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# Who affects CEO compensation? Firm performance, ownership structure, and board diversity

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## ABSTRACT

This paper examines the relation among firm performance, ownership structure, and board gender diversity on the firm board and CEO compensation, i.e., total compensation, salary-based compensation, and bonus-based compensation. The paper employs a unique dataset from S&P 1500 firms from 2007 to 2018. The empirical results suggest that large and diversified boards are the main determinants of CEO compensation, in line with the theory. Moreover, longer-tenured CEOs who also hold the board chairperson position receive greater compensation and bonuses than their peers. In addition, a firm financial performance affects CEO compensation, with the influence being more pronounced in the CEO's total compensation. This paper adds to the existing literature on CEO compensation, corporate governance, and board attributes, especially when revealing empirical support for the link between board diversity and CEO compensation against a strong demand for sound corporate governance practices.

## 1. Introduction

Retention of qualified and efficient CEOs has always been a concern of employers for business growth and development. An inappropriate compensation plan may fail to retain the top-tier position holder of management or increase the organization's unnecessary cost. However, factors affecting CEOs' compensation not only depend on negotiation between the CEO and the management but also on diversified factors such as firm performance, board diversity, ownership structure, industry type, etc. Several researchers affirm that CEO compensation is still a controversial issue (Assenso-Okofu, Ali, & Ahmed, 2021; Bouteska & Mefteh-Wali, 2021; Chalmers, Koh, & Stapledon, 2006; Chen, Yi, & Lin, 2013; Chhaochharia & Grinstein, 2009; Chourou, Abaoub, & Saadi, 2008; Coombs & Gilley, 2005; Dong & Ozkan, 2008; Elsayed & Elbardan, 2018; Jian & Lee, 2015). Although widespread civic attention and rigorous

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academic inquiry, the nexus between executive compensation, governance mechanisms, and firm results remains unknown.<sup>1</sup> At the same time, the remarkable rise in executive compensation led the CEO compensation topic to be subject to colossal scrutiny by different stakeholders.<sup>2</sup>

To dig into the background of the study, we need to move back to the agency theory. Although critics also raise issues regarding the appropriate solution to the agency conflict, there is a consensus that conflict of interest is one of the prime routes of agency conflict. Good governance supports the separation of ownership and management for transparency. Given the separation of ownership and control, agents' interests must be aligned with those of the shareholders to mitigate the principal-agent problem. It is primarily related to publically traded firms as the alleviation of agency problems in publicly listed firms has been the main point of discussion in the studies of [Bebchuk and Fried \(2003\)](#) and [Jensen and Meckling \(1976\)](#).

As per agency theory, managers do not show interest in maximizing shareholders' interest by having riskier investments with greater returns to secure the position. One of the possible solutions suggested by management experts and researchers is to establish a uniform goal for the organization to address the conflict of interest between management and owners. Compensation packages and other facilities are feasible options for CEOs to uphold the owners' interest and sustainable growth of the organization. Now the question arises whether a compensation package is a self-determinator or depends on other factors like characteristics of CEOs, board diversity, and/or firm-specificity.

Although different theories like optimal contracting theory (OCT) and managerial power hypothesis (MPH) ([Ntim, Lindop, Thomas, Abdou, & Opong, 2019](#)), agency theory, etc., are explained by different researchers, however, agency theory is dominantly discussed in the literature. Experts, researchers, and stakeholders of the organization prescribe a good compensation package for managers to address agency conflict and induce managers in favor of principle. However, debates in the literature also argue that failure of good governance increases the cost of executives ([Elmagrhi, Ntim, Wang, Abdou, & Zalata, 2020](#)). Again good governance prescribes separation of ownership and control to confirm the transparency of the organization ([Moudud-Ul-Huq, Zheng, & Gupta, 2018](#)).

CEO compensation is an integral part of the agency contract. The contract must be organized, agreed upon, and executed to incentivize and encourage the agents to work in the best interest of the principal shareholders' wealth maximization. To save their economic and otherwise interests, shareholders set up control mechanisms as a firm board that accepts the responsibility to monitor agents' actions. Governance scandals such as Enron and WorldCom in the United States, the deceitful bankruptcy of Italian Parmalat, and the recent 2008 financial crisis have resulted in a rise in calls for an attentive firm board.

The literature examining corporate governance characteristics and executive compensation does not attain a concrete conclusion ([Kyere & Ausloos, 2021](#)). An effective governance mechanism created at the firm board level will improve the monitoring function, thus controlling agents' behavior and mitigating the principal-agent issue ([Khanchel, 2007](#)). In particular, [Firth, Fung, and Rui \(2006\)](#) state that the board characteristics, i.e., the board size and gender diversity, are considered important determinants of executive compensation. Firm Boards have the fiduciary responsibility to protect the interests of principals while proposing the contract to agents. There is a warning that executives strive to bypass board control to maximize compensation.

Consequently, compensation is one of the major components of an agent's contract proposed with the board of directors. Thus, the board of directors is responsible for confirming CEO compensation, and this control mechanism directly affects CEO compensation. Similarly, this paper investigates how the corporate board's control mechanism influences CEO compensation.

Due to the contractual significance, the board looks to relate CEO compensation with firm performance; however, the CEOs are working to remove this condition.<sup>3</sup> [Ozkan \(2011\)](#) shows evidence that relates CEO compensation to firm performance outcomes and suggests that CEOs receive lucrative salary packages if firms achieve greater economic performance. [Jensen and Meckling \(1976\)](#) the relationship between firm performance and CEO compensation from an agency perspective and given the separation of ownership and control. They approve that an attractive salary is an engaging measure to mitigate the principal-agent problem. Financially well-rewarded agents will fight to work in the best interests of shareholders as they think their financial interests are aligned to those of shareholders' wealth maximization goals. Thus, a firm's performance impacts the CEO's compensation plan and vice versa.

Value creation, human capital, intellectual capital, etc., are issues of argument in deciding CEOs' compensation. [Nawaz \(2019\)](#) argues that value creation in today's knowledge-intensive economy requires diversified organizational resources, financial, physical, intangible, and especially human capital. Human capital has always been the main driving force of organizations for control and sustainable growth of other resources ([Das Gupta, Sarker, & Rifat Rahman, 2021](#); [A. D. Gupta, 2018](#); [Zheng, Gupta, & Moudud-Ul-Huq, 2018](#)). Well educated workforce can generate wealth for an organization and also affect the performance of the organization ([Zheng et al., 2018](#)). As a chief controller and key matchmaker, the CEO is crucial for the organization's performance and future growth

<sup>1</sup> Academic research and mainstream media built mounting pressures resulted in civic pressure on the firm elite as well as on the regulators to slow down the unprecedented trends in CEO compensation. Then, worldwide regulatory agencies have brought new regulations or have amended the actual ones to address the issue of executive compensation. For example, while [Eklund \(2015\)](#) documents the Binding "Say-on-Pay" in Switzerland, [Ferri and Maber \(2013\)](#) and [Correa and Lel \(2016\)](#) reports about the "say-on-pay" rule in both U.S. and the UK.

<sup>2</sup> CEOs salary is 350 times higher than an employees' salary in the United States in which CEOs' total pay exceeds \$7000 per hour, compared with \$20 per hour for the ordinary employees.

<sup>3</sup> [Bebchuk and Fried \(2003\)](#) highlight the managerial power theory and argue that executives disapprove mechanisms that relate their compensation to firm performance results. Based on [Buchholtz et al. \(1998\)](#), executives fight to implement various strategies like using lower risk and greater flexibility resulting in additional profits for them i.e. if executives assume higher power within the firm, they look to exercise the power conferred upon power to impact board decisions to suppress the conditional contract among compensation and firm performance.

direction. Thus, the literature supports CEOs' appropriate compensation for retention and mitigating agency conflict. Now the question arises whether all organizations, board diversity, and governance systems support widespread CEOs compensation or not—literature evidence contradictory outcomes. Tournament theory proposes widespread compensation for managers with significant responsibilities (Eriksson, 1999). In contrast, Elmagrhi et al. (2020) argue that implementing good corporate governance empowers firms to hire and uphold managers at a lower cost than their counterparts.

CEOs and board directors bring human capital resources, which, if combined with other organizational resources, translate into greater economic results. Following Hillman, Withers, and Collins (2009) and N. Gupta and Mahakud (2020), it is coherent with the resource dependence theory that relates executive characteristics to organizational performance and stipulates that attractive salary packages should recompense agents to eliminate the brain drain, maintain profitability and market share. Brick, Palmon, and Wald (2006) and Y.-C. Lin, Wang, Chiou, and Huang (2014) support that point of view with empirical evidence showing that CEO attributes such as duality and tenure directly affect CEO compensation. In this direction, the paper considers the influence of CEO attributes on CEO compensation.

From the debate of the existing literature, it is apparent that CEO compensation is not an independent issue that is affected only by a single factor. Neither is it upon the evaluation of CEOs' characteristics. What are the factors that affect the top-tier position of an organization? This question motivates us to delve into the relationship between CEO compensation plans and factors that significantly impact them. Few research questions are yet to answer in this respect. These questions are, a) Do firm-specific factors like profitability, ownership structure, size, risk, leverage, etc., significantly affect CEOs' compensation? b) Do firm-specific factors or CEOs' characteristics significantly influence compensation plans? c) What is the board's role in deciding CEOs' compensation?

To address these questions, this study explores a unique available accurate dataset from S&P 1500 firms drawn from different database sources, i.e., Execucomp, Boardex and DataStream, from 2007 to 2018. Our empirical findings observed a few insights contributing to the existing literature in multiple ways. Firstly, this study examines firm specifics, performance-specific factors, CEOs' characteristics, and board attributes in the single model to determine their effect on CEOs' compensation. Secondly, the data set is separated into three-dimensional evaluations. One examines the relationship between total base compensation and determinants of CEOs' compensation, whereas the other two examine the impact of determinants on CEOs' salary and bonus-based compensation. Finally, the impact of interim variables derived from the interaction between firm-specific CEOs' characteristics and broad attributes pinpoint the joint effects of the CEOs' compensation plan.

Unlike previous studies, this study explores the multidimensional factors determining CEOs' compensation. Most previous studies focus on firm performance and CEO compensation, CEO compensation and gender diversity, or Board attributes and CEO compensation. Again, previous examinations concentrated on the total compensation plan of CEOs. Thus segregating salary-based, bonus-based, and total compensation, this study traces new insights other than confirming previous findings.

The empirical findings suggest that large and diversified firm boards are the main determinants of CEO compensation. Moreover, longer-tenured CEOs who keep the board chairperson positions are awarded more significant total compensation and bonuses. Furthermore, firm financial performance proxies through (ROA) impact CEO compensation, and the effect is more pronounced in the CEO's total compensation. The study's findings have significant economic and policy implications for the firm sector, regulators, investors, market analysts, academics, and the general public, beyond the U.S. context.

The rest of this paper is organized as follows. Section 2 illustrates the literature review and development of hypotheses. This section demonstrates theoretical literature regarding compensation and subsequently presents the empirical literature development of hypotheses. Section 3 describes the data and variables descriptions and methodology of the study. The empirical results of the investigation and robustness test are presented in Section 4, and Section 5 demonstrates the summary and conclusions.

## 2. Literature review and development of hypotheses

### 2.1. Theoretical literature regarding compensation

Two dominant theory is observed in the literature regarding compensation. These theories are the optimal contracting theory (OCT) and managerial power hypothesis (MPH) (Ntim et al., 2019). Bebchuk and Fried (2003) opine that a broad needs to design an efficient compensation plan for the manager to maximize shareholders' value. The authors also level it as an optimal contracting approach. Literature supports the OCT as an agency conflict mitigating approach. Although different literature supports the OCT, it is also not out of the debate. Political influence makes the OCT questionable in the application.

The managerial power hypothesis (MPH) depicts the opposite concept of OCT. The MPH assumes that managers have the power to bargain and decide their pay (Bebchuk & Fried, 2003; Ntim et al., 2019). However, this power exercise can be detrimental to shareholders' wealth maximization. Bebchuk and Fried (2003) argue that the manager power approach plays a role in deciding compensation; however, distorting compensation increases costs and acts inversely on the corporation's performance.

Eriksson (1999) proposes tournament theory in deciding the compensation of managers. The author traces a significant positive association between widespread compensation and the manager's role. The more the responsibilities of the manager, the more the compensation. Eriksson (1999) argues that widespread compensation is an incentive for managers to enhance firm performance.

Empirical literature also supports the agency theory in CEOs' compensation. Mengistae and Colin Xu (2004) support the agency theory and pinpoint the association between payment and the performance of CEOs. The authors argue that the sensitivity of payment decreases with the variance of the performance of CEOs. Mengistae and Colin Xu (2004) evidence the significant positive association between the performance and compensation of chief executive officers. However, pointing differently, Elmagrhi and Ntim (2022) evidence that CEO compensation depends on the performance goal of the organization. The authors point out that organizations with

long-term social performance goals tend to pay less than short-run reputational performance goals counterparts.

## 2.2. Prior empirical literature and development of hypotheses

This section reviews the empirical literature on CEO compensation and firm performance, board characteristics, big three personality traits, and firm characteristics. We state our hypotheses at the end of the respective sections.

### Firm performance and compensation

Literature regarding agency theory and OCT support the significant impact of compensation of manager over the performance of the firm and vice versa. [Elmagrhi et al. \(2020\)](#) pinpoint the effect of firm-specific determinants in top executive compensation. The authors opine that confirming good corporate governance firms can save executive payments compared to poor governance counterparts. However, firm characteristics affect and are affected by the executive and CEOs' compensation ([Agyei-Boapeah, Ntim, & Fosu, 2019](#)). [Eklund \(2015\)](#) and [Dunn, He, Trabelsi, and Yu \(2019\)](#) report that giving appropriate pay for performance to CEOs leads to healthy economic development. [Finkelstein and Boyd \(1998\)](#) assume that the board is bound to implement a reward system that strategically aligns organizational performance and agents' financial rewards. Generally said, monetary reward is a prodigious factor of motivation. [Sarhan, Ntim, and Al-Najjar \(2019\)](#) pinpoint four major board roles. These are a) Advisory roles toward managers; b) Monitoring and controlling managers; c) Confirming compliance of organization rules and regulations as per plan; and d) connecting with the external environment. Therefore, the researchers emphasize the board's role in managing the organization's controlling agent.

The principles of agency theory support that when managers are not motivated enough to pursue the business's long-term value, conflicts of interest arise. An important solution is to make well-designed compensation contracts to align executives' and shareholders' interests. Most studies offer mixed directional evidence on the relationship between CEO compensation and firm performance ([Bebchuk & Fried, 2003](#); [Firth et al., 2006](#); [Sun & Cahan, 2009](#)). Following [Brick et al. \(2006\)](#), who approve the prior results of [Buchholtz, Young, and Powell \(1998\)](#), firm performance is observed to affect executive compensation positively. However, [Capezio, Shields, and O'Donnell \(2011\)](#) opine that firm performance has no significant effect on executive compensation. Hence, the debate on the current issue is still here. An emerging literature stream finds that greater compensation is an incentive for executives, which encourages them to work in the interest of their shareholders by employing the available resources at their disposal effectively.

The effective allocation of organizational resources is thus conducive to increase firm performance. Conversely, the greater compensation may decrease executives' efficiency as they find a comfort zone with greater financial reward within the organization. The greater compensation gap between executives and employees can potentially decline firm performance. We could explain these mixed findings using various datasets, different samples in countries, time-varying periods, companies from different sectors, numerous firm performance measures, and different methods of computing CEO compensation. Several research works have been interested in total compensation, but at the same time, they require further examination for this issue. CEOs tend to ask for a reward for better company performance. Accordingly, the CEO may claim a greater rise in salary if the firm performs better.

Conversely, it seems very difficult to justify when firm performance directly results from the CEO's efforts and is not justified by market forces. Thus, the CEO should not be rewarded for short-run performance profits. Also, the board may provide performance-based bonuses to keep the brain and retain the CEO in the short run. Hence, we think a positive relationship exists between firm performance and CEO bonus awards. In this vein, we focus on three different proxies of CEO compensation in our work such as total compensation, salary-based, and bonus-based compensation, and based on the discussions above, the following hypotheses are presented:

H<sub>1</sub>: The effect of firm performance on the CEO's total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive.

### Board diversity and compensation

Board gender diversity, or the proportion of females on the board of directors, is seen as major dethronement in the remuneration of intriguing agents, for instance, CEOs. [Konrad et al. \(2008\)](#) find that the current proportion of women directors is still low despite all calls for greater women representation at the board level. While approximately 30% of firms contain one female director, approximately 5% of fortune 500 firms remain without women directors on the board ([Fairchild, 2015](#)). [Buse, Bernstein, and Bilimoria \(2016\)](#) recognize the importance of women directors' contribution to corporate decision-making by showing that the existence of women board of directors helps the board to make the best decisions when dealing with complex issues. Also, he adds that gender diversity improves corporate governance and firm performance.

Further, differences in gender impact corporate strategic choices where female directors tend to be more involved with corporate decision-making than their male peers. Hence, women directors are more attentive when supervising and monitoring the actions of the agents, i.e., the CEOs ([Post & Byron, 2015](#)). Women directors may motivate the board to take into account a wider range of problems and potential solutions, such as decisions concerning CEO compensation ([Ellwood & Garcia-Lacalle, 2015](#)). Women directors tend to determine CEO compensation based on the social and communal aspects since they are exposed to the social environment. They can fight to impact the board of directors and push to consider the standards while setting CEO compensation. The existing literature supports that gender diversity has a direct implication for CEO salary level and that there are other factors, i.e., CEOs' personal and professional traits like education and experience, which need to be considered by the board to determine the salary. The diversified boards take into account corporate performance while setting CEO total compensation and CEO compensation-based bonuses or equity options. Therefore, we anticipate a positive or negative relation between board diversity and CEO compensation as follows:

H<sub>2</sub>: The effect of board diversity on the CEO's total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive or negative.

### Board Size and CEO compensation

Many researchers affirm that the board is a significant determinant of executive compensation. The importance of the board is shown in studies investigating the influence of board size on CEO compensation. [Lin, Wang, et al. \(2014\)](#) have analyzed if large board size strengthens or weakens corporate governance through the control of CEO power and remuneration. In contrast, no consensus exists on the relation direction. [Forbes and Milliken \(1999\)](#) argue for larger corporate boards based on the resource dependence theory. Large boards can strengthen corporate governance by decreasing CEO control and raising board power, which may efficiently control CEO compensation or raise the sensitivity of compensation performance. In other words, larger boards offer the organization more knowledge, skills, expertise, and resources.

Conversely, [Lin, Wang, et al. \(2014\)](#) explain that a large board does not bring significant advantages because a small board can maintain effective communication, coordination, and decision-making process and, therefore, is best for daily corporate operations. [Canyon and Peck \(1998\)](#) find that coordination issues make it difficult for the board of directors to use their skills efficiently, decreasing effective work tasks. [Ozkan \(2007\)](#) believes that the large boards' inefficiency was linked to greater executive salaries in the UK context. The author's study analyzes the board size of listed firms and states that they have a great sense of responsibility because their reputation is being played when they lead a listed firm. However, CEO pay in cash and noncash form is also associated with firm performance ([Ntim, Lindop, Osei, & Thomas, 2015](#)). We anticipate a positive relation between board size and CEO compensation as follows:

H<sub>3</sub>: The effect of board size on the CEO total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive.

#### Board independence and CEO compensation

Based on [Nawaz \(2019\)](#), board independence which represents the proportion of non-executive directors on the board, is a significant feature for listed companies. The measure known as NED ratio is employed to supervise the agents' actions to diminish agency costs. The outsiders, i.e. non-executive directors, would add a set of talents necessary to execute the company's work in the shareholders' interests. The directors, as outsiders, are there to play a significant essential role in structuring a fair CEO salary package. Thus, we anticipate a positive relationship between board independence and CEO compensation as follows:

H<sub>4</sub>: The effect of board independence on the CEO total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive.

#### Board meeting and CEO compensation

The supervisory role of the boards of directors is improved lately in the listed firms, which directly impacts the demand for time and work at the board. The number of board meetings in a full year is an interesting aspect of efficient monitoring and board effectiveness. A higher board meeting frequency allows the board to get feedback and discuss firm affairs in due time. Regarding executive compensation, frequent board meetings provide enough room for discussion and agreement on CEO salary packages. Hence, we anticipate a positive relationship between board meeting frequency and CEO compensation as follows:

H<sub>5</sub>: The effect of board meeting frequency on the CEO total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive.

#### CEO duality and compensation

CEO duality is if the CEO also takes the position of board chair. CEO duality can increase the conflict of interest because it reduces the monitoring ability of the board. The duality of the CEO is a double-edged weapon ([Eklund, 2015](#); [N. Gupta & Mahakud, 2020](#)). Following the principles of organization theory, if the CEO is head of the board of directors, the firm management may make a unified decision fast, thus making an efficient and clear decision-making process, enhancing work effectiveness and, therefore, firm performance. On the other hand, [Bebchuk and Fried \(2003\)](#) find that remuneration is less sensitive to the firm's performance if managers have relatively higher power. [Capezio et al. \(2011\)](#) show that when a CEO has a duality role, he has more power to impact the board's decision on CEO compensation. Since the duality of roles gives important power to the CEO, we anticipate a positive relationship between CEO duality and CEO compensation as follows:

H<sub>6</sub>: The effect of CEO duality on the CEO's total compensation, salary-based compensation, and CEO bonus-based compensation is positive.

#### CEO experience and compensation

The number of years of experience as a lead CEO in the firm, i.e., CEO tenure, is a significant key for determining CEO compensation. CEO tenure refers to CEO power because when tenure increases in the firm also, the power increases ([Hillman et al., 2009](#)). [Finkelstein and Boyd \(1998\)](#) show that the literature reports mixed evidence of the CEO's tenure. While a negative relationship exists between CEO tenure and CEO compensation in Sweden and Norway ([Randøy & Nielsen, 2002](#)), longer-tenured CEOs have a tendency to have larger power to fix their own remuneration level and remuneration structure and even make their remuneration unrelated to the firm performance ([Bebchuk & Fried, 2003](#)). [Cremers and Palia \(2011\)](#) argue that CEO tenure is positively linked to CEO compensation and to the CEO's global performance sensitivity. In addition, larger tenured CEOs are best at controlling the organizational resources and best in equipping them to allow transform these resources into profitable economic activities in an effective way ([Faulkender & Yang, 2010](#)). Longer-tenured CEOs are generally the best in the management of daily operations of a firm, promoting the decision-making and implementation process, and can decide their salary by themselves. With this in mind, we anticipate a positive relationship between CEO tenure and CEO compensation as follows:

H<sub>7</sub>: The effect of CEO tenure on the CEO total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive.

#### Gender diversity of CEO and compensation

The empirical evidence in recent years indicates that gender plays a significant key role in CEO compensation and confirms the increase in the number of female CEOs of companies. A strand of literature adds that the presence of female CEOs in the firm's

executives diminishes the level of financial report manipulation. In comparison, another stream of literature considers that females are risk-averse and susceptible to respect the code of ethics compared to their men counterparts. There is an important, valuable role played by gender differences in leadership styles, communication skills, and decision-making processes (Ross & Robertson, 2003). Jurkus, Park, and Woodard (2011) proved that firms with a more significant proportion of women executives present lower agency costs. These researchers also show that for less competitive markets where companies have weak external governance mechanisms, they can eventually benefit more from the greater proportion of women executives. The importance of gender-diverse CEO is being argued in the overall literature, which believes it is a potential determinant of firm decision-making. With these arguments, we anticipate a positive or negative relation between gender-diverse executive and CEO compensation as follows:

H<sub>8</sub>: The effect of the gender-diverse executives on the CEO's total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive or negative.

#### Institutional ownership and CEO compensation

Another aspect that represents an important determinant of CEO compensation is institutional ownership (Su, Li, & Li, 2010; Victoravich, Xu, & Gan, 2013). Recent literature documents that centralized ownership allows institutional owners to oversee executive compensation better, and by the increase of concentration for institutional ownership, institutional investors will have more impact on determining CEO incentives. On the other hand, Su et al. (2010) report a significant negative relationship between state ownership and CEO compensation. He also supports the fact that firms with very concentrated institutional ownership apply low CEO salaries, options, and total compensation. Likewise, it is indicated by Gomez-Mejia, Tosi, and Hinkin (1987) that the total compensation of family member CEOs of family-holding firms is less compared to that of external CEOs. However, Bebchuk and Fried (2003) show that the more institutional ownership is low, the more the power of the CEO is great. If the CEO's power is high, the board's decision is influenced by CEO compensation. But, if the institutional shareholders govern the firms, executive compensation is relatively diminished. When the institutional shareholders, being the major or black shareholders, control the listed firms, they have a tendency to offer lower CEO compensation than their peers. Consequently, we anticipate a negative relation between institutional ownership and CEO compensation.

H<sub>9</sub>: The effect of institutional ownership on the CEO's total compensation, CEO salary-based compensation, and CEO bonus-based compensation is negative.

#### Firm characteristics and CEO Compensation

The association between firm size and CEO compensation has long been investigated. In a controlled firm, the firm size can forecast the total remuneration, bonus, and basic remuneration of executives; hence, it is being said that the size of the organization is a significant determinant of CEO compensation (Gomez-Mejia et al., 1987). Large and complex firms need CEOs with greater expertise to manage their complex activity structure, processes and operations by which the organization strategy is deployed because firm complexity rises as the firm increases in size. Most recent studies argue that firm size has a big impact on CEO compensation, i.e., the Change in the CEO's remuneration strongly depends on the firm size in which large firms pay greater remuneration, particularly in cash bonuses (Tai, 2004). Similarly, Cooley, Di Giannatale, and Clementi (2008) show that cash and equity-based remuneration are linked positively to firm size. Based on the literature, large and complex companies have a tendency to pay greater CEO compensation, and a significant positive relation exists between CEO compensation and firm size. Since executives may demand higher compensation to manage large and complex organizations, we anticipate a positive association between firm size and CEO compensation. To distinguish good from poor CEOs, Jensen (1986) believes that debt financing with its fixed contractual obligations acts like a disciplining device for executives and mitigates agency problems. In the light of this reasoning of assuming debt as a disciplining mechanism, they need not only depend on compensation to motivate their executives. Thus, firms with greater leverage ratios are expected to have weaker CEO compensation practices. Several studies empirically support the idea of a negative association between firms' leverage ratios and their CEO compensation (Palepu & Healy, 2012; Penman & Penman, 2010). Accordingly, we anticipate a negative relationship between firm leverage and CEO compensation. We consider that CEO compensation can be widely linked to the beta as a proxy of risk for the firm. Some studies argue that a negative relationship between firm risk and CEO compensation is not significant (Eklund, 2015). Similarly, Cheng, Lin, and Wei (2015) believe that high-risk firms have a tendency to pay higher CEO compensation because of the complex nature of their activity. Thus, we anticipate a positive relationship between firm risk and CEO compensation. Another important factor having the potential to impact CEO compensation is namely, the current ratio. Given the current ratio informs about the ability of a firm to pay the short-term debt, which is always due within a year, the CEO would be fighting to retain its short-term liabilities. Therefore, we anticipate a negative relation between the firm current ratio and CEO compensation. Taken together, we pose this Hypothesis as follows:

H<sub>10</sub>: The effect of firm size, leverage, risk, and current ratio on the CEO total compensation, CEO salary-based compensation, and CEO bonus-based compensation is positive or negative.

### 3. Research design

This section encompasses several subsections, such as data description, variables descriptions, and methodology of the study. Firstly data and variables description is presented, and a later section illustrates the methods of the study.

### 3.1. Data description

We obtain U.S. firms' data S&P 1500 from three datasets: Compustat, Execucomp, and BoardEx. First, we get financial information from Compustat. We exclude firms in regulated industries (i.e., utilities and financial industries), which are Standard Industrial Classification (SIC) codes 4900–4999 and 6000–6999. Second, CEO compensation and related information are from Execucomp. Third, board-specific attributes are from BoardEx. Stock price data from CRSP supplement this. The primary sample in our study consists of 12,830 firm-year observations for 1320 firms over the 2007–2018 period. To avoid the potential impact of outliers, all the variables are winsorized at the 1st and 99th levels. We provide the summary statistics of the sample selection in [Table 1](#) and detailed definitions of variables in [Table 2](#).

The primary dependent variable of interest is CEO compensation. We employ three different measures, i.e., CEO total compensation, CEO salary-based compensation, and CEO total bonus-based compensation. Precisely, we measure CEO total compensation based on salary, long-term bonus, short-term bonus or loyalty bonus, pension compensation, social security, and incentive measures consisting of stock options, stock-based awards, long-term incentive plans, or conditional stock awards. Following the literature [Sun and Cahan \(2009\)](#) and [Eklund \(2015\)](#), CEO total compensation is the perfect measure since some firms can have only a basic salary and a bonus plan does not exist, whereas they have the power to adopt the CEO total compensation to recompense the CEO. For the independent variables, we use four groups of variables. First, we include the return on assets (ROA) and Tobin's Q as firm performance measures. Second, we include board attributes, i.e., board diversity, board size, board independence, and board meeting. Third, we include CEO characteristics, i.e., CEO duality, CEO tenure, and gender-diverse executive. Finally, we include firm-specific characteristics as control variables, i.e., institutional ownership, firm size, leverage, firm risk (beta), and current ratio.

Data on CEO compensation is available as a result of the SEC's disclosure regulations enforced beginning in 2006.<sup>4</sup> Thus, we limit our sample to post-2006 observations. The ExecuComp database contains a total of 18,106 CEO compensation data, specifically CEO annual total compensation, CEO salary-based compensation, and CEO bonus-based compensation, as well as CEOs' characteristics (duality, tenure, and executive diversity) for the S&P 1500 firms in our sample period of January 1, 2007 to December 31, 2018. Eliminating the CEO compensation data issued by financial firms (Standard Industrial Classification, SIC, codes 6000–6999), regulated utilities (SIC codes 4900–4999), and firms with missing data leave a total of 15,840 CEO compensation data. We consider only firms with board-specific attributes, financial variables, and stock information reflecting CEO compensation reported by BoardEx, Compustat, and (CRSP) databases, respectively. Moreover, we exclude firms with negative total assets, liabilities, or turnover from our analysis, further limiting our sample. This screening leads to the exclusion of 3010 observations. Thus, our final sample is reduced to 12,830 observations in CEO compensation.

### 3.2. Variables description

#### 3.2.1. Dependent variables

The main variable of interest is the CEO's compensation. The study uses three diverse proxies: CEO total compensation, salary-based compensation, and total bonus-based compensation. CEO total compensation consists of salary, long-term bonus, short-term bonus or loyalty bonus, pension compensation, social security, and incentive measures (stock options, stock-based awards, long-term incentive plans, or conditional stock awards). [Eklund \(2015\)](#) and [Sun and Cahan \(2009\)](#) contend that CEO total compensation is better proxy because some firms may only have a basic salary without any bonus plan. Still, they have the power to adjust the CEO's total compensation to reward the CEO.

#### 3.2.2. Independent variables

Independent variables are subsumed under three groups. First, firm performance is measured by the return on assets (ROA) and Tobin's Q. Consistent with the existing literature, the study uses financial performance measure as the main variable for corporate performance. However, the study includes Tobin's Q as an alternative measure for further analysis. Second, board attributes include board diversity, board size, board independence, and board meeting. Third, CEO traits include CEO duality, CEO tenure, and Gender diverse executive.

#### 3.2.3. Control variables

Furthermore, firm control variables included in the analysis are firm size, leverage, institutional ownership, firm risk (beta), and current ratio, i.e., the variance of a firm's stock price relative to its market portfolio and institutional ownership (proportion of outstanding shares held by institutional investors). Variables definitions, along with their operationalization, are provided in [Table 2](#).

### 3.3. Methodology

We test the hypotheses in different models through variations of regressions of CEO compensation,<sup>5</sup> using several of the following variables (in some models, changed dependent variable). As the baseline regression, we adopt the following specification:

<sup>4</sup> The SEC stands for the US Securities and Exchange Commission.

<sup>5</sup> We obtain similar results after running robustness tests using dynamic panel methodology of the System Generalized Method of Moments (GMM). The results are made available upon request.

**Table 1**  
Summary of the sample selection process – CEO compensation data.

Procedure	Number of observations
Total CEO compensation data available in ExecuComp database from 2007 to 2018 for the S&P 1500 sample firms	18,106
Less CEO compensation issued by utilities and financial firms, and firms with missing data	2266
CEO compensation data available by the other industries	15,840
Eliminating CEO compensation with no data in BoardEx, Compustat, and (CRSP) databases	2491
Retained CEO compensation data between Jan 1, 2007 and Dec 31	13,349
Excluding firms with negative total assets, liabilities or turnover	519
Total CEO compensation data	12,830

**Table 2**  
Summary of operationalization of the variables.

Variable name	Operationalization	Acronym
Dependent variables		
<i>CEO compensation:</i>		
CEO total compensation	Log of total CEO compensation	CEO total compensation
CEO salary-based compensation	Log of total CEO salary	CEO salary
CEO bonus-based compensation	Log of total CEO bonuses	CEO bonus
Independent variables		
<i>Firm performance:</i>		
Return on Assets	Net income available to stockholder/average total assets	ROA
Tobin's Q	Market value of equity + book value of liabilities/book value of assets	Tobin's Q
<i>Board attributes:</i>		
Board diversity	Ratio of women on the board to total board size	Board diversity
Board size	Total directors on the corporate board	Board size
Board independence	Ratio of non-executive directors to total board size	Board independence
Board meeting	Total number of board meeting during a fiscal year	Board meeting
<i>CEO characteristics:</i>		
CEO duality	A dummy variable equals 1 if the CEO chairs the board, and zero otherwise	CEO duality
CEO tenure	Total number of years as CEO	CEO tenure
Gender diverse executive	Ratio of women in executive positions in the firm	Gender diverse executive
<i>Firm specific characteristics:</i>		
Firm size	Log of total short- and long-term assets	Firm size
Firm leverage	Debt to equity ratio	Leverage
Institutional ownership	Proportion of outstanding shares held by institutions to total outstanding shares	Institutional ownership
Firm risk (beta)	Variance of a firm's stock price relative to its market portfolio	Risk
Current ratio	Ratio of current assets to current liabilities	Current ratio

$$\begin{aligned}
 CEO\ compensation_{i,t} = & \alpha + \beta_1 Performance_{i,t} + \sum_2^5 \beta_k Board\ attributes_{i,t} + \sum_6^8 \beta_k CEO\ characteristics_{i,t} + \sum_9^{13} \beta_k Controls_{i,t} + Year_t \\
 & + Industry_t + \epsilon_{i,t}
 \end{aligned}
 \tag{1}$$

The subscript *i* denotes the firm (*i* = 1, 2, ..., 1320), and *t* represents the fiscal year (*t* = 2007, 2009, ..., 2018).

Where *i* and *t* represent the firm and fiscal year, respectively, thus,  $\alpha$ ,  $\beta$ , and  $\epsilon$  denote the intercept, the coefficient estimates, and the error term, respectively. We measure CEO compensation using three proxy measures: total CEO compensation, salary, and bonuses. We also include performance variables, ROA or Tobin's Q, several board attributes, CEO characteristics, and firm-specific characteristics as the control variables (see Table 2 for the definitions). We also include the year and industry dummies in the analysis to control for the industry and time-related effects. Further, our goal is to provide evidence of how the variable causes CEO compensation and investigate if these variables relate to each other and affect CEO compensation. Thus, different interaction variables are added to the model analysis to strengthen the observed results' validity.

#### 4. Empirical results and discussion

This section presents empirical results and robustness tests. An empirical investigation of developed Hypotheses and generalizing the model to run the model's robustness. In all regression models related to CEO compensation, we check for multicollinearity, heteroskedasticity, and autocorrelation. The *p*-values are calculated using robust standard errors.

##### 4.1. Empirical results

In the empirical investigation, at first descriptive statistics (see Table 3) and correlation matrix (see Table 4) is presented to understand the data pattern and check the multicollinearity of the data.

Table 3 presents the summary statistics of our sample. The sample consists of firm-year observations from 2007 to 2018. We



**Table 3**  
Descriptive statistics.

Variables	N	Mean	SD	Min	Max
CEO total compensation	12,830	15.87	0.831	13.56	18.10
CEO salary	12,830	14.38	0.389	13.49	15.43
CEO bonus	12,830	14.45	1.188	11.62	16.48
<i>Firm performance</i>					
ROA	12,830	6.786	7.638	-9.289	33.63
Tobin's Q	12,830	2.694	7.448	0.862	55.80
<i>Board attributes</i>					
Board diversity	12,830	24.15	10.35	0.000	47.81
Board size	12,830	11.27	2.439	7.000	18.00
Board independence	12,830	70.71	12.44	43.84	91.18
Board meeting	12,830	9.037	3.166	5.000	22.00
<i>CEO characteristics</i>					
CEO duality	12,830	0.596	0.491	0.000	1.000
CEO tenure	12,830	5.481	5.006	0.187	28.00
Gender diverse executive	12,830	12.98	13.35	0.000	51.00
<i>Firm characteristics</i>					
Firm size	12,830	7.561	1.487	6.476	15.38
Leverage	12,830	2.110	1.654	0.618	3.214
Institutional ownership	12,830	95.98	22.55	43.27	145.3
Risk	12,830	1.146	5.302	-12.63	17.20
Current ratio	12,830	1.641	1.967	0.431	4.587

exclude the regulated industries (Standard Industrial Classification (SIC) codes 4900–4999 and 6000–6999). We winsorize all independent (and continuous) variables at the 1st and 99th percentiles. *CEO total compensation* is the log of total CEO compensation. *CEO salary* is the log of total CEO salary-based compensation. *CEO bonus* is the log of total CEO bonuses-based compensation. *ROA* is the ratio of the net income available to stockholder to total assets. *Tobin's Q* is the ratio of the sum of market value of equity and total liabilities to total assets. *Board diversity* is the ratio of females on the board to total board size. *Board size* is the total number of directors on the board. *Board independence* is the ratio of independent directors to total number of directors. *Board meeting* is the total number of board meeting during a fiscal year. *CEO duality* is an indicator equals to one for CEOs who are the chair of board of directors; zero otherwise. *CEO tenure* is the total number of years as CEO. *Gender-diverse executive* is the ratio of females in executive positions within the firm. *Institutional ownership* is the proportion of outstanding shares held by institutions to total outstanding shares. *Firm size* is the natural logarithm of total assets. *Leverage* is the ratio of total debt to total assets. *Risk* is the variance of a firm's stock price relative to its market portfolio. *The current ratio* is the ratio of current assets to current liabilities. N, SD, Min, and Max denote the number of observations, standard deviations, minimum and maximum values, respectively.

Table 5 reports the results examining the determinants of total CEO compensation. Columns (1) of model 1 show that a significant positive relationship at the 1% level exists between ROA and total compensation. This statistically significant positive relation is continued across all models confirming that firm profitability, i.e., ROA, is an important determinant of CEO total compensation. Hence, Hypothesis (1) is accepted. Columns (2), (3), (4), and (5) consist of measuring the influence of board attributes on CEO total compensation and begin to note that there is a statistically significant positive relation at the 1% level among board diversity, board size, and CEO total compensation. Hence, hypotheses (2) and (3) are accepted. Whereas a weak negative, no statistically significant relationship is observed between the board independence, board meeting, and CEO total compensation. These results do not support or oppose both hypotheses (4) and (5). Also, columns (6), (7), (8) consist of investigate the influence of CEO characteristics on CEO total compensation. We find that CEO characteristics are linked in a positive manner with CEO total compensation. In particular, we note that CEO duality, tenure, and gender-diverse executives are positively and statistically associated with CEO total compensation at the 1%, and 5% levels, respectively.

Similarly, hypotheses (6), (7), and (8) are accepted. We also find consistent results for firm-specific characteristics with CEO total compensation. In particular, firm size and risk are statistically and positively related to CEO total compensation. However, leverage and institutional ownership are statistically and negatively related to CEO total compensation. Conversely, no statistical evidence exists for the current ratio and CEO's total compensation. Hence, hypothesis (9) is accepted, while Hypothesis (10) is partially accepted. According to the results of the interaction variables available from models (9) to (13), the large and diversified boards promote CEO total compensation and encourage it even though under the assumption that the CEO who chairs the board has a dual role. Furthermore, the dual CEO role with longer tenure among large boards has a tendency to favor CEO total compensation as they relate positively together. But, large independent boards have the opposite impact by defavoring CEO's total compensation.

We perform the same analysis for the determinants of CEO salary-based compensation in Table 6. Column (1) of model 1 shows that a statistically significant positive relation exists between ROA and CEO salary compensation at the 5% level. In comparison, there are no consistent findings for this across all remaining models. Hence, we accept Hypothesis (1) with a low level of statistical significance. As previously mentioned, Columns (2), (3), (4), and (5) consist of measuring the influence of board attributes on CEO salary compensation and suggest the following. There is a statistically significant positive relation at the 1% level among board diversity,

**Table 4**  
Correlation coefficients.

	VIF}	(1)}	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1. CEO total comp		1.000															
2. CEO Sal.		0.5042***															
3. CEO Bon.		0.4074***	0.2920***														
4. ROA	1.5	0.0276	-0.2286***	-0.1035													
5. Tobin's Q	2.0	-0.0197	0.0009	-0.0099	-0.0427												
6. Board diversity	2.0	0.2518***	0.3370***	0.1787***	0.0613***	-0.0058											
7. Board size	2.5	0.3886***	0.4959***	0.2766***	-0.2506***	-0.0332	0.0830										
8. Board independence	1.8	-0.0298	0.0261	-0.0285	-0.0411	-0.0101	0.0086	-0.0594									
9. Board meeting	1.7	0.0140	0.0089	0.0348	-0.0028	-0.0497	0.0398	0.0569	0.1315**								
10. CEO duality	1.9	0.0288	-0.0075	0.0595	-0.0249	-0.0091	-0.0730	0.0062	-0.0270	0.0020							
11. CEO tenure	2.2	0.1411	-0.1625***	0.0717	0.1198	-0.0248	0.0133	0.0921	-0.0137	-0.0003	0.0354						
12. Gender diverse exe	2.0	0.1029	0.2125***	0.0534	-0.0226	-0.0375	0.3964**	0.0512	-0.0144	-0.0132	0.0364	-0.1832***					
13. Firm size	1.3	0.4298***	0.4389***	0.2972***	-0.4660***	-0.0050	0.2169	0.3638***	-0.0300	0.0296	-0.0499	-0.1381***	0.1613***				
14. Leverage	1.4	-0.0278	-0.0078	0.0249	0.0233	-0.0041	0.0417	0.0010	0.0485	0.2705***	-0.0534	-0.0117	0.0045	0.0265			
15. Institutional owner	1.4	-0.2979***	-0.3116**	-0.169**	0.0183	0.0420	-0.1536***	-0.3994***	0.0325	-0.0098	0.0196	-0.1475***	-0.0115	-0.3624***	-0.0307	0.0225	
16. Risk	1.2	0.0486	0.0915	0.0349	-0.0668	0.0145	-0.0927	0.0648	-0.0143	0.0129	0.0301	-0.0348	0.0689	0.0921	-0.0031	-0.0239	
17. Current ratio	1.4	0.0245	-0.0055	0.0261	-0.0580	-0.0506	0.0277	0.0382	-0.2341***	-0.1133	0.0244	0.0147	-0.0054	0.0252	-0.2581**	0.0856	

**Table 5**  
Regression of CEO total-based compensation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
ROA	0.0265***	0.0233***	0.0229***	0.0229***	0.0229***	0.0234***	0.0227***	0.0243***	0.0243***	0.0241***	0.0243***	0.0247***	0.0248***
Board diversity		0.0117***	0.0126***	0.0123***	0.0122***	0.0124***	0.0118***	0.0142***	0.00852**	0.00855**	0.00853**	0.00292**	0.00369**
Board size			0.0524***	0.0516***	0.0507***	0.0491***	0.0356**	0.0425**	0.0304**	0.0306	0.0305	-0.0109	-0.0399
Board independence				-0.000690	-0.000649	-0.000550	-0.000402	0.000699	0.000616	0.000634	0.000587	0.000731	-0.00434
Board meeting					-0.0208			-0.0359	-0.0695	-0.0731	-0.0717	-0.0705	-0.0773
CEO duality						0.562***	0.537***	0.760***	0.757***	1.570***	2.774***	2.784***	2.633***
CEO tenure							0.0235***	0.00397**	0.00362**	0.00362**	0.00384**	-0.0617	-0.0642
Gender diverse executive								1.674**	1.655**	1.651**	1.654**	1.589**	1.665**
Board diversity*Board size									0.000539*	0.000536*	0.000536*	0.001022*	0.000934*
Board size*Board independence										-0.0813**	-0.271***	-0.271***	-0.273***
Board diversity * Board size *CEO duality											0.00386*	0.00379*	0.00398*
Board size*CEO tenure												0.00638	0.00664
Board size*CEO tenure*CEO duality													0.000468*
Firm size	0.185***	0.167***	0.129***	0.129***	0.130***	0.133***	0.155***	0.114***	0.114***	0.114***	0.114***	0.116***	0.116***
Leverage	-0.0491	-0.0528	-0.0418	-0.0404	-0.0393	-0.0374	-0.0503	-0.0823**	-0.0838**	-0.0843**	-0.0835**	-0.0824**	-0.0816**
Institutional ownership	-0.00699***	-0.00669***	-0.00557***	-0.00562***	-0.00566***	-0.00564***	-0.00459***	-0.00271	-0.00264	-0.00264	-0.00263	-0.00247	-0.00246
Risk	0.00292*	0.00594*	0.00579*	0.00595*	0.00600*	0.00563*	0.00549*	0.00196	0.00180	0.00165	0.00186	0.00289	0.00284
Current ratio	0.00300	0.000301	-9.16e-05	-0.00117	-0.00147	-0.00189	-0.00350	3.62e-05	0.000155	0.000277	0.000246	-0.000145	-3.84e-05
Constant	14.62***	14.51***	14.19***	14.26***	14.30***	14.28***	14.02***	14.15***	14.27***	14.27***	14.25***	14.70***	15.02***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.260	0.271	0.267	0.266	0.269	0.290	0.252	0.251	0.248	0.246	0.250	0.249	0.374
Observations	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830

This table presents the determinants of CEO total-based compensation. Variables are defined in Table 2. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions control for industry and year-fixed effects. The sample consists of firm-year observations from 2007 to 2018.

**Table 6**  
Regression of CEO salary based compensation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ROA	0.00248**	0.000313	0.000105	0.000225	0.000194	0.000354	0.000655	0.000970	0.000943	0.000947	0.001051
Board diversity		0.00813***	0.00854***	0.00833***	0.00823***	0.00830***	0.00854***	0.01004***	0.00596**	0.00595**	0.00592**
Board size			0.0247***	0.0248***	0.0245***	0.0239***	0.0297***	0.0359***	0.0273**	0.0272**	0.0271**
Board independence				0.00107	0.001042	0.00107	0.001014	0.00196*	0.00191*	0.00190*	0.00183*
Board meeting					0.00790	0.00642	0.0108	0.0125	0.0128	0.0124	0.0144
CEO duality						0.174*	0.185*	0.483***	0.480***	0.167*	2.084***
CEO tenure								-0.0192***	-0.0194***	-0.0194***	-0.0191***
Gender diverse executive							-0.0106***	0.756*	0.740*	0.742*	0.746*
Board diversity*Board size									0.000387**	0.000388**	0.000389**
Board size*Board independence										-0.0313*	-0.271*
Board diversity*Board size*CEO duality											0.00647***
Firm size	0.130***	0.117***	0.0991***	0.0995***	0.0995***	0.1005***	0.0903***	0.0801***	0.0801***	0.0802***	0.0766***
Leverage	-0.00881	-0.0113	-0.00624	-0.00696	-0.00869	-0.00809	-0.00252	-0.00537	-0.00640	-0.00621	-0.00490
Institutional ownership	-0.00231***	-0.00210***	-0.00157***	-0.00165***	-0.00170***	-0.00170***	-0.00215***	-0.00153**	-0.00149*	-0.00149*	-0.00147*
Risk	0.00253	0.00462**	0.00455**	0.00458**	0.00456**	0.00445**	0.00451**	0.00333*	0.00320	0.00327	0.00359*
Current ratio	-0.00615	-0.00803	-0.00821	-0.00679	-0.00675	-0.00689	-0.00619	-0.00398	-0.00390	-0.00394	-0.00399
Constant	13.40***	13.32***	13.17***	13.10***	13.10***	13.09***	13.20***	13.06***	13.16***	13.16***	13.16***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.421	0.461	0.473	0.475	0.474	0.475	0.492	0.528	0.528	0.527	0.527
Observations	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830

This table presents the determinants of CEO salary based compensation. Variables are defined in Table 2. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions control for industry and year fixed effects. The sample consists of firm-year observations from 2007 to 2018.

**Table 7**  
Regression of CEO bonus based compensation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ROA	-0.00465	-0.00802	-0.00855	-0.00897	-0.00896	-0.00903	-0.00942	-0.01002	-0.01013	-0.01015	-0.01047
Board diversity		0.0125***	0.0137***	0.0136***	0.0135***	0.0140***	0.0138***	0.0106*	0.00317*	0.00311*	0.00275*
Board size			0.0691***	0.0684***	0.0676***	0.0647***	0.0560***	0.0595**	0.0296*	0.0301*	0.0305*
Board independence				-0.00257	-0.00266	-0.00249	-0.00237	-0.00187	-0.00212	-0.00206	-0.00228
Board meeting					0.0139	0.00505	-0.00682	0.0267	0.0290	0.0321	0.0355
CEO duality						0.1002***	0.995***	1.424***	1.418***	3.853	9.300***
CEO tenure							0.0197***	0.0277**	0.0292**	0.0292**	0.0273*
Gender diverse executive								-0.843	-0.871	-0.880	-0.872
Board diversity*Board size									0.00131*	0.00130*	0.00128*
Board size*Board independence										-0.243*	-1.091***
Board diversity*Board size*CEO duality											0.0172***
Firm size	0.151***	0.129***	0.0775**	0.0771**	0.0776**	0.0810**	0.0960**	0.0755	0.0753	0.0751	0.0754
Leverage	0.0156	0.0177	0.0296	0.0305	0.0275	0.0317	0.0269	-0.0250	-0.0294	-0.0312	-0.0259
Institutional ownership	-0.00424***	-0.00409**	-0.00250**	-0.00261*	-0.00268*	-0.00269*	-0.00192	0.00266	0.00280	0.00280	0.00286
Risk	0.00697*	0.00366*	0.00348*	0.00348*	0.00341*	0.00401*	0.00422*	0.00140	0.000883	0.000351	0.00147
Current ratio	0.0126	0.00985	0.00853	0.00475	0.00476	0.00379	0.00215	0.00986	0.01036	0.01070	0.01020
Constant	13.37***	13.31***	12.89***	13.09***	13.08***	13.07***	12.87***	12.87***	13.20***	13.19***	13.17***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.066	0.073	0.081	0.079	0.077	0.082	0.085	0.033	0.031	0.028	0.026
Observations	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830	12.830

This table presents the determinants of CEO bonus based compensation. Variables are defined in Table 2. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions control for industry and year fixed effects. The sample consists of firm-year observations from 2007 to 2018.

board size, and CEO salary compensation. Hence, we accept hypotheses (2) and (3).

On the other hand, a positive weak, no statistically significant relationship is seen between board independence, board meeting, and CEO salary compensation. We can say that these results do not support or oppose both hypotheses (4) and (5). Also, columns (6), (7), and (8) consist of investigate the influence of CEO characteristics on CEO salary compensation. CEO duality is positive and statistically significant at the 1% level, except for models 6, 7, and 10 at the 10% level. Thus, enough statistical evidence is found to accept Hypothesis (6). We find a piece of contradictory evidence for CEO tenure as it relates negatively to CEO salary compensation at the 1% level. Thus, we reject Hypothesis (7). Gender-diverse executive is positively and significantly linked to CEO salary compensation at 10%, and then we can accept hypothesis (8).

Similarly, for firm-specific characteristics with CEO salary compensation, we find the same consistent results as above, except for firm leverage, which is in the negative direction but turns insignificant. Hence, we totally and partially accept Hypothesis (9) and (10), respectively. Based on the findings of the interaction variables, we approve the prior conclusion that large and diversified boards represent the main determinants of the CEO salary compensation, even if a dual CEO is a leader on the board. Whereas large and independent boards are negatively associated with CEO salary compensation.

We perform a similar analysis for the determinants of CEO bonus-based compensation in Table 7. Column (1) of model 1 indicates that no statistically significant relationship exists between ROA and CEO bonus compensation. Since no sufficient evidence is provided by the interaction coefficients across all rest models, we cannot accept or reject Hypothesis (1). Columns (2), (3), (4), and (5), which consist of measuring the effect of board attributes on CEO bonus compensation, show that there is a statistically significant positive relation at the 1% level among board diversity, the board size, and CEO bonus compensation. Hence, we can accept both hypotheses (2) and (3). Similar to previous analyses, a negative, weak no statistically significant relationship is observed between board independence, board meeting, and CEO bonus compensation. Therefore, these results do not support or oppose hypotheses (4) and (5). As before, columns (6), (7), and (8) consist of examining the effect of CEO characteristics on CEO bonus compensation. The estimated coefficients suggest that CEO duality and tenure are positively and statistically associated with CEO bonus compensation at the 1% level; hence, we accept Hypothesis (6) and (7). Whereas, not enough evidence is provided to accept or reject Hypothesis (8) as gender diverse executive is negative but insignificant with CEO bonus compensation. For our controls, i.e., the firm-specific characteristics, the observed results remain unchanged with CEO bonus compensation, similar to the above table about CEO salary compensation. Hence, we accept totally and partially Hypothesis (9) and (10), respectively. Lastly, the interaction variables' results are coherent and confirm the conclusion that if even a dual CEO is the leader on large and diversified boards, they are positively linked to CEO bonus compensation at the 1% level of statistical significance. However, independent and large boards show opposite effects on the latter.

#### 4.2. Robustness analysis

In this subsection, we conduct additional analysis to support our argument and enhance confidence in our findings. We begin this research by using the performance proxy, i.e., return on assets (ROA), to predict CEO compensation. To generate stylized facts that can enhance our knowledge about profitability, CEO traits, and governance influence on CEO compensation and help investors and firms handle those events from a market perspective, we perform an alternative analysis for our baseline model, replacing (ROA) by the market performance proxy, Tobin's Q. Table 8 reports the results of the three models, i.e., CEO total compensation, salary, and bonus, respectively. The results indicate a positive and significant relationship at 1% level of significance exists among Tobin's Q and CEO compensation measures, namely CEO total compensation, CEO salary compensation, and CEO bonus compensation. Thus, these

**Table 8**

Regression of CEO compensation with market performance Tobin's Q.

	(1)	(2)	(3)
Tobin's Q	0.00371***	0.00154***	0.00352***
Board diversity	0.0172***	0.01015***	0.00927**
Board size	0.0480**	0.0361***	0.0574***
Board independence	-0.000468	0.00194**	-0.00122
Board meeting	-0.111	0.0116	0.0463
CEO duality	0.607***	0.475***	1.420***
CEO tenure	0.0115**	-0.0190***	-0.0308*
Gender diverse executive	1.536*	0.740*	-0.796
Firm size	0.0689***	0.0742***	0.0934***
Leverage	-0.0815	-0.00341	-0.0232
Institutional ownership	-0.00357*	-0.00155**	0.00315
Risk	0.00491	0.00358*	0.000156
Current ratio	-0.00921	-0.00436	0.0138
Constant	15.85***	13.09***	12.57***
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.301	0.605	0.329
Observations	12.830	12.830	12.830

This table presents the determinants of CEO compensation, i.e. CEO total based compensation, CEO salary based compensation, CEO bonus based compensation. Variables are defined in Table 2. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions control for industry and year fixed effects. The sample consists of firm-year observations from 2007 to 2018.

**Table 9**  
Robustness analysis: Regression of CEO compensation.

	GMM	GMM	GMM	2SLS	2SLS	2SLS	3SLS	3SLS	3SLS
	(1.1)	(1.2)	(1.3)	(2.1)	(2.2)	(2.3)	(3.1)	(3.2)	(3.3)
ROA	0.01629***	0.000690*	-0.06878	0.01828***	0.00774*	-0.00771	0.01556***	0.00060*	-0.00657
Board diversity	0.00242**	0.00388**	0.00180*	0.00272**	0.00436**	0.00202*	0.00231**	0.00371**	0.00172*
Board size	-0.02621	0.0178**	0.02003*	0.02941	0.01997**	0.02248*	-0.02504	0.01701**	0.01914*
Board independence	-0.00285	0.00120*	-0.00149	-0.00319	0.00134*	-0.00168	-0.00272	0.00114*	-0.00143
Board meeting	-0.05229	0.00945	0.02332	-0.05868	0.01061	0.02617	-0.04996	0.00903	0.02228
CEO duality	1.7297***	1.3690***	6.10948***	1.94111***	1.53638***	6.85620***	1.65283***	1.30820***	5.83795***
CEO tenure	-0.0421	-0.0125***	0.01793*	-0.04732	-0.01408***	0.02012*	-0.04030	0.01198***	0.01713*
Gender diverse executive	1.0937**	0.49007*	-0.57284	1.22748**	0.54997*	-0.64286	1.04518**	0.46829*	-0.54738
Firm size	0.07620***	0.00503***	0.04953	0.08551***	0.05647***	0.05558	0.07281***	0.04808***	0.04733
Leverage	-0.05360**	-0.00321	-0.01701	-0.06015**	-0.00361	-0.01909	-0.05122**	-0.00307	-0.01625
Institutional ownership	-0.00161	-0.00096*	0.00187	-0.00181	-0.00108*	0.00210	-0.00154	-0.00092*	0.00179
Risk	0.00186	0.00235*	0.00965	0.00209	0.00264*	0.00108	0.00178	0.00225*	0.00092
Current ratio	-2.52e-05	-0.00262	0.00670	-2.83e-05	-0.00294	0.00751	-2.41e-05	0.00250	0.00640
Constant	9.8671	8.6452***	8.65182***	11.07***	9.70189***	9.70927***	9.42861***	8.26102***	8.60010***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
J-statistic (over identification)	4.311	1.874	1.205	3.579	1.606	0.171	2.126	1.336	1.027
P-values	0.946	0.291	0.144	0.699	0.255	0.119	0.481	0.248	0.102
Adj. R <sup>2</sup>	0.245	0.346	0.017	0.275	0.388	0.019	0.234	0.330	0.016
Observations	12.830	12.830	12.830	11.048	11.048	11.048	11.048	11.048	11.048

This table presents the determinants of CEO compensation, i.e. CEO total based compensation, CEO salary based compensation, CEO bonus based compensation. Model 1 reports the results of one step system-(GMM) regression model. Model 2 reports the results of 2SLS analysis. Model 3 reports the results of 3SLS analysis. Variables are defined in Table 2. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions control for industry and year fixed effects. The sample consists of firm-year observations from 2007 to 2018.

relationships are in line with our prior findings. Further, the results concerning board diversity and board size across all models are consistent and support the evidence that board gender diversity and board size are the main determinants of CEO compensation in the S&P 1500 firms. We can add that the remaining variables' results are also largely consistent too.

In this empirical analysis, we focus on suggesting different characteristics for the determinants of CEO compensation being CEO total compensation, CEO salary-based compensation, and CEO bonus-based compensation. First, we find a statistically significant positive relation between board diversity and CEO compensation measures, which suggests that board diversity is one of the main determinants of CEO compensation. The results contribute to the idea that the presence of women on corporate boards has valuable implications in corporate decision-making. The three CEO compensation proxies' consistent results indicate that a greater proportion of women on the board of directors impact favorably various components of the CEO's compensation [see, (Buse et al., 2016)]. Moreover, we find that large boards have a tendency to reward the CEO well if the firm is achieving more remarkable and better performance results. We find support for this finding in previous research works like Ozkan (2007) and W.-C. Lin, Lai, and Powers (2014). Similarly, Table 9 reports a statistically positive relation between corporate performance, CEO total compensation, and CEO salary compensation that can add to the argument of earlier studies (Brick et al., 2006; Buchholtz et al., 1998). Also, the findings support the idea that CEOs' compensation is directly related to organizational results, i.e., the corporate's financial performance [see Firth et al., 2006, and Ozkan, 2011]. Furthermore, the findings supplement the debate in which agency conflict is mitigated through the alignment of economic interests of the agents, i.e., CEOs and the shareholders, and thus, the agency problem is extenuated. In other words, the best motivator for the agents is financial reward, and as can be seen in the results of this study, the agents who are financially well paid are highly motivated to maximize shareholders' wealth because they look for slack for themselves and for sure these CEOs fight to achieve greater profitability. However, we note that the CEO bonus-based compensation analysis findings are not strong enough to relate CEO bonuses with firm profitability. Second, the findings are based on CEO traits; the study finds strong evidence for CEO duality and CEO compensation, i.e., CEO total compensation, salary compensation, and bonus compensation. These coherent findings across the three compensation measures approve the hypotheses which say that when CEOs obtain more power, i.e., the CEO leader also on the board, they are well rewarded if the corporate performs financially better. We offer new insights and support existing studies (Eklund, 2015) through such results. Likewise, the study shows that long-tenured CEOs tend to obtain greater total compensation but lower salary compensation. This finding is in line with prior literature such as Cremers and Palia (2011), and it can be explained by the fact that longer-serving CEOs develop their authority into the board since they get internal knowledge linked to the organizational resources, culture, internal efficiencies that are mandatory to the implementation of any strategy, thereby, they find themselves in the best position as CEOs to strive in negotiating a good financial deal and compensation. Third, regarding our firm-related control variables, we document that firm size is in a positive and statistically significant relation with CEO compensation across all three measures suggesting that larger firms can provide higher compensation to their agents, similar to the previous research, for example, see Gomez-Mejia et al. (1987) and Tai (2004), which supports the argument that the agents of larger corporations get greater financial rewards compared to their small counterparts. In addition, the study shows evidence that firms dominated by institutional investors have a tendency to offer lower CEO compensation. While these findings give divergent insights to the earlier studies of Su et al. (2010), they are consistent with the related literature, which says that when institutional ownership increases, CEO compensation declines or diminish [see Khan, Dharwadkar, & Brandes, 2005; Lam, McGuinness, & Vieito, 2013, and Su et al., 2010]. In order to explain this phenomenon we can rely on the argument that intuitional shareholders have a lot to say in the strategic planning focusing on human capital resources and agency costs, and CEO compensation which is one of the main agency costs, is considered as a key decision for the firm board, in which institutional shareholders have a direct influence on. As expected, the other control variables are measuring firms' leverage and risk exhibit significant negative and positive relations with CEO compensation for the U.S. context.

## 5. Summary and conclusion

Although a good number of research investigated the compensation of managers and firm performance, investigation of determinants of CEOs' compensation with multiple factors like CEOs' characteristics, firm-specific factors, and board attributes is under-research and scarce. We investigate the relationship between CEO compensation, board attributes, and firm performance, measured by the return on assets (ROA) and Tobin's Q, CEO characteristics, and firm-related variables in the U.S. listed firms. This study is the first attempt to examine a sample from S&P 1500 firms listed on the American stock exchange from 2007 to 2018. The study built a unique dataset that is drawn from different sources such as Compustat, Execucomp, and BoardEx. The study further complements the initially collected data with another dataset, such as CRSP.

This study contributes to the ongoing debate on CEO compensation (Boyd, 1994; Chalmers et al., 2006; Chhaochharia & Grinstein, 2009; Coombs & Gilley, 2005) by offering new and inserting insights. More specifically, we provide evidence that large and diversified boards determine greater CEOs' compensation. Large and diversified boards of directors, i.e., a greater proportion of women board favorite more compensation for the CEO, supporting thus Ozkan (2007, 2011) regarding the size of the board and Ellwood and Garcia-Lacalle (2015), and Post and Byron (2015) concerning diversity in the board. Our results are important in understanding and enriching the existing literature by adding new insights (Kyerere & Ausloos, 2021). Likewise, increasing the power of CEOs, i.e., CEOs are also leaders on the firm board and have longer serving periods lead CEOs to receive higher compensation. These findings complement the growing literature by adding new insights that CEOs with significant positions holding, such as the duality of roles, receive more excellent compensation than their peers (Brick et al., 2006; Lin, Wang, et al., 2014). In addition, we find that higher firm performance is associated with higher CEO compensation. This study supports the pay-for-performance mechanism in establishing CEOs' remuneration. Thus the study reinforces the application of optimal contracting theory. The findings of the study suggest new empirical



evidence and supplement the ongoing debate that paying for performance is an engaging measure to mitigate the principal-agent issue (Jensen & Meckling, 1976).

Similarly, we add new insights to the current empirical literature, such as (Ozkan, 2011), approving the conclusion that firm performance is one of the main determinants of CEO remuneration packages. Furthermore, we find that larger and diversified firms have a tendency to offer higher compensation for the CEO. On the other hand, the paper finds evidence that firms dominated by institutional investors tend to provide CEOs with low compensation because greater institutional ownership is negatively linked to CEO compensation. We bring a contradicting view to the prior results of Croci, Gonenc, and Ozkan (2012), who have reported a positive relationship between institutional ownership and various degrees of CEO compensation. The multidimensional examination of the study will guide the owners, policymakers, and regulators in policy implications regarding the CEOs' compensation plans. Evidence also supports the concurrent relationship between risk, leverage, CEOs' duality, and CEO tenure with CEOs' compensation plan. Thus, findings will support drafting policy implications in future endeavors.

The findings of the paper have merit for further examination. Future research avenues can be suggested by considering new mechanisms such as the representation of institutional investors and block equity shareholders together at the firm board and see their influence on CEO compensation as the block equity holders have direct implications for the various degrees of CEO compensation.

## Data availability

Data will be made available on request.

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