Accounting and Auditing with Application

www.aaa.reapress.com

Acc. Aud. Appl. Vol. 2, No. 3 (2025) 171–182.

Paper Type: Original Article

Investigation of the Effect of Board Compensation and CEO Power on Firms' Innovation with the Moderating Role of Ownership Structure

Amir Ghafourian Shagerdi[1,*], Leila Cheragh Sahar[1], Seyyed Kazem Ebrahimi[2]

[1] Department of Administrative Sciences, Imam Reza International University, Mashhad, Iran; ghafourian@imamreza.ac.ir; n.kh3045@gmail.com.

[2] Department of Economics, Management and Administrative Sciences, Semnan University, Semnan, Iran; kebrahimi@semnan.ac.ir.

Citation:

Received: 14 October 2024 *Revised: 27 January 2025* *Accepted: 19 February 2025*	Ghafourian Shagerdi, A., Cheragh Sahar, L., & Ebrahimi, S. K. (2025). Investigation of the effect of board compensation and CEO power on firms' innovation with the moderating role of ownership structure. *Accounting and auditing with application, 2*(3), 171-182.

Abstract

The present study examines the effect of board compensation and CEO power on Firms' innovation with the moderating role of ownership structure based on data envelopment analysis. The statistical population of the study includes all companies listed on the Tehran Stock Exchange, which after sampling amounted to 143 companies and over a 10-year period from 2012 to 2021. The hypothesis testing method in the present study was the use of multiple ordinary regression using R software. The results of the study show that there is a significant relationship between board compensation and firms' innovation. There is also a significant relationship between CEO power and firms' innovation. Ownership structure does not moderate the relationship between board compensation and firms' innovation, and finally, ownership structure does not moderate the relationship between CEO power and firms' innovation.

Keywords: Board compensation, CEO power, Firms' innovation, Ownership structure.

1 | Introduction

The institutionalisation of a culture of innovation involves key dynamics in the area of programme implementation and the realisation of a control framework to shape the rational and reliable implementation of programmes by managers in companies. This is what has attracted financial professionals, managers, directors and stakeholders [1]. The nature of this innovative culture is reflected in executive compensation

Corresponding Author: ghafourian@imamreza.ac.ir

10.22105/aaa.v2i3.70

plans and business powe [2]. Since the beginning of the 21st century, corporate governance has received a lot of attention from analysts and the business world. Several countries have created their own corporate governance codes for companies to follow [3].

This research is mainly focused on two important parts of corporate governance that help in resolving the issues of the organization. Elements of corporate governance include operating system and governance that focuses on innovation of the companies. Over the past two decades, board compensation has provided the enthusiasm of analysts from different disciplines, for example, financial, fund and key management aspects [4]. The relationship between board compensation and various hierarchical outcomes has been reported in many studies, including firm innovation and CEO late-stage risk-taking [1].

Much of the research studied has been based on organizational theory, which is somewhat mixed and contradictory [4]. Innovation is information that is detrimental to the sustainability of the workplace. The separation of ownership from managers has created problems for both groups. Investors are either sceptical of managers or trust them, although managers may act cautiously or in a manner appropriate to the partner level. This complex relationship cannot be explained by a single theory. According to agency theory, the board of directors acts as an expert for investors. Organisational theory is presented as the "operating system theory of the firm". The ideal view of organisational theory shows the need and importance of a remuneration plan based on presentation and power at all levels of the relationship.

Stewardship theory, contrary to what might be expected, makes it clear that managers act as stewards of their owners and provide the greatest value to their owners. Given that an innovative firm is one that performs better, this study focuses on research and development expenditure as the basis for firm innovation.Companies need to allocate resources to relevant innovation in order to foster an innovative culture. Interest in innovation-related work often has a long payback period, which can be beyond the reach of managers and supervisors. In this context, stable budgets and good conditions, together with a well-functioning operating system, can overcome the problems of committing resources to long-term commitments. A strong investment plan, together with the support of key investors, can help managers make these decisions.

In this way, ownership structure is considered as a moderating variable to understand the relationship. In this regard, research has typically used a set of variables, and despite the impact of board compensation and CEO power on firm innovation, only Akram et al. [5] has examined these components in developing markets. To investigate the above relationship, Akram et al. [5] studied data from 27 chemical and pharmaceutical companies listed on the Pakistan Stock Exchange during 2013-2021 and concluded that board compensation has a positive effect on firm innovation. Another interesting finding is that this relationship becomes negative under the conditional role of ownership structure, which supports organisational theory.

However, CEO power has no role in corporate innovation even under the moderating role of ownership structure [5]. Based on these studies, the present study seeks to answer the following fundamental questions Does executive compensation affect firm innovation? What is the direction of this effect? Does CEO power affect firm innovation? What is the direction of this effect? Does ownership structure moderate the relationship between board pay and firm innovation? Does ownership structure moderate the relationship between board power and firm innovation?

2 | Theoretical Literature

2.1 | Board Compensation

Total payments made to the board of directors for salaries, benefits and bonuses during a financial year. Pursuant to article 134 of the commercial code of 1347, if the Articles of Association so provide, the General Meeting may, in accordance with article 241 of the same code, allocate a certain portion of the company's annual net profit as bonuses to the members of the board of directors, provided that the amount of the

bonuses allocated to the members of the board of directors shall not exceed 5 per cent of the profit distributed to the shareholders in the same year in the case of public limited liability companies and 10 per cent of the profit distributed to the shareholders in the same year in the case of private limited liability companies. In addition, non-executive members of the board of directors shall not be entitled to receive any salary, bonus or fee from the company, whether on a continuing or discontinuing basis, in return for their directorship, except as provided in this article.

2.2|CEO Power

In today's world, management plays a decisive role in increasing the efficiency and productivity of companies. Among the four key factors of success in organizations, including labor, capital, raw materials and management, the role of management has become more important than ever. In today's competitive world, there is great pressure to quickly achieve desired results and, consequently, quick decision-making, in which managers play a vital role in implementing this important task, and sometimes, as a result of not achieving the desired results as soon as possible, management changes are made in the organization [6]. In this context, CEO power can be defined by Finkelstein as "the ability of individual actors to exercise their will" [7]. Hence, in a company run by a powerful CEO, other managers subordinate to the CEO, such as the CFO, will have less influence in shaping company policies, but can be considered as the CEO's operational arm that simply implements the CEO's policy preferences.

2.3|Firms' Innovation

In fact, innovation is the transformation of creativity and new ideas into action and results. Most innovation is the result of a conscious and focused search for new opportunities, and this process begins with the analysis of those opportunities. Innovation also means creating a new product, process or service to increase competitiveness and overall profitability based on customer needs and requirements [8]. This study discusses innovation in the field of research and development. Research and development is, in fact, any embodied and creative activity aimed at increasing knowledge related to man, culture and society and at using this knowledge for new applications [9]. In this study, research and development expenses refer to all costs incurred by companies active in the capital market in this area.

2.4|Ownership Structure

Typically, name companies have different legal structures. The ownership structure refers to the composition of all members and shareholders, or in other words the owners of a company, who are considered to be the main owners of that company based on their percentage of ownership [10]. The structure of widespread ownership is one of the indicators of ownership concentration. Berle and Means drew attention to the importance of widely owned companies in 1932. In widely owned companies, ownership of capital is spread among the shareholders, but control is concentrated in the hands of managers. Increasing concentration of ownership by major shareholders provides sufficient incentive to monitor managers. In contrast, there is little incentive to monitor management because the costs of monitoring will increase the benefits [11].

2.5|Research Background

Rezaei pitenoei et al. [12] conducted a study to investigate the "effect of management overconfidence on the amount of research and development costs of companies". The results of the study indicate that management overconfidence increases the amount of research and development costs of companies [12]. Keshavarz and Keshavarz and Kiamehr [13] studied the "Effects of financial constraints and agency costs on investment in research and development in companies listed on the Tehran Stock Exchange".

The results indicate that if financial constraints increase in joint-stock companies, investment in research and development decreases. Also, if the agency cost of a company increases in joint-stock companies, investment in research and development of the company increases. In this regard, state ownership has a moderating role on the relationship between financial constraints and investment in research and development of the

company. Finally, state ownership has a moderating role on the relationship between agency costs of a company and investment in research and development of the company [13]. Turkashavand et al. [14] conducted a study titled "The relationship between financing source ratio and R&D cost intensity in companies listed on Tehran Stock Exchange".

The results of the analysis showed that the financing source ratio has a negative and significant effect on the intensity of investment in R&D costs [14]. Ghasemi and Asiai [15] conducted a study entitled "Investigating the relationship between cash flow and financing with investment in research and development". The results of this study show that there is no significant relationship between the variable operating cash flow and financing with investment in research and development. There is also no significant relationship between the variable debt financing and investment in research and development and finally, according to the results, there is a significant relationship between the variable equity financing and investment in research and development [15]. Molaei and Dehghani [16] conducted a study to investigate the "effect of research and development costs on market share of two-digit industries in Iran".

The results showed that there is a direct and non-linear relationship between research and development costs and market share in the Iranian industrial sector [16]. Akram et al. [5] examined data from 27 chemical and pharmaceutical companies listed on the Pakistan Stock Exchange during 2013-2021, and showed that CEO compensation has a positive effect on firm innovation. This relationship is also negative under the conditional role of ownership structure, which supports organisational theory. However, CEO power plays no role in firms' innovation even under the moderating role of ownership structure.

Chen et al. [17] examined the relationship between CEO overconfidence and significant increases in R&D spending. They found that long-term stock performance was positive only for companies whose CEOs were not overconfident. The researchers believe that their findings, which may be related to overinvestment and overestimation of future cash flows, suggest that R&D resulting from overconfident behaviour does not add value to companies [17]. Zaho and Hong [18] examined "investor preferences, CEO-chairman duality, and R&D investment in a sample of Chinese listed companies during 2007-2010".

The results show that corporate governance is not significantly aligned with investor preferences. However, when we examine the CEO-Chairman duality variable and its interaction with investor preferences, it is suggested that mispriced stocks caused by investor preferences and CEO-Chairman duality have a positive effect on firms' R&D investment. Furthermore, the interaction coefficient of investor propensity and CEO-Chairman duality is significantly negative, suggesting that firms with a board member as CEO will generate investment propensity by investing in R&D, while firms where the CEO and the chairperson are separated will make more rational investment decisions [18]. Chen [19] conducted a study on "The relationship between R&D investment and CEO tenure and the moderating effect of board capital". Therefore, this study makes two important findings. First, it enriches our understanding of how CEO life cycle (tenure) affects the investment decisions of large firms, especially in R&D. Second, it provides evidence for the positive moderating effects of the board and its social capital [19].

2.6 | Research Hypotheses

According to the theoretical and research foundations mentioned above, the research hypotheses are as follows:

H1: There is a significant relationship between board of directors' compensation and corporate innovation.

H2: There is a significant relationship between CEO power and corporate innovation.

H3: Ownership structure moderates the relationship between board of directors' compensation and corporate innovation.

H4: Ownership structure moderates the relationship between CEO power and corporate innovation.

3 | Methodology

3.1 | Statistical Population

This research is an applied research in terms of its purpose and a descriptive survey research in terms of its research method. The data in this research were collected from two sources: library and field. The target statistical population in this research is all the companies listed in Tehran Stock Exchange in the years 2012-2021. The statistical sample is through elimination sampling method (systematic) in which the selected companies are selected from a set of companies listed in Tehran Stock Exchange, considering the limitations mentioned below, which have the following conditions:

I. The company was not listed on the Tehran Stock Exchange during the years under review.

II. The required financial information, in particular the notes to the financial statements, is available.

III. The companies studied are not financial, investment, insurance and fund companies, etc.

IV. The companies studied are not non-manufacturing companies such as services, trade, etc.

V. The companies have not changed their financial year or their activities during the years under review.

Taking into account the above conditions, 143 companies remained, which in fact represents the actual statistical population to be studied. For this reason, the present study was conducted using the statistical method of data envelopment analysis and a multivariate regression model. In this regard, the research hypotheses were tested using the R software and analysed according to the description of the statistical hypothesis testing plan presented in the following sections.

3.2 | Model and Variables

In this study, the following regression models were used to test the hypotheses:

$$R\&Dit = \beta 0 + \beta 1\, CEOCit + \beta 2\, Sizeit + \beta 3\, Leverageit + \beta 4\, BIit + \beta 5\, ROAit + \beta 6\, Tobin's\ Qit + \varepsilon it \quad (1)$$

$$R\&Dit = \beta 0 + \beta 1\, CEOPit + \beta 2\, Sizeit + \beta 3\, Leverageit + \beta 4\, BIit + \beta 5\, ROAit + \beta 6\, Tobin's\ Qit + \varepsilon it \quad (2)$$

$$R\&Dit = \beta 0 + \beta 1\, CEOCit + \beta 2\, CEOC\, i,t \times OS\, i,t + \beta 3\, OS\, i,t + \beta 4\, Sizeit + \beta 5\, Leverageit + \beta 6\, BIit + \beta 7\, ROAit + \beta 8\, Tobin's\ Qit + \varepsilon it \quad (3)$$

$$R\&Dit = \beta 0 + \beta 1\, CEOPit + \beta 2\, CEOP\, i,t \times OS\, i,t + \beta 3\, OS\, i,t + \beta 4\, Sizeit + \beta 5\, Leverageit + \beta 6\, BIit + \beta 7\, ROAit + \beta 8\, Tobin's\ Qit + \varepsilon it \quad (4)$$

Based on the principles presented in this study, the variables are expressed in four groups: independent, dependent, moderating, and control, which are presented below.

Independent variable

CEO Bonus (CEOC): It is the amount of bonus paid to the company's board of directors divided by the book value of the company's assets CEO power (CEOP): Based on the research method of Schoephall et al. [20], the following four factors are calculated to determine the CEO power. The scores from each factor are then added together and the final CEO power score is calculated. Obviously, the lowest score is zero and the highest score is 4:

CEO bonus: A dummy variable equal to one if the bonus is greater than the sample median and zero otherwise. In this way, all companies in all industries are ranked from smallest to largest in terms of CEO bonus and the median is used as the selection basis. Since companies report only one figure as bonus and do not disclose non-cash bonuses, the same figure is taken as the total bonus.

CEO role duality: If a person is a board member and CEO at the same time, it equals 1, otherwise it equals zero.

Board independence: This is the composition of the board and is calculated as the ratio of non-executive directors to the total number of directors. Thus, if the board's independence is greater than the industry median, its value is one, otherwise it is zero.

CEO tenure: equals one if the CEO tenure is greater than the sample median, otherwise zero.

Dependent variable: Corporate innovation

Based on the research method of Akram et al. [5], corporate innovation will be measured by the sum of research and development expenditures divided by the book value of assets.

Moderator variable: Ownership structure

In this study, it will be measured through ownership concentration. It is the percentage of ownership of shareholders who hold more than five percent of the company's shares.

Control variables

ROA: Earnings before interest and taxes divided by the book value of assets.

BI: Board independence of the company is the ratio of the number of non-executive directors to the total number of directors of the company.

Size: The natural logarithm of the company's sales: The ratio of total liabilities to total assets.

Tobin's Q: Tobin's Q index is the sum of the company's market value (the product of the price per share multiplied by the number of shares held by shareholders) and the book value of the company's liabilities divided by the book value of the company's assets.

4|Findings of the Research

4.1|Descriptive Statistics of the Data

In the descriptive statistics section, data analysis was performed using central indices such as mean and dispersion indices such as standard deviation, as well as minimum and maximum. The descriptive statistics of the study are as follows in *Table 1*.

Table 1. Descriptive statistics of the study.

Variable	Symbol	Mean	Median	Max	Min	S.D	Skewness	Kurtosis
Company innovation	R&D	0.000094	0.000	0.010	0.000	0.006	12.363	184.255
Board compensation	CEOC	0.000	0.0003	0	0.0165	0.001	3.905	22.208
Company size	Size	14.447	14.283	9.725	21.099	1.560	0.624	1.193
Financial leverage	Leverage	0.557	0.546	0.031	3.851	0.257	4.100	0.219
Board independence	BI	0.708	0.8	0	1	0.195	-0.472	0.475
Return on assets	ROA	0.166	0.145	-0.566	0.683	0.170	0.338	90.657
Q Tobin	Tobin's Q	2.879	1.773	0.586	68.136	3.739	7.575	90.657
CEO power	CEOP	1.443	1	0	4	0.898	0.155	-0.505
Ownership structure	OS	68.255	73.575	0	77.3	31.286	9.377	205.025

The most important central index is the mean, which indicates the balance point and centre of gravity of the distribution and is a good index to show the centrality of the data, and the standard deviation is also one of the most important dispersion parameters and a measure of the dispersion of observations from the mean. Now, according to the results of *Table 1*, the highest value of the financial leverage variable with the symbol (Leverage) is 3.851, which is related to Saipa Diesel Company based on the financial reporting information for 2010, in which the value of the company's assets was 7,088,258 million rials and the value of the company's liabilities was 27,301,994 million rials. The highest value of the research and development variable with the symbol (R&D) is 0.010, which is related to Osve Pharmaceutical company based on financial reporting

information for 2013, and the lowest value is zero, which is related to many companies based on their financial reporting information, research and development costs were not reported in them. The highest value of the company size variable with the symbol (Size) is 0.21999 for Mobarakeh Steel Company of Isfahan based on financial reporting information for 2021, and the lowest value is 9.725 for Ravan Fan Avar Industrial Company based on financial reporting information for 2012.

4.2 | Results

The F-limer test is used to check whether the data are panel, the Hausman test is used to check whether there are fixed or random effects in the panel model, and finally the Brosch-Pagan-Godfrey test is used to check the homogeneity of the error variances in the panel model. The results of these tests are presented in *Table 2*.

Table 2. Result of the F-limer test performed to select the ordinary least squares or panel data method.

Model	Null Hypothesis (H0)	Test	Stat	P-Value	Result	Test Type
1	Preference of ordinary least squares method	F Limmer	4.8350	0.000	Rejection of the null hypothesis	Data Panel
2	Preference of ordinary least squares method	F Limmer	4.8427	0.000	Rejection of the null hypothesis	Data Panel
3	Preference of ordinary least squares method	F Limmer	4.8429	0.000	Rejection of the null hypothesis	Data Panel
4	Preference of ordinary least squares method	F Limmer	4.8454	0.000	Rejection of the null hypothesis	Data Panel

According to the results of *Table 2* of the Limer test on the dependent variable in the research models in R software, it can be seen that the probability value obtained from the test in the models is less than 0.05. Hypothesis H0, i.e. the preference for the ordinary least squares method, is not confirmed and the panel data method is accepted.

Table 3. Hausman test performed to determine the random effects model versus the fixed effects model.

Model	H0	Test	Statχ^2	P-value	Result	Test Type
1	Using the random effects method	Hausman	10.594	0.101	Rejection of the null hypothesis	Random
2	Using the random effects method	Hausman	11.08	0.085	Rejection of the null hypothesis	Random
3	Using the random effects method	Hausman	11.518	0.174	Rejection of the null hypothesis	Random
4	Using the random effects method	Hausman	11.672	0.166	Rejection of the null hypothesis	Random

According to the results of *Table 2* of the Limer test on the dependent variable in the research models in R software, it can be seen that the probability value obtained from the test in the models is less than 0.05. Hypothesis H0, i.e. the preference for the ordinary least squares method, is not confirmed and the panel data method is accepted.

Table 4. Results of the brouch-pagan test to detect homogeneity of variance between errors.

Model	Null Hypothesis (H0)	Test	Stat	P-value	Result
1	Equality of variances between errors	Brooch- Pagan	466.38	0.000	Rejection of the null hypothesis
2	Equality of variances between errors	Brooch- Pagan	467.77	0.000	Rejection of the null hypothesis
3	Equality of variances between errors	Brooch- Pagan	465.85	0.000	Rejection of the null hypothesis
4	Equality of variances between errors	Brooch- Pagan	467.58	0.000	Rejection of the null hypothesis

According to the results of the Brosch-Pagan test in *Table 4* and the five percent error level, the null hypothesis of this test is rejected, and as a result, there is a problem of variance heterogeneity in the regressions. Therefore, the generalized model should be used for estimation.

Analysis of the results of the first hypothesis of the research

The summary of the results of the regression *Model (1)* is presented in *Table 5*:

Table 5. Estimation of the first regression model of the study using the generalized panel method with a random effects approach.

Variable	Symbol	Coeff.	S.D	t Stat.	P-value
Intercept	C	6.967	2.488	2.800	0.005
Board Compensation	CEOC	2.044	7.726	2.646	0.008
Firm Size	Size	-4.880	1.601	-3.048	0.002
Financial Leverage	Leverage	1.775	8.671	2.047	0.040
Board Independence	BI	-4.093	8.849	-0.463	0.643
Return on Assets	ROA	2.439	1.346	1.812	0.069
QTobin	Tobin's Q	-1.507	4.089	-0.369	0.712

The results of *Table 5* show that the probability value of the board of directors' compensation variable is less than the 5% error level (0.008), and as a result, the relevant variable is significant, indicating that there is a significant relationship between board of directors' compensation and company innovation, and the first hypothesis is accepted. The coefficient of 2.044 indicates a direct relationship between directors' remuneration and firm innovation. In other words, as board compensation increases, there is more firm innovation, and this effect is significant.

Analysis of the results of the second research hypothesis

The summary of the results of the regression *Model (2)* is presented in *Table 6*:

Table 6. Estimation of the second regression model of the study using the generalized panel method with a random effects approach.

Variable	symbol	Coeff.	S.D	t Stat.	P-value
Intercept	C	6.765	2.423	2.791	0.005
CEO power	CEOP	2.618	1.224	2.139	0.032
Company size	Size	-4.740	1.553	-3.052	0.002
Financial leverage	Leverage	1.767	8.671	2.037	0.041
Board independence	BI	-4.296	9.210	-0.466	0.640
Return on assets	ROA	2.275	1.294	1.758	0.078
QTobin	Tobin's Q	-1.413	4.098	-0.345	0.730

The results of *Table 6* show that the probability value of the variable CEO power and company innovation is less than the 5 percent error level (0.002), and as a result the relevant variable is significant, indicating that the relationship between CEO power and company innovation is significant and the second hypothesis is accepted. The coefficient of 2.618 indicates a direct relationship between CEO power and firm innovation.

Analysis of the results of the third research hypothesis

The summary of the results of the regression *Model (3)* is presented in *Table 7*:

Table 7. Estimation of the third regression model of the study using the generalized panel method with a random effects approach.

Variable	symbol	Coeff.	S.D	t Stat.	P-value
Intercept	C	7.048	2.513	2.805	0.005
Board compensation	CEOC	3.025	1.277	2.369	0.017
Independent convergence	CEOC × OS	-8.095	4.655	-1.739	0.082
Ownership structure	OS	3.880	5.880	0.066	0.947
Company size	Size	-5.003	1.604	-3.120	0.001
Financial leverage	Leverage	1.885	8.684	2.170	0.029
Board independence	BI	-3.884	8.839	-0.439	0.660
Return on assets	ROA	2.482	1.345	1.845	0.065
QTobin	Tobin's Q	-1.657	4.093	-0.405	0.685

The results of *Table 7* show that the probability value of the interaction variable of ownership structure and board remuneration is greater than the 5 percent error level (0.082), and as a result, the relevant variable is not significant, indicating that the cost of ownership structure does not moderate the relationship between board remuneration and firm innovation, and the third hypothesis is not accepted.

Analysis of the results of the fourth research hypothesis

The summary of the results of the regression *Model (4)* is presented in *Table 8*:

Table 8. Estimation of the fourth regression model of the study using the generalized panel method with a random effects approach.

Variable	Symbol	Coeff.	S.D	t Stat.	P-Value
Intercept	C	6.968	2.507	2.779	0.005
CEO power	CEOP	1.781	8.704	2.046	0.040
Integration with independence	CEOP × OS	-1.618	4.009	-0.040	0.967
Ownership structure	OS	-3.227	9.458	-0.341	0.732
Firm size	Size	-4.740	1.555	-3.049	0.002
Financial leverage	Leverage	1.785	8.677	2.057	0.039
Board independence	BI	-4.299	9.211	-0.467	0.640
Return on assets	ROA	2.204	1.295	1.779	0.072
Q Tobin	Tobin's Q	-1.573	4.116	-0.382	0.702

The results of *Table 8* show that the probability value of the interaction variable of ownership structure and CEO power is greater than the 5 percent error level (0.967), and as a result, the relevant variable is not significant, indicating that the cost of ownership structure does not moderate the relationship between board compensation and firm innovation, and the fourth hypothesis is not accepted.

5|Discussion and Recommendations

The aim of the present study is to investigate the effect of board compensation and CEO power on corporate innovation with regard to the moderating role of ownership structure based on data envelopment analysis [21]. The first hypothesis of the study stated that there is a significant relationship between board compensation and corporate innovation. According to the results of the fitted regression model, the probability value of the board compensation variable is less than the 5% error level, and as a result, the relevant variable is significant, indicating that there is a significant relationship between board compensation and corporate innovation, and the first hypothesis is accepted. A positive coefficient indicates a direct relationship between board compensation and corporate innovation. In other words, with an increase in board compensation, more corporate innovation occurs, but this effect is significant. In general, the results

of the first hypothesis of the study were consistent with the results of Choi et al. [22] and Amore and Fila [23].

The second hypothesis of the study states that there is a significant relationship between CEO power and firm innovation. According to the results of the fitted regression model, the probability value of the CEO power and firm innovation variable is less than the 5% error level, and as a result the relevant variable is significant, indicating that the relationship between CEO power and firm innovation is significant, and the second hypothesis is accepted. A positive coefficient indicates a direct relationship between CEO power and firm innovation. In general, the results of the second hypothesis of the study are consistent with the results of Fang et al [24].

The third hypothesis of the study stated that ownership structure moderates the relationship between board compensation and company innovation. According to the results of the fitted regression model, the probability value of the interaction variable of ownership structure and board compensation is greater than the 5% error level, and as a result, the relevant variable is not significant, indicating that the cost of ownership structure does not moderate the relationship between board compensation and company innovation, and the third hypothesis is not accepted. In general, the results of the third hypothesis of the study were in conflict with the results of Akram et al [5].

The fourth hypothesis of the study stated that ownership structure moderates the relationship between CEO power and firm innovation. According to the results of the fitted regression model, the probability value of the interaction variable of ownership structure and CEO power is greater than the 5% error level, and as a result, the relevant variable is not significant, indicating that the cost of ownership structure does not moderate the relationship between board compensation and firm innovation, and the fourth hypothesis is not accepted. In general, the results of the fourth hypothesis of the study were in contradiction with the results of Akram et al [5].

It is suggested that the board of directors of companies, considering the effect of the CEO's reward and power on R&D expenditures, closely monitor the impact of the management contract and the benefits included in it on the manager's motivation to plan for the development of the company's activities, while increasing transparency by publishing the terms of the contract and management benefits during the tenure of office. It is also suggested that investors and capital market activists pay special attention to the R&D expenditures of companies when making investment decisions and consider the role of managers' characteristics in their decision-making models. This understanding can be inferred based on the results of this study. Finally, this study contributed significantly to the development of existing research by providing a better understanding of the CEO's status and his characteristics on investment in R&D and highlighting two important considerations (power and reward) that should be given more special attention in future research.

Author Contributions

Amir Ghafourian, student, responsible for project management and research designer.

Seyyed Kazem Ebrahimi, responsible for supervision and consulting in the research process.

Leila Cheragh Sahar, responsible for collecting and analyzing research data.

Funding

This research has not received any external funding.

Data Availability

The data used in this study were obtained from publicly available financial statements of companies listed on the Tehran Stock Exchange. Additional data may be available from the author upon request.

References

[1] Zulfiqar, M., & Hussain, K. (2020). Ceo compensation and firm innovation: Moderating role of ownership concentration. *International journal of innovation management*, *24*(06), 2050058. https://doi.org/10.1142/S1363919620500589

[2] Mazouz, K., & Zhao, Y. (2019). CEO incentives, takeover protection and corporate innovation. *British journal of management*, *30*(2), 494–515. https://doi.org/10.1111/1467-8551.12330

[3] Kostyuk, A., Guedes, M. J. C., Govorun, D., & Huryna, M. K. (2020). *Corporate governance: Examining key challenges and perspectives* [presentation]. Conference proceedings. International online conference. https://doi. org/10.22495/cgekcp.

[4] Lee, M. G., & Kim, J. S. (2019). The effects of corporate governance on CEO compensation. *Journal of derivatives and quantitative studies*, *27*(2), 165–191. https://doi.org/10.1108/JDQS-02-2019-B0002%0A%0A

[5] Akram, H., Azam, N., Farooq, M. U., Ahad, A., & Saadat, U. (2022). Impact of CEO compensation and CEO power on firmsâ€™ innovation moderating role of ownership structure. *Jurnal aplikasi manajemen, ekonomi dan bisnis*, *6*(2), 61–73. https://doi.org/10.51263/jameb.v6i2.146

[6] Diantai Deilami, Z., Moradzade Fard, M., & Mazaheri, A. (2013). The effect of management tenure on firm value, agency costs, and the database. *Empirical research in accounting*, *3*(3), 21–39. https://doi.org/10.22051/jera.2013.587

[7] Finkelstein, S. (1992). Power in top management teams: Dimensions, measurement, and validation. *Academy of management journal*, *35*(3), 505–538. https://doi.org/10.2307/256485

[8] Linder, J. C., Jarvenpaa, S., & Davenport, T. H. (2003). *Toward an innovation sourcing strategy*. MIT Sloan Management Review. https://sloanreview.mit.edu/article/toward-an-innovation-sourcing-strategy/

[9] Towfiq, A. A. (1999). Management of research and development units in production units. *The second conference of research and development centers for industries and mines*. Civilica. (**In Persian**). https://civilica.com/doc/21626

[10] Shahyakitash, M. N., Kazemi, M., & Amini, M. (2012). A Study of the Relationship between Ownership Structure and Performance of Listed Companies in Tehran Stock Exchange. *2*, *12*(9), 5–24. (**In Persian**). https://ejip.ir/article-1-476-en.html

[11] Roe, M. J. (1990). Political and legal restraints on ownership and control of public companies. *Journal of financial economics*, *27*(1), 7–41. https://doi.org/10.1016/0304-405X(90)90019-V

[12] Rezaei pitenoei, Y., Safari gerayli, M., & Gholamrezapoor, M. (2019). Research paper: Management overconfidence and research and development costs. *Financial management strategy*, *7*(3), 157–173. (**In Persian**). https://doi.org/10.22051/jfm.2018.21247.1728

[13] Keshavarz, Z., & Kiamehr, M. (2018). Investigating the effects of financial constraints and agency costs on investment in research and development. *The third international conference on dynamic management, accounting and auditing*. (**In Persian**). Civilica. https://civilica.com/doc/826439

[14] Turkashavand, S., Hosseini, S. R., & Khatiri, M. (2017). The relationship between financing sources ratios and research and development cost intensity in companies listed on the tehran stock exchange. *The 8th international conference on accounting and management with a modern research science approach.* (**In Persian**) Civilica. https://civilica.com/doc/771594

[15] Ghasemi, G., & Asiai, F. (2017). Free cash flow and investment opportunity portfolio. *The third annual conference on business management and economics.* (**In Persian**). Civilica. https://civilica.com/doc/743370

[16] Molaei, M. A., & Dehghani, A. (2011). Evaluating the impact of research and development costs on market share in the Iranian industrial sector (nonlinear LSTAR approach). *Economic growth and development research*, *1*(4), 50–55. (**In Persian**). https://elmnet.ir/doc/1155123-41052?elm_num=1

[17] Chen, S., Ho, K., & Ho, P. (2014). CEO overconfidence and long-term performance following R&D increases. *Financial management*, *43*(2), 245–269. https://doi.org/10.1111/fima.12035

[18] Zhu, Z., & Huang, W. (2014). Investor sentiment, chairman-ceo duality and R&D investment. *Proceedings of picmet'14 conference: portland international center for management of engineering and technology; infrastructure and service integration* (pp. 2583–2588). IEEE. https://ieeexplore.ieee.org/abstract/document/6921166

[19] Chen, H. L. (2013). CEO tenure and R&D investment: The moderating effect of board capital. *The journal of applied behavioral science*, *49*(4), 437–459. https://doi.org/10.1177/0021886313485129

[20] Schopohl, L., Urquhart, A., & Zhang, H. (2021). Female CFOs, leverage and the moderating role of board diversity and CEO power. *Journal of corporate finance*, *71*, 101858. https://doi.org/10.1016/j.jcorpfin.2020.101858

[21] Imeni, M., & Daryaei, A. A. (2021). Managers' certification: Further evidence of the role of safeguarding in financial reporting in the Iranian capital market. *Journal of accounting knowledge*, *12*(4), 67–91. (**In Persian**). https://jak.uk.ac.ir/article_2944.html?lang=en

[22] Choi, S. B., Lee, S. H., & Williams, C. (2011). Ownership and firm innovation in a transition economy: Evidence from China. *Research policy*, *40*(3), 441–452. https://doi.org/10.1016/j.respol.2011.01.004

[23] Amore, M. D., & Failla, V. (2020). Pay dispersion and executive behaviour: evidence from innovation. *British journal of management*, *31*(3), 487–504. https://doi.org/10.1111/1467-8551.12337

[24] Fang, L. H., Lerner, J., & Wu, C. (2017). Intellectual property rights protection, ownership, and innovation: evidence from China. *The review of financial studies*, *30*(7), 2446–2477. https://doi.org/10.1093/rfs/hhx023