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## Article

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## ACCOUNTING, CORPORATE GOVERNANCE & BUSINESS ETHICS | RESEARCH ARTICLE

# Effectiveness of board governance and dividend policy as alignment mechanisms to firm performance and CEO compensation

Farzan Yahya<sup>1\*</sup> and Zahiruddin B. Ghazali<sup>1</sup>

**Abstract:** *Purpose:* The purpose of the study is to investigate whether operating and market performance are aligned to CEO compensation and how board governance and dividend policy could influence pay-performance link in the capital market of Pakistan. *Design/methodology/approach:* The hand-collected information on 219 non-financial firms listed on the Pakistan stock exchange (PSX) is acquired over the period 2012–2016. Additionally, panel data technique, namely Prais–Winsten (PCSE) and 2SLS (robust standard errors) regression are applied to account for the heteroscedasticity, serial correlation and endogeneity issue. *Findings:* The empirical results indicate that CEO compensation is positively associated with operating performance and market performance. The evidence also provides partial support to agency perspective that board independence and optimal board size could positively, while CEO duality negative moderates the relationship between operating performance and CEO compensation. However, none of these mechanisms are proved to be effective in aligning market performance to CEO compensation. In fact, dividend policy negatively moderates the association between firm performance (operating and market) and CEO compensation. Thus, contrary to the agency theory's proposition, dividend policy cannot be utilized as a substitute control device in the absence of strong corporate governance mechanisms. *Practical Implications:* In light of this empirical evidence, regulatory bodies in Pakistan could improve corporate

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Farzan Yahya completed his PhD in Financial Analysis and Policy from Universiti Utara Malaysia. He helps finance and business management students to embark the glorious career path in the field. Farzan has more than 4 years of research experience and published a number of research papers in Scopus- and ISI-indexed journals. His main research interests include corporate governance, behavioral finance, and corporate finance.

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### PUBLIC INTEREST STATEMENT

Agency conflicts may arise with the separation of ownership and control. It is generally believed that CEOs/managers are self-interested who can manipulate other stakeholders to enhance their own compensation. Owing to the financial manipulation and excessive CEO compensation cases, theorists argued that the compensation should be linked to firm performance. This article has tested this phenomenon in the context of Pakistan along with underexplored monitoring mechanisms. The results show that CEO compensation is aligned to firm performance in Pakistan. Additionally, board independence and optimal board size can effectively maintain and strengthen pay-performance link. However, CEO duality and dividend payouts could distort this link and may accelerate agency conflicts in the capital market of Pakistan.

governance mechanisms as well as CEO compensation structure to ensure remunerative and ethical financial market. *Originality/value*: This study contributes to the academic literature by validating the underexplored pay–performance alignment propositions of agency theorists, especially in the reference of Pakistan.

**Subjects:** Corporate Finance; Leadership; Corporate Governance

**Keywords:** CEO compensation; optimal board size; board independence; CEO duality; dividend policy

**JEL classifications:** D53; G02; G30; G35; J33

### 1. Introduction

Over the past few decades, CEO compensation has gained noteworthy attention. Much of the attention is largely due to repugnant increase in compensation of executives in term of cash and stock bonuses and further fuel by debatable ethical practices. Public perception of CEO compensation is evidently unfair, that is why it gains enough attention of academic literature and practitioners (Gray & Benson, 2003; Lin, Kuo, & Wang, 2013; Wilmers, 2014). Excessive compensation of CEOs can create agency problem as mentioned by Jensen and Meckling (1976). Managers or executives may use their discretion in many ways for their own advantages (Shleifer & Vishny, 1997). Mueller (2012) argued that CEOs might involve themselves in empire building and they avoid investing in positive NPV projects. Therefore, organizations failed to distribute enough cash to its shareholders due to lack of investment opportunities (Jensen, 1986).

Callahan (2004) claimed that executive's greed for compensation is contributing the cheating culture and negatively influencing the society as a whole. Lin et al. (2013) used a term "fat cat problem" to define the firms with inefficient performance because of highly paid CEOs. The bulk of the problem is due to the lack of linkage between firm's performance and CEO's compensation. Blinder (2009) demonstrated that inefficient compensation plans of executives were one the major issues of financial crises in the year 2008. Most of the CEOs were engaged in excessive risk-taking and short-term gambles rather than paying attention to company's long-term objectives for viable growth (Fotouh, 2010). Although developed countries are trying to overcome this issue, an emerging economy like Pakistan is still facing a huge controversy in resolving agency conflicts.

Recent cases in Pakistan have revealed the excessive compensation of CEOs (Alam, 2014). Shareholders showed much vexation toward overly paid CEOs and protested that annual compensation of CEO is more than the profit declares by the firm. Regulatory bodies of Pakistan are acquainted with this discernment but have not yet taken any necessary notice (Subohi, 2013). Researchers proposed several models in the past to mitigate agency conflicts and excessive CEO compensation problem. One of the effective strategies proposed by agency theory is to align the CEO's compensation with firm performance as it could align the interests of executives with that of shareholders (Grossman & Hart, 1992; Jensen & Murphy, 1990). However, the purpose of the study is to validate the role of corporate control components which could act as alignment mechanisms.

Core, Holthausen, and Larcker (1999) suggest that corporations with stronger corporate governance have lesser principal–agent problems and pay their executives a reasonable compensation. In addition, the firms with lesser agency conflicts are more likely perform efficiently. Therefore, the study by Li, Moshirian, Nguyen, and Tan (2007) demonstrates that executives could take advantage of less demanding shareholders or weaker board governance to achieve excessive compensation packages, especially in the developing countries. This occurrence previously studied by Boyd (1994) that CEO compensation in firms with a lower level of board control was not aligned to firm size or profitability. Additionally, Goergen, Renneboog, and Correia da Silva (2005) view dividends as substitute control device which can mitigate managerial agency costs in case of weak board governance mechanisms.

In order to testify these propositions empirically in the context of Pakistan, Yahya and Ghazali (2016) examined the link between CEO compensation with firm performance along with the moderating effect of dividend policy in the financial sector. Nonetheless, this study provides a more comprehensive model by incorporating the moderating effect of board governance (CEO duality, board independence, and optimal board size) which phenomenon is still underexplored especially in the perspective of the non-financial sector of Pakistan. Additionally, panel data analysis utilized in this study could mitigate several behavioral and modeling biases (Hsiao, 2013). It is believed that this study will provide compensation committees and regulatory bodies an extensive model to restrict agency conflicts through an optimal compensation structure. Consistent with aforementioned discussion, the objective of this study is to determine whether CEO's compensation is aligned to firm performance in the non-financial sector of Pakistan and the role of board governance (main control device) and dividend policy (substitute control device) as alignment mechanisms to pay-performance link.

