The Economics and Finance Letters
2026 Vol. 13, No. 4, pp. 194-228
ISSN(e): 2312-430X
ISSN(p): 2312-6310
DOI: 10.18488/29.v13i4.5323
© 2026 Conscientia Beam. All Rights Reserved.

CEO power, ownership structure and firm investment efficiency: A three-way interaction model

Qaiser Abbas[1+]
Muhammad Asadullah[2]

[1,2]*Karachi Institute of Economics and Technology, Pakistan.*
[1]*Email: qaiserabbas.bukc@bahria.edu.pk*
[2]*Email: m.asadullah@kiet.edu.pk*



(+ Corresponding author)

Article History
Received: 7 April 2026
Revised: 12 August 2026
Accepted: 1 September 2026
Published: 28 October 2026

Keywords
CEO power
Investment efficiency
Ownership structures
Three-way interaction analysis
Type 2 agency theory

JEL Classification:
G31; G32; G34; M12.

ABSTRACT

The study aims to investigate the moderating role of ownership structures in the relationship between CEO power and investment efficiency. Specifically, we examined the direct impact of various dimensions of CEO power on investment efficiency. Moreover, we explored the moderating effect of family ownership on the relationship between CEO power and investment efficiency. Lastly, we examined whether institutional ownership weakens this negative effect. To achieve these objectives, we employed a sample of 310 listed non-financial firms in Pakistan for the financial years ending 2016–2025. Further, we employed panel regression and Driscoll-Kraay fixed-effects models to analyze the baseline, two-way, and three-way interaction equations. Our findings showed that CEO power is negatively related to investment efficiency, and this relationship is amplified in family-owned firms. Moreover, we found that institutional ownership mitigates this negative effect, suggesting that the negative moderating effect of family ownership is reduced in its presence. Our study extends Type 2 agency theory by employing a complex interaction of ownership structures, providing unique insights into corporate governance dynamics. The findings offer practical implications for regulatory authorities and corporate boards intending to restrict suboptimal capital allocation in family-owned businesses. Furthermore, the findings also assist investors in preferring to invest in companies with a strong institutional environment.

Contribution/Originality: The study offers a novel perspective by examining the unique and complex interplay among CEO power, ownership structures, and investment efficiency within an emerging economy context, namely Pakistan. Moreover, unlike prior research, this study extends Type 2 agency theory by employing a three-way interaction model.

1. INTRODUCTION

Investment efficiency (IE) has gained significant importance in the corporate finance literature because it represents how firms efficiently invest capital resources to maximize shareholders' wealth. At the same time, inefficient investments can cause severe repercussions not only for individual corporate entities but also for the economy at large (Nisar, Li, Shah, & Rafique, 2024). Evidence from the Asian Financial Crisis of the late 1990s implies that inefficient deployment of debt-financed capital significantly contributed to corporate instability and financial distress (Goh, Choi, & Cho, 2016). Post-crisis literature further notes that weak corporate governance mechanisms can be among the factors behind such inefficient capital allocation (Zhuang, Edwards, Webb, & Capulong, 2000). Moreover, it is also argued that these concerns are very common in emerging economies such as Pakistan, where inefficient allocation of capital remains a significant challenge (Shah et al., 2021). In this context, Iqbal (2025) reports

© 2026 Conscientia Beam. All Rights Reserved.

that firms often engage in aggressive borrowing to finance growth and expansion without assessing the feasibility of investment projects. Further, the literature also shows that only 1.8% of listed non-financial firms in Pakistan invest in R&D projects, hindering technological growth (Khan & Viganola, 2023). Such suboptimal capital allocation can have serious consequences for firms. First, underinvestment in high-return projects will ultimately deteriorate shareholder value. Second, overinvestment in low-return projects can increase exposure to default risk. Lastly, inefficient investments can weaken financial performance and affect global competitiveness.

Given the importance and consequences of inefficient investments, various researchers have tried to explore the determinants of firm-level IE. For instance, Ali, Rehman, Jawad, and Naz (2024); Lei and Chen (2019); Stoughton, Wong, and Yi (2017); and Gulen and Ion (2016) have identified financial and accounting information quality, market competition, political uncertainty, and various firm-level factors as key determinants of sub-optimal investment decisions. Additionally, several recent studies have largely focused on governance-related variables affecting IE. In this regard, Menshawy, Basiruddin, Mohd-Zamil, and Hussainey (2023) and Bhutta, Abid, Anees, and Sheikh (2025) investigated how various board characteristics affect investment decisions. However, some recent literature shows that chief executive officer (CEO) power plays a critical role in influencing the investment decisions of a firm. Within the limited literature, most prior studies have documented an inverse association between CEO power and IE, except for Aibar-Guzmán and Frías-Aceituno (2021) and Shaheen, Alatyat, Aldabbas, Abu Shihab, and Abuaddous (2024), who reported a positive and an insignificant effect, respectively. This inconsistency in the existing literature highlights contradictory findings, which can further create theoretical ambiguity. Moreover, existing studies have largely focused on developed economies such as the USA and China (Lo & Shiah-Hou, 2022; Majeed & Ullah, 2020). These economies are often characterized by stronger governance mechanisms, unlike Pakistan, where the governance system is usually dominated by a concentrated group of individuals and board independence is often symbolic, while CEO authority remains unchecked. In such situations, CEOs can opt for investment decisions that fulfill their personal interests at the cost of shareholders' wealth, increasing the risk of a type 1 agency problem. Similarly, in such an environment, powerful CEOs can misuse corporate resources to secure their positions and attain financial benefits. Therefore, the first research objective of this study is to investigate the effect of CEO power on IE in listed non-financial firms in Pakistan.

Additionally, prior literature suggests that approximately 45% of firms in Pakistan are family-owned (FO). It is argued that family members often dominate board composition and tend to appoint closely aligned CEOs to extract private benefits. In this capacity, they are more likely to support and reinforce powerful CEOs. Several studies highlight that CEOs in family-controlled firms tend to protect the family members' wealth; therefore, they may pursue those investment projects that benefit dominant family owners. In this capacity, they may engage in related-party transactions, manipulate earnings, and are most likely to avoid investment decisions that may threaten family wealth and control. Therefore, we argue that the negative effect of CEO power on IE is more likely to be pronounced in family-owned firms. This tendency can increase the risk of a Type 2 agency problem, which suggests that majority shareholders (family members) prioritize self-interest at the cost of minority shareholders (outsiders) (Young, Peng, Ahlstrom, Bruton, & Jiang, 2008). Prior literature has predominantly used several other corporate governance factors that may amplify the negative association between CEO power and IE, such as co-opted boards, CