constant), Zscore: Board size, CEO Tenure, Industry codes (SIC), D/E, Firm Age, CEO Age, MTenureBIndp, Firm SIze, ROA, Zscore: Independent Director Ratio, MTenureBsi, CEO Tenure squared

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	10.416	.987		10.556	<,001		
	CEO Age	.000	.011	-.005	-.042	.966	.824	1.213
	Firm SIze	1.530E-5	.000	.306	2.617	.011	.724	1.380
	Firm Age	-.004	.005	-.093	-.844	.402	.811	1.234
	ROA	.645	1.644	.045	.392	.696	.768	1.302
	Industry codes (SIC)	-.015	.012	-.133	-1.279	.205	.916	1.091
	D/E	-.019	.048	-.043	-.402	.689	.873	1.146
	CEO Tenure	.045	.158	.093	.284	.778	.093	10.765
	CEO Tenure squared	-.001	.007	-.045	-.138	.890	.094	10.589
	MTenureBIndp	.451	.316	.183	1.429	.157	.606	1.650
	MTenureBsi	-.012	.346	-.005	-.035	.972	.546	1.832
	Zscore: Independent Director Ratio	-.015	.331	-.006	-.047	.963	.622	1.609
	Zscore: Board size	.748	.362	.285	2.069	.042	.523	1.911

a. Dependent Variable: lnRD