## 2. Literature review and hypotheses development

In order to provide in-depth insight into the pay-performance alignment mechanisms, this study has divided the literature review into different strands. Firstly, a wide range of current and prior literature on the pay-performance link is discussed. Secondly, the role of board governance mechanism and dividend policy as alignment mechanisms is justified with previous theoretical and empirical literature review.

### 2.1. CEO compensation and firm performance

The pay-performance link is thought to be crucial because the separation between management and ownership in firms gives rise to agency conflicts in which managers chase self-regard over the shareholder value (Jensen & Murphy, 1990). Consistent with agency theory, many researchers propose that efficient compensation design can resolve this problem (Bizjak, Lemmon, & Naveen, 2008; Gabaix & Landier, 2008; Kaplan & Rauh, 2010). Although there is a wide range of literature on the pay-performance link but they provide mixed evidence. For instance, by utilizing the sample of 30 US restaurant firms, Dalbor, Oak, and Rowe (2010) found evidence relating compensation alignment with performance. In the same US industry, Demirev and Yuan (2013) revealed that compensation only in the form of bonuses and non-equity positively affects restaurant firm performance. In addition, Ghosh (2010) employed cross-sectional data to explore the link between firm performance and CEO compensation on Indian manufacturing firm for the year 2007. He observed the significant pay for performance sensitivity estimates but the magnitude was smaller.

In contrast, many researchers determine evidence that is consistent with “skimming view” or managerial power vis-à-vis executive compensation. On that account, Core et al. (1999) employed 205 publicly traded US firms to reveal a negative association between excessive executive compensation and subsequent market and operating performance. Parallel to this study, on the basis of executive compensation data-sets of 1,441 Standard and Poor's firms, Brick, Palmon, and Wald (2006) found empirical evidence persistent with cronyism hypothesis. Moreover, they suggest that excessive compensation leads to value destruction and it is an indication of agency conflicts in a firm.

Along the same lines, Malmendier and Tate (2009) coined a term, “superstar CEOs” for those chief executives who extract and enjoy the bulk of compensation. In line with managerial power theory, they also found underperformance of firm's market and accounting performance due to these superstar CEOs. Furthermore, over the period from 1998 to 2010, Balafas and Florackis (2014) examine the ex-post consequences of CEO compensation for shareholder value with a sample size of 1787 UK listed firms. Through panel data regressions, they ascertain the negative relationship of excess CEO compensation with future operating performance and short-term subsequent returns of the firm. Likewise, Cooper, Gulen, and Rau (2016) also found the negative effect of excess CEO compensation on future shareholder return by utilizing a sample size of NASDAQ, AMEX, and NYSE firms.

In the perspective of the capital market of Pakistan, there is inconclusive and lack of literature on the pay-performance association. For instance, by computing common effect model on 114 KSE listed companies, Shah, Javed and Abbas (2009) found no significant relationship of firm performance variables with CEO compensation. Similarly, Anjam (2011) also discovered that listed firms in Pakistan have no association with firm performance. However, holding the managerial power theory, Younas, Mehmood, Ilyas, and Bajwa (2012) revealed the negative association of CEO compensation with the firm performance by performing fixed effects regression on 151 KSE listed companies. Therefore, it can be concluded from previous studies that agency conflicts in Pakistan prevails due to the absence of the pay-performance link, back scratching and cronyism. There is only one study by Yahya and Ghazali (2015) which revealed the positive association of operating and market performance with CEO compensation in the financial sector of Pakistan. However, it is still not clear if the non-financial sector of Pakistani capital market has aligned their CEO's compensation with firm performance. Directors believe that the best measure of firm performance is shareholder return, while CEO's consider accounting-based operating measures more effectual because CEO's could directly influence operating performance rather than stock returns (Donatiello, Larcker, & Tayan, 2016). In order to consider both viewpoints, this study has proposed that CEO compensation should be aligned with both operating and market performance. Accordingly, following hypotheses are formulated:

H1: There is a positive effect of operating performance on CEO compensation

H2: There is a positive effect of market performance on CEO compensation

## **2.2. Board governance**

Agency theory argued that strong board governance could mitigate the agency conflicts by aligning the interests of agents with that of shareholders (Conyon, 1997). Nonetheless, there are explicit strong and weak mechanisms which explain the effectiveness of corporate governance. Consistent with agency theory, this study has taken into account independent directors and optimal board size as strong mechanisms but CEO duality as a weak board governance mechanism (Jensen & Meckling, 1976).

### **2.2.1. Board independence**

Agency theorists have argued that company board should include independent board of directors (Zahra & Pearce, 1989) because they are free of conflicts of interest and less sensitive to the influence of corporate insiders (Dalton, Daily, Ellstrand, & Johnson, 1998). Moreover, studies have revealed a dynamic role of independent directors in resolving agency conflicts through efficient executive pay setting. By utilizing 362 from 2001 to 2004 and 492 from 2005 to 2007 Chinese listed firms, Zhu, Tian, and Ma (2009) found that independent board directors generate a stronger association between firm performance and executive compensation.

Similarly, Conyon and He (2011) determined that firms with greater independent directors have a stronger pay-performance link. By employing 1381 Chinese public listed companies, they also purported that independent directors can replace the CEO if they perform poorly. A meta-analysis of 219 US-based studies by van Essen, Otten, and Carberry (2015) suggests that independent directors can positively moderate the relationship between CEO compensation and firm performance as CEOs receive lower compensation in case of powerful board and the pay-performance link would be tighter in that case. In the same lines, Chee-Wooi and Chwee-Ming (2010) also suggested that independent directors strengthen the pay-performance relationship if they are in majority. The aforementioned debate derived the argument that independent directors provide effective monitoring role and eventually moderate the relationship between performance-related indicators and CEO compensation. Consistent with theoretical and empirical available evidence, this study has generated following hypotheses:

H3: Board independence positively moderates the relationship between operating performance and CEO compensation

H4: Board independence positively moderates the relationship between operating performance and CEO compensation

#### 2.2.2. Optimal board size

Jensen (1983) argued that to fulfill the functions of the board, board size is a crucial determinant of board effectiveness. Nonetheless, owing to the different perspectives of agency theory and resource dependence theory, there is inconsistent evidence regarding the role of board size in mitigating agency conflicts. According to agency perspective, large board size may give rise to the problem related to low firm performance, free riding, inefficient decision-making, and weak monitoring (Fama, 1980; Ghosh, 2003; Jensen & Meckling, 1976). CEOs could easily manipulate the board member if they are larger (Jensen, 1993) but the small board can fire the CEO for poor performance and align their pay with performance (Yermack, 1995). In tandem to this argument, several studies found that large board size could lead to excessive CEO compensation (Ali & Teulon, 2014; Core et al., 1999; Mertens & Knop, 2010; Ozkan, 2011; Reddy, Abidin, & You, 2015; Sapp, 2008). Consequently, Fahlenbrach (2009) and Ozkan (2007) proposed a negative effect of board size on pay-performance sensitivity.

The perspective of resource dependence theory is different than agency theory as the former concept supports the inclusion of large board size. Large board size could provide external resources, greater knowledge, and more vigorous skills to the organization (Dalton, Daily, Johnson, & Ellstrand, 1999). Consistent with this theoretical argument, van Essen et al. (2015) found the positive moderating effect of board size on the relationship between firm performance and CEO compensation. Prior studies have made their claims on the basis of small or large board size but according to researcher's best knowledge, the academic literature has ignored any specific quantitative assessment criteria for the estimation of optimal board size. In order to mitigate the inconclusiveness regarding the preferred number of board members, this study argued that board size between seven members to nine members can be considered as optimal. This assertion is evaluated from the prior study conducted by Petra and Dorata (2008) who proposed that board size beyond nine members is not effective. Seminal work of Jensen (1993) and Lipton and Lorsch (1992) also argued that board size should not exceed 8 or 9 members. Accordingly, this study proposed that neither very small board size (less than 7) nor very large board size (more than 9) could effectively monitor CEO opportunistic behavior. Therefore, following hypotheses are generated:

H5: Optimal board size positively moderates the relationship between operating performance and CEO compensation

H6: Optimal board size positively moderates the relationship between market performance and CEO compensation

#### 2.2.3. CEO duality

It is an indication of weak corporate governance when CEO's influence over board increases (Core et al., 1999; Hallock, 1997). Therefore, agency theorists show disapproval toward CEO duality as CEOs gain all the decision-making powers, which can only benefit the specific owners and harm the shareholder value in this case (Finkelstein & D'Aveni, 1994). In line with this postulation, several studies found positive association between CEO duality and CEO compensation (Cyert, Kang, & Kumar, 2002; Grinstein & Hribar, 2004; Jensen, 1993; van Essen et al., 2015; Vemala, Nguyen, Nguyen, & Kommasani, 2014) as duality of position provide excessive discretion to CEOs through which they influence their pay-setting process. However, there is mixed evidence regarding the effect of CEO duality on pay-performance link due to dissimilar assertions of agency, managerial power, and stewardship theory. Owing to the fact that stewardship theory prefers insiders over outsiders, Dorata and Petra (2008) revealed the positive moderating effect of CEO duality on the



relationship between firm performance and CEO duality. On the other hand, van Essen et al. (2015) proposed no significant moderating effect of CEO duality, while Fahlenbrach (2009) found a negative effect of CEO duality on pay-performance link. Nevertheless, due to the prevalence of principal-agent conflicts in the capital market of Pakistan (Alam, 2014; Subohi, 2013), the postulations of this study are more inclined toward managerial power and agency theory regarding the role of CEO duality. It is proposed that CEO duality adversely affect pay-performance link as CEO duality is associated with empire building and rent extraction. In tandem to aforementioned theoretical and empirical discussion, following hypotheses are formulated.

*H7: CEO duality negatively moderates the relationship between operating performance and CEO compensation*

*H8: CEO duality negatively moderates the relationship between market performance and CEO compensation*

### **2.3. Dividend policy**

Financial theorists assumed that dividend payout is one of the efficient solutions to mitigate agency conflicts. A higher level of dividends satisfy the demand of the investors (Michael, 2013) and protect minority shareholders' investments by reducing excessive cash available in the organization (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000). Higher agency costs exist in a corporation where there is a high amount of available free cash flow which further leads to lower shareholder value, overinvestment, or empire building by executives. Therefore, cash flow hypothesis suggested that to reduce agency costs and free flows, firms should pay dividends (Richardson, 2006). Although agency theory argued dividend policy can act as a substitute control device in the absence of strong corporate governance (Haye, 2014) but there is a lack of empirical evidence regarding the role of dividend policy in mitigating agency conflicts. Nonetheless, the empirical evidence by Emerenciana (2012) is not consistent with the agency perspective. The author found more rent extraction, more agency conflicts and lower pay-performance sensitivity in dividend-paying firms. Yahya and Ghazali (2016) reiterate the claims of Emerenciana (2012) and found that dividend policy distorts the link between firm performance and CEO compensation. However, this study is interested to validate the agency theory and cash flow theory's proposition in the non-financial sector of Pakistan. Accordingly, it is proposed that dividend policy can act as a substitute control mechanisms when the board is not in the favor of shareholders. In view of that postulation, following hypotheses are generated:

*H9: Dividend policy positively moderates the relationship between operating performance and CEO compensation*

*H10: Dividend policy positively moderates the relationship between market performance and CEO compensation*

### **3. Literature on control variables**

Several studies relating to the pay-performance alignment or determinants of CEO compensation have considered firm size and growth opportunities as control variables. Large firms can enjoy economies of scale due to the greater variety of capabilities and eventually they pay a higher compensation to their CEOs. Owing to this reason, many researchers found the positive association between firm size and CEO compensation (Abed, Suwaidan, & Slimani, 2014; Conyon, 2014; Gabaix, Landier, & Sauvagnat, 2014; Sigler, 2011). In addition, firms with high growth opportunities and operational complexity demand high-quality CEOs (Chalmers, Koh, & Stapledon, 2006). Consequently, several researchers proved that the firms with higher growth or investment opportunities, pay their CEOs a high level of compensation (e.g. Elloumi & Gueyié, 2001; Kim & Suh, 1993; Sloan, 1993; Wang, Frostburg, & Providence, 2013). Market share is also viewed as a control variable. Although there is a lack of evidence pertaining to the association of market share with CEO compensation (Yahya & Ghazali, 2015) but it is proposed that CEO compensation should also be aligned with market share as managerial talent can be assessed by their ability to enhance market share in a high competitive

market (Ferreira, 2015). Industry and year dummies are also included in the model as control variables. Industry was coded according to the Stockholm Stock Exchange 10-category classification.

#### 4. Research methodology

##### 4.1. Data and sample size

Sekaran (1992) pointed out that a careful selection of data for analysis is very important part of a good research. According to Hair (2007), if the population is small then the whole population should be considered in the study. As this study is intended to capture the picture of the entire capital market of Pakistan, all companies listed on PSX are considered except financial firms. There are some structural and reporting differences between financial and non-financial companies, thus, the inclusion of financial firms could increase the heteroscedasticity issue (Fama & French, 1992). There are 582 companies listed on PSX with a market capitalization of USD 95 billion from which 151 firms are related to financial sector (insurance, banks, leasing, Modarabas, etc.). Accordingly, the rest of 431 non-financial firms were the focus of the study. However, through data cleaning process, some companies were eliminated from the data due to unavailability or lack of disclosure. Consequently, final sample of 219 PSX listed companies were selected for the analysis. For further elaboration, Table 1 can be viewed.

Additionally, previous studies on CEO compensation in Pakistan have covered the period up to the year 2012. Thus, this study has considered the period from 2012 to 2016. This period is selected due to the revised Code of Corporate Governance of Pakistan in the year 2012. Accordingly, the total firm-year observations of the study were 1095 ( $219 \times 5$ ). In addition, data were collected from annual reports of companies. Furthermore, corporate transparency has increased with the advent of revised corporate governance code of 2012, which bound the Pakistani listed firms to disclose the information regarding CEO compensation and board of directors. Therefore, information regarding corporate governance, dividend, firm characteristics, and performance can be extracted from the annual report of the firm.

##### 4.2. Measurement of the variables

Measurements of the variables are adopted from the prior related studies. Total salary and benefit of CEO are considered to measure CEO compensation but the log of this value is more preferred by prior studies to move the skewed data toward linearity and normality (Bachan, 2008; Barnes, Harikumar, & Roth, 2006; Bivens & Mishel, 2013). In order to measure operating performance, this study has considered ROS/operating margin. Most of the prior studies have considered Return on assets (ROA) or Return on equity (ROE) to measure accounting-based operating performance. Very few studies have employed operating margin to build its link with CEO compensation (Awang, Asghar, & Subari, 2010; Dehning & Stratopoulos, 2002). Employing operating margin (ROS) is more appropriate in this sense because executives could have more control over this metric. CEOs believe that they should be compensated for their ability enhances revenues and operating efficiency as some of the other metrics are beyond their control.

Prior studies have measured market performance with different proxies such as stock market return, stock price, Tobin's Q and P/E ratio. Researchers and analysts argued that P/E ratio is a good indicator for market performance because it provides future insight for a specific security (Adams & Periton, 2007). Tobin's Q is not considered in this study to assess market performance because it could have cause multicollinearity with M/B ratio. Therefore, P/E ratio is employed as a proxy for market performance (Leong, Pagani, & Zaima, 2009; Williams & Naumann, 2011). Moreover, most of the researchers have measured dividend policy through dividend payout ratio (Al Masum, 2014; Hashemijoo, Ardekani, & Younesi, 2012; Okafor, Mgbame, & Chijoke-Mgbame, 2011). Board independence is measured by percentage of independent directors on the board. On the other hand, optimal board size and CEO duality are assessed as dummy variables.



**Table 1. Industrial classification and available sample size**

Sector	Total companies in sector	Available data
Automobile	22	15
Cables and Elec. Goods	8	3
Cement	21	13
Chemical	29	24
Engineering	19	8
Fertilizer	7	6
Food & Personal care	23	15
Glass & Ceramics	10	8
Leather & Tanneries	5	2
Miscellaneous	22	10
Oil, Gas, and Refinery	17	12
Paper & Board	11	6
Pharmaceuticals	11	8
Power Generation & Distribution	19	8
Sugar and Allied Industries	34	19
Technology & Communication	10	5
Textile	155	52
Tobacco	3	2
Transportation	5	3
Total nonfinancial firms	431	219

Previous literature has suggested many proxies for firm size such as the log of sales, the log of assets, the log of market capitalization, and the log of total employees (Dang, Li, & Yang, 2018). This study employed log of sales because it also reflects product market competition (De Andres, Azofra, & Lopez, 2005; Raheman & Nasr, 2007). In order to assess growth or investment opportunities, many studies have considered the market to book value ratio. Although investment opportunity set (IOS) is better and advanced proxy but the data for real options is not publically accessible in the reference of Pakistan (Alti, 2006; Fich & Shivdasani, 2005). Identifying an adequate measure of market share could be difficult but most of the researchers have measured it by comparing a firm's total sales with total sales of industry (Banker, Darrough, Huang, & Plehn-Dujowich, 2013; Kaydos, 1998; Khorana & Servaes, 2012). Last but not the least, board size is also accounted as control variable as it is the second major determinant of CEO compensation after firm size (van Essen et al., 2015). Table 2 shows the list of variables and their specific measurements utilized in this study.

#### 4.3. Statistical technique and operational model

The nature of the data (unbalanced panel) has precluded the study from utilizing ordinary least squares (OLS) regression. It is the limitation of OLS that it does not account for unobserved heterogeneity relating to between- and within-firm effects. Using OLS regression on panel data could inflate *t*-statistics, underestimated standard errors and could produce correlated error terms (Sanders & Hambrick, 2007). Due to different individual traits which do not fluctuate over time, panel data observations cannot assume to be autonomously distributed (Wooldridge, 2015). For the ease of readability and understandability, the regression model is operationalized in Equation 1 along with dependent, independent, moderating, and control variables.

$$\begin{aligned}
 \text{CEOit} = & \beta_0 + \beta_1 \text{OPit} + \beta_2 \text{MPit} + \beta_3 \text{BINDit} + \beta_4 \text{OPBINDit} + \beta_5 \text{MPBINDit} + \beta_6 \text{OBZit} \\
 & + \beta_7 \text{OPOBZit} + \beta_8 \text{MPOBZit} + \beta_9 \text{CEODit} + \beta_{10} \text{OPCEODit} \\
 & + \beta_{11} \text{MPCEODit} + \beta_{12} \text{DPRit} + \beta_{13} \text{OPDPRit} \\
 & + \beta_{14} \text{MPDPRit} + \beta_{15} \text{BSIZEit} + \beta_{16} \text{SIZEit} + \beta_{17} \text{GOit} + \beta_{18} \text{MSit} + \epsilon_{it}
 \end{aligned} \tag{1}$$

**Table 2. Measurement of the variables**

Variable	Measurement	Proxy or Ratio
CEO compensation	CEO salary and benefits	Log of CEO's salary and benefits
Firm performance	Operating performance	ROS—Operating margin: Operating profit/Sales
	Market performance	Price to earnings ratio
Board governance	Board independence	Percentage of independent directors on the board
	Optimal board size	Dummy variable: 1 if board members lies within the range of 7–9, 0 otherwise
	CEO duality	Dummy variable: 1 if CEO is also chairman, 0 otherwise
Dividend policy	Dividend pay-out	Total annual dividends per share/Diluted earnings per share
Control variables	Firm size	Log of sales
	Growth opportunities	Market to book value: Market capitalization/Book value of equity
	Market share	Total sales/total sales of industry
	Board size	The number of directors on the board

where it is the  $i$ th firm at time  $t$ , OP is the operating performance, MP is the market performance, BIND is the board independence, OPBIND is the interaction of operating performance with board independence, MPBIND is the interaction of market performance with board independence, OBZ is the optimal board size, OPOBZ is the interaction of operating performance with optimal board size, MPOBZ is the interaction of market performance with optimal board size, CEOD is the CEO duality, OPCEOD is the interaction of operating performance with CEO duality, MPCEOD is the interaction of market performance with CEO duality, DPR is the dividend payout, OPDPR is the interaction of operating performance with dividend payout, MPDRP is the interaction of market performance with dividend payout, BSIZE is the board size, SIZE is the firm size, GO is the growth opportunities, MS is the market share, and  $\varepsilon$  is the random error term.

## 5. Results and analysis

### 5.1. Summary statistics

The descriptive statistics are illustrated in Table 3 including minimum, maximum, mean, and standard deviation values of all variables from the year 2012 to 2016. It is revealed that the average compensation of CEOs in Pakistan is 1.32 million Rupees (USD 0.01 million). Nonetheless, the minimum value shows that some companies have not paid their CEOs any compensation due to the severe deficit. Standard deviation indicates substantially large variation. On the average, operating performance is 0.02 and market performance is 20.38. Variation in operating performance indicator is lower than market performance metric.

The summary statistics also show that there is a lower level of representation of independent directors on board (8%) in PSX. Nevertheless, it is an indicator of sound corporate governance practices that almost 86% of board size lies within the optimal range. Furthermore, around 26% firms listed on PSX are practicing CEO duality. Some firms have paid the dividend from existing cash despite their deficit in order to build investor confidence due to which the minimum value of dividend payout is negative. Notably, overall payout ratio in the capital market of Pakistan is low as their preference is to retain earnings for future investment opportunities. The central tendencies, variability, and spreads for control variables are also mentioned in Table 3, respectively.

### 5.2. Data validity and model specification

There are certain assumptions of regression analysis which should be fulfilled before testing the hypotheses empirically. Accordingly, this study has identified the issues of non-normality in some variables which were transformed to normality with Box–Cox power transformation. Box and Cox (1964) proposed a power transformation tool with the intention of reducing anomalies such as

**Table 3. Descriptive statistics**

	Min	Max	Mean	S.D.
CEO compensation	0	72,654.00	1,317.94	4,919.28
Operating performance	-64.22	5.21	0.018	1.99
Market performance	-1,205	14,060	20.38	428.40
Board independence	0	0.78	0.08	0.13
CEO duality	0	1	0.26	0.44
Optimal board size	0	1	0.86	0.35
Dividend payout	-193.55	5.50	0.05	5.87
Board size	6	21	8.06	1.57
Firm size	7.34	20.90	15.32	1.76
Growth opportunities	-31.98	2,534.88	5.46	90.02
Market share	0	0.94	0.09	0.14

heteroscedasticity, non-normality, and non-additivity. This technique uses an adequate exponent (optimal  $\lambda$ ) to transform data within the normality curve. After transformation, skewness and kurtosis of all variables were aligned within an acceptable range of  $-2$  to  $+2$  (George & Mallery, 2010).

Outliers were identified through Cook's distance. Pardoe (2012) purported that the observations with a Cook's distance less than 0.5 are rarely so influential. There were some potential observations with the Cook's distance greater than 0.5 which were removed. Accordingly, the observations were reduced from 1095 to 1035. There is also no issue of multicollinearity as correlations between variables are less than 0.9 (see Table 4), VIF values were less than 10 and tolerance values were greater than 0.1 (Hair, Black, Babin, & Anderson, 2010; Tabachnick & Fidell, 2007). Although Durbin-Watson statistic demonstrates no issue of serial correlation ( $D = 1.93$ ), however, Wooldridge test for autocorrelation indicates the presence of this issue ( $F = 9.73$ ;  $p < 0.01$ ). Additionally, modified Wald test for GroupWise heteroscedasticity also pointed that responses are not homogenous across the sample ( $\chi^2 = 1.3e + 06$ ,  $p < 0.01$ ).

**Table 4. Correlation matrix**

	CEO	OP	MP	BIND	OPZ	CEOD	DPR	BSIZE	SIZE	GO
CEO	1									
OP	0.238**	1								
MP	0.304**	-0.054	1							
BIND	-0.279**	-0.135**	-0.239**	1						
OPZ	-0.294**	-0.119**	-0.151**	0.168**	1					
CEOD	-0.263**	-0.059	-0.206**	0.204**	0.139**	1				
DPR	-0.273**	-0.119**	-0.277**	0.150**	0.154**	0.136**	1			
BSIZE	-0.366**	-0.067*	-0.146**	0.212**	0.710**	0.243**	0.178**	1		
SIZE	0.488**	-0.061	0.150**	-0.223**	-0.252**	-0.214**	-0.267**	-0.278**	1	
GO	-0.303**	-0.075*	-0.499**	0.222**	0.176**	0.172**	0.287**	0.162**	-0.201**	1
MS	0.550**	0.024	0.259**	-0.205**	-0.247**	-0.193**	-0.267**	-0.300**	0.747**	-0.243**

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

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

In order to account for the issue of serial correlation and heteroscedasticity, this study has utilized Prais–Winsten panel corrected standard error estimates (PCSE) regression. It should be noted that Park's feasible generalized least squares (FGLS) estimator can also account for these issues but it can only be implemented if number of cross sections are less than number of time periods which is not the case in this study, therefore, Beck and Katz (1995) argued that PCSE can more effectively estimate standard errors in finite sample. A wide range of studies have utilized this technique in the domain of corporate governance (Hategan & Curea-Pitorac, 2017; Ntow-Gyamfi, Bokpin, & Gemegah, 2015).

### 5.3. Hypotheses testing

In order to show differentiation and variation in regression techniques, the results of pooled OLS, random effects, fixed effects, and Prais–Winsten (PCSE) are presented in Table 5. It is believed that the pooled OLS estimator ignores the panel structure of the data due to which pooled OLS without any robustness provides biased estimates (Cameron & Trivedi, 2005). Lagrange multiplier (LM) test further confirms that random effect is more appropriate as compared to pooled OLS ( $\chi^2 = 1099.40$ ,  $p < 0.01$ ). However, Hausman test indicates that fixed effect estimator should be preferred over random effect in case of this study ( $\chi^2 = 81.55$ ,  $p < 0.01$ ). Owing to the issue of serial correlation and heteroscedasticity, Prais–Winsten (PCSE) regression is utilized which examine error structure that does not conform to the classical OLS assumptions (Johnston, 1972). Therefore, it can be argued

**Table 5. Regression results**

	Dependent variable = CEO compensation			
	Pooled OLS	Random effect	Fixed effect	Prais–Winsten (PCSE)
OP	75.70 (–9.01)***	20.90 (3.14)***	6.57 (0.94)	40.35 (4.04)***
MP	0.39 (4.55)***	0.11 (2.22)**	0.06 (1.20)	0.20 (2.70)***
BIND	–0.32 (–2.63)***	–0.24 (3.15)**	–0.13 (–1.68)*	–0.25 (–3.40)***
OPBIND	0.38 (2.22)**	0.03 (0.26)	–0.02 (–0.23)	0.01 (0.08)*
MPBIND	0.11 (0.53)	0.23 (2.16)**	0.21 (2.01)**	0.11 (0.78)
OBZ	0.02 (0.04)	0.29 (0.64)	0.56 (1.20)	–0.26 (–0.55)
OPOBZ	0.49 (2.87)***	–0.05 (–0.39)	–0.12 (–1.080)	0.14 (1.11)**
MPOBZ	0.19 (0.87)	0.08 (0.60)	0.10 (0.750)	0.15 (1.33)
CEOD	–0.92 (–2.64)***	–1.02 (–3.60)***	–0.86 (–3.02)***	–0.82 (–2.31)**
OPCEOD	–0.38 (–2.31)**	–0.16 (–1.62)	–0.08 (–0.86)	–0.35 (–2.52)**
MPCEOD	–0.05 (–0.36)	–0.08 (–0.86)	–0.05 (–0.61)	–0.13 (–1.48)
DPR	0.06 (0.56)	0.00 (0.01)	–0.01 (–0.12)	–0.06 (–0.39)
OPDPR	–0.18 (–0.77)	–0.10 (–0.59)	0.02 (0.120)	–0.26 (–3.15)***
MPDPR	–0.69 (–2.45)**	–0.27 (–1.62)	–0.21 (–1.30)	–0.35 (–1.77)*
BSIZE	–57.59 (–5.07)***	–34.12 (–3.45)***	–24.29 (–2.28)**	–45.97 (–4.06)***
SIZE	0.02 (5.33)***	0.04 (5.29)***	0.08 (7.25)***	0.02 (5.16)***
GO	–0.25 (–2.25)**	–0.20 (–2.48)**	–0.13 (–1.58)	–0.17 (–1.51)**
MS	11.88 (6.95)***	4.95 (1.75)*	–20.39 (–4.22)***	12.60 (7.80)***
Year	Included	Included	Included	Included
Industry	Included	Included	Included	Included
Constant	–62.24 (–7.04)***	–11.33 (–1.61)	6.35 (0.84)	–29.92 (–3.02)***
R <sup>2</sup>	0.462	0.410	0.103	0.490
N	1035	1035	1035	1035

Note: The numbers are coefficients along with z and t scores in parenthesis, t-values for OLS and fixed effect and z-statistics for random and Prais–Winsten (PCSE).

\*10% significance level.

\*\*5% significance level.

\*\*\*1% significance level.

that Prais–Winsten (PCSE) regression could provide more precise estimates as compared to pooled OLS, random effect, and fixed effect estimators.

Prais–Winsten (PCSE) regression results revealed that there is a positive and a significant effect of operating performance ( $\beta = 40.35$ ,  $p < 0.01$ ) and market performance ( $\beta = 0.20$ ,  $p < 0.01$ ) on CEO compensation due to which the study accepts *H1* and *H2*. On the other hand, the presence of independent directors on the board is negatively associated with CEO compensation ( $\beta = -0.25$ ,  $p < 0.01$ ). It is also purported that board independence positively moderates the relationship between operating performance and CEO compensation ( $\beta = 0.01$ ,  $p < 0.1$ ) but the proposition does not hold true in the case of market performance ( $\beta = 0.11$ ,  $p > 0.1$ ) resulting in the acceptance of *H3* but the rejection of *H4*. Although fixed and random effect estimators evaluated that board independence strengthens the association between market performance and CEO compensation but the estimates of Prais–Winsten (PCSE) regression are considered more reliable in this study.

The results also asserted that there is no direct significant effect of optimal board size on CEO compensation ( $\beta = -0.26$ ,  $p > 0.1$ ), however, *H5* is accepted due to the significant moderating effect of optimal board size on the relationship between operating performance and CEO compensation ( $\beta = 0.14$ ,  $p < 0.05$ ). Nevertheless, optimal board size shows no significant moderating effect on the relationship between market performance and CEO compensation ( $\beta = 0.15$ ,  $p > 0.1$ ) due to which *H6* is rejected. CEO duality is negatively associated with CEO compensation ( $\beta = -0.82$ ,  $p < 0.05$ ) which is not consistent with agency perspective but as expected, it negatively moderates the relationship between operating performance and CEO compensation ( $\beta = -0.35$ ,  $p < 0.05$ ) which leads to acceptance of *H7*. CEO duality has also a negative moderating effect on the relationship between market performance and CEO compensation but the  $p$ -value is insignificant ( $\beta = -0.13$ ,  $p > 0.1$ ) and therefore, the study fails to accept *H8*.

The regression results also revealed no significant association of dividend policy with CEO compensation ( $\beta = -0.06$ ,  $p > 0.1$ ). Nevertheless, contrary to the substitute control proposition, results suggest that dividend payout negatively moderates the relationship between operating performance and CEO compensation ( $\beta = -0.26$ ,  $p < 0.01$ ) resulting in rejection of *H9*. Similar evidence is purported in the context of market performance ( $\beta = -0.35$ ,  $p < 0.1$ ), thus, *H10* cannot be accepted. In the scenario of control variables, board size ( $\beta = -45.97$ ,  $p < 0.01$ ) and growth opportunities ( $\beta = -0.17$ ,  $p < 0.05$ ) are negatively associated, while firm size ( $\beta = 0.02$ ,  $p < 0.01$ ) and market share ( $\beta = 12.60$ ,  $p < 0.01$ ) are positively associated with CEO compensation. The goodness of fit for Prais–Winsten (PCSE) regression is highest ( $R^2 = 0.49$ ), while fixed effect estimates reflect only 10% variation in CEO compensation model.

#### 5.3.1. Sensitivity analysis

Some studies identified that the relationship between firm performance and CEO compensation is subject to endogeneity issues and simultaneous bias (Lilling, 2006; Raithatha & Komera, 2016). In the presence of simultaneity or endogeneity, the estimates of OLS are inconsistent and biased (Bullock, Green, & Ha, 2010). One of the popular estimators to reduce the issue of endogeneity is two-stage least squares (2SLS) as it has the tendency to generate consistent parameter estimates (Byrne, 2001). Table 6 shows three models estimated with 2SLS (robust standard errors) regression. Operating and market performance variables are considered as endogenous variables and their lagged values are utilized as instrumental variables as suggested by Reed (2015). Angrist and Krueger (2001) argued that researchers should rely on fewer instrumental variables because the bias of 2SLS is close to zero if the number of instruments are equal to the number of endogenous factors. It is confirmed that instruments are not weak as minimum eigenvalues were higher than the 2SLS size of the nominal 5% Wald test (Stock & Yogo, 2005).

The first model includes only direct effect of firm performance, board governance, and dividend payout on CEO compensation. Interaction terms are added in the second model and control variables with all other variables are incorporated in the third model. The estimates of the third model can

**Table 6. Two-stage least squares (2SLS) regression analysis**

	1	2	3
OP	101.38 (6.75)***	119.94 (7.32)***	120.43 (8.13)***
MP	0.83 (6.1)***	1.01 (5.13)***	0.83 (3.68)***
BIND	−0.36 (−2.43)**	−0.39 (−2.43)**	−0.10 (−0.73)**
OBZ	−2.35 (−4.05)***	−2.44 (−3.23)***	1.31 (1.54)
CEOD	−1.47 (−3.25)***	−1.91 (−4.28)***	−0.93 (−2.33)**
DPR	−0.27 (−2.43)**	0.09 (0.55)	0.34 (2.17)**
OPBIND		0.68 (2.88)***	0.43 (2.06)**
MPBIND		−0.11 (−0.40)	−0.07 (−0.29)
OPOBZ		0.66 (2.62)***	0.44 (1.94)**
MPOBZ		−0.04 (−0.12)	−0.27 (−0.90)
OPCEOD		−1.02 (−4.81)***	−0.63 (−3.32)***
MPCEOD		−0.24 (−1.20)	−0.11 (−0.60)
OPDPR		−0.73 (−2.27)**	−0.55 (−1.93)**
MPDPR		−1.67 (−3.62)***	−1.60 (−3.56)***
BSIZE			−63.03 (−4.85)***
SIZE			0.02 (4.82)***
GO			−0.05 (−0.32)
MS			10.67 (5.11)***
Year	Included	Included	Included
Industry	Included	Included	Included
Constant	−76.64 (−5.09)***	−98.37 (−5.81)***	−112.02 (−7.17)***
R <sup>2</sup>	0.22	0.25	0.43
Eigenvalue	200.52	128.08	80.40

Note: The numbers are coefficients along with z scores in parenthesis.

\*10% significance level.

\*\*5% significance level.

\*\*\*1% significance level.

be considered more reliable as the variables explain almost 43% variation in CEO compensation. There are slight differences in the results of 2SLS regression and Prais–Winsten (PCSE) regression. In 2SLS regression, the effect of dividend payout in CEO compensation has become positive and significant ( $\beta = 0.34$ ,  $p < 0.05$ ) which is negative and insignificant in Prais–Winsten (PCSE) regression. In addition, growth opportunities show no significant association with CEO compensation ( $\beta = -0.05$ ,  $p > 0.1$ ). Sargan test confirms that there is no issue of over-identification ( $\chi^2 = 116.08$ ,  $p > 0.1$ ).

#### 5.4. Discussion

This paper has addressed the principal–agent issues arise from inefficient CEO compensation structures. Agency theory argued that agency conflicts could be mitigated if CEO's compensation will be aligned to firm performance (Jensen & Meckling, 1976). In reference to this argument, it is found that CEO's compensation in the capital market of Pakistan is aligned to both operating and market performance. The results are in line with the findings of Yahya and Ghazali (2015), however, other studies in the perspective of Pakistan have either found no significant association (Anjam, 2011; Lone, Hasan, & Afzal, 2015; Shah et al., 2009) or negative association between firm performance and CEO compensation (Usman, Akhter, & Akhtar, 2015; Younas et al., 2012). The substantial difference in results is due to their utilization of panel data prior to the implementation of revised Code of Corporate Governance introduced in year 2012. Yahya and Ghazali (2015) purported that this revised Code has improved the corporate governance practices in the capital market of Pakistan.



It is a good indicator that CEO's compensation in Pakistan is also aligned to market performance as accounting-based measures can be manipulated by managers (Ball, 2006; Rayburn, 1986). Aligning market performance with CEO compensation could testify the postulation of optimal contracting in a competitive market for managerial talent (Frydman & Jenter, 2010). Agency theorists also argued that board should be comprised of independent directors to ensure superior control and monitoring over agents (Fama & Jensen, 1983), to weaken the CEO's bargaining power and to abstain them from rent extraction (Hermalin & Weisbach, 1998). Consistent with this agency perspective, the results revealed that independent directors desist CEOs to withdraw a high level of compensation (Core et al., 1999; Fallatah, 2015). Additionally, the evidence regarding the role of board independent in pay-performance alignment is consistent with the proposition of van Essen et al. (2015). The results show that independent directors in Pakistan have the capability to align CEO's compensation with the operating performance but their role as an alignment mechanism to market performance and CEO compensation seems ineffective. There is a possibility that the discretion and empowerment of independent directors could be enhanced with their greater representation on board as a previous study by Chee-Wooi and Chwee-Ming (2010) purported that pay-performance link can be reinforced by the independent directors if they are more than 50%.

The results also purported that optimal board size cannot directly influence CEO compensation but it could strengthen the relationship between operating performance and CEO compensation. Although there is no prior study which has employed optimal board size to ensure the variation in CEO compensation but the evidence can be partially compared with the meta-analysis of van Essen et al. (2015) who also proposed positive moderating effect of board size on the relationship between firm performance and CEO compensation. The optimal level of board size formulated from the pivotal work of Petra and Dorata (2008), Jensen (1993), and Lipton and Lorsch (1992) can influence the relationship between operating performance and CEO compensation but it cannot influence the association between market performance and CEO compensation.

In the scenario of CEO duality, the results are also not consistent with agency theory. Agency theorists proposed that duality of positions represent ineffective board monitoring over managers and eventually leads to CEO entrenchment (Kim, Al-Shammari, Kim, & Lee, 2009) and higher inherent risk (Dickins, 2010). However, this study found that CEO compensation decreases with the increase in CEO duality but it cannot be claimed that CEOs in Pakistan are stewards due to previous rent extraction and overcompensation cases (Alam, 2014; Subohi, 2013). This proposition can also be confirmed by the empirical evidence of this study that CEO duality could distort the link between operating performance and CEO compensation. This evidence is consistent with the study of Fahlenbrach (2009) who revealed that CEO duality negatively influences pay-performance sensitivity which eventually leads to agency conflicts. Nonetheless, in line with the postulation of van Essen et al. (2015), it is evaluated that CEO duality cannot moderates the relationship between market performance and CEO compensation.

Although agency theory proposed that dividend policy can act as a substitute control device in the absence of strong corporate governance mechanisms (Haye, 2014) but this notion is not widely tested empirically. The results of 2SLS regression posited that dividend-paying firms also pay a higher compensation to their CEOs. However, contrary to the agency perspective, it cannot strengthen the relationship between firm performance and CEO compensation. In fact, dividend policy in Pakistan weakens or distorts the link between firm performance (operating and market) and CEO compensation. The evidence is consistent with Yahya and Ghazali (2016) and Emerenciana (2012) that dividend-paying firms have the lower level of pay-performance association and the higher level of agency conflicts.

As per as control variables are concerned, board size has a negative effect on CEO compensation which is congruent with resource dependence view rather than agency theory, i.e. larger board can also effectively protect shareholders' interests and eventually restrict managerial opportunistic behavior (Zahra & Pearce, 1989). As expected, positive association between firm size and CEO compensation revealed that large firms pay their CEOs a higher level of compensation. This finding is consistent with many regional and international studies (see Gayle, Golan, & Miller, 2015; Lone et al., 2015;

Shah et al., 2009; Tosi, Werner, Katz, & Gomez-Mejia, 2000; Usman et al., 2015; van Essen et al., 2015; Yahya & Ghazali, 2015). On the other hand, Prais–Winsten (PCSE) regression suggests that firms with greater growth opportunities pay their CEOs a lower level of compensation, while 2SLS regression revealed no association of growth opportunities with CEO compensation. Owing to the simultaneity issue, the estimates of 2SLS regression can be considered more reliable. Last but not the least, the results found that CEO compensation in Pakistan is also aligned to market share. Executives' talent can be assessed by their ability to enhance market share through cost-effective strategies, thus, aligning CEO's compensation with market share could help an organization to survive in a competitive market environment (Jung & Subramanian, 2017; Ross, Westerfield, & Jordan, 2008).

## 6. Conclusion

This study investigates whether CEO's compensation is aligned with operating and market performance and how board governance and dividend policy affect the pay–performance link in the non-financial sector of Pakistan. Empirical evidence indicates that both operating and market performance are positively associated with CEO compensation which is congruent with the pay–performance alignment proposition of agency theory. However, mixed evidence is purported regarding the role of board governance and dividend policy as alignment mechanisms to firm performance and CEO compensation. In this scenario, findings are partially supported by agency perspective that board independence and optimal board size positively moderates the relationship between operating performance and CEO compensation, while CEO duality distorts this association. However, none of these mechanisms have a significant influence over the relationship between market performance and CEO compensation.

Contrary to the postulation of agency theory, this study argues that dividend policy cannot act as a substitute control device when corporate governance mechanisms are not strong, especially in the context of Pakistani capital market. Pertaining to the effect of control variables on CEO compensation, it is purported that board size has negative while firm size and market share have a positive association with CEO compensation. Nonetheless, there is no statistically significant evidence that growth firms pay their CEOs more (less) compensation. Large firms with greater market share have the capability to pay their CEOs a higher level of compensation. Additionally, consistent with resource dependence theory, large board restricts CEOs from rent extraction.

This study contributes to the new and existing body of knowledge, especially in the reference of pay–performance alignment. Firstly, only a handful of academic literature has discussed the alignment of both operating and market performance with CEO compensation. Especially in the perspective of Pakistan, only Yahya and Ghazali (2015) have incorporated both performance indicators in their study. Most of the studies have relied only on accounting-based measures while building their link with managerial compensation which can be manipulated by managers. Secondly, there is a lack of empirical evidence regarding the moderating role of board governance (main control mechanism) and dividend policy (substitute control device) on the relationship between firm performance and CEO compensation.

According to researchers' best knowledge, there is no prior study which has validated the effect of these moderators with both operating and market performance metrics. Thirdly, Yahya and Ghazali (2016) evaluated the effect of different performance indicators on CEO compensation along with the moderating role of dividend policy in the financial sector of Pakistan. Nonetheless, they have utilized OLS regression which is a less effective technique in case of panel data. Prais–Winsten (PCSE) and 2SLS regression employed in this study provide more robust evidence in this reference of the non-financial sector of Pakistan. Most of the prior studies in the context of Pakistan also ignored the simultaneity or endogeneity issue while analyzing the relationship between firm performance and CEO compensation which is accounted in this study. Fourthly, the study has empirically tested the under-explored propositions of agency theory in the capital market of Pakistan and formulated a quantitative proxy for assessing optimal level of board size with the support of prior academic literature. It is expected that the ambiguity associated with the optimal board size will be mitigated in future. The

findings of the study could help regulatory bodies of Pakistan to design better CEO compensation structure and to improve corporate governance mechanisms for the prosperity of capital market.

## 7. Limitations and future recommendations

Owing to the lack of disclosure and transparency in the capital market of Pakistan, this study was not able to include all types of CEO's socio-psychological characteristics and board attributes (e.g. CEO tenure, CEO age, CEO education, board financial expertise, board activity, etc.). Acquiring this data is very difficult because it is not available publicly as a secondary source. Therefore, this study examined relationships for which data was publically available in annual reports of the companies.

Future research is required to offer a further in-depth body of knowledge into the determinants of CEO compensation along with various other moderators in the context of Pakistan. In addition, the study can be further explored to other Asian countries to reveal the applicability of the current model on other capital markets. Furthermore, the sector-wise analysis is also possible within the reference of Pakistan. The current study investigates only specific performance measures with CEO compensation. The study could become more valuable if researchers will test the model with some other accounting and marketing-based performance measures (especially, Economic Value Added (EVA) and Tobin's Q).

In addition, some other moderators should also be tested in this context to ensure their role in aligning pay-performance link as this study does not find any effective alignment mechanism between market performance and CEO compensation. Studies can also explore the role of different ownership structures and audit committee characteristics as moderating variables in the proposed model. The study has also not considered the segmented market capitalization group of large cap, medium cap, and small cap companies. Therefore, future researchers should continue research in this area by analyzing these groups distinctly.

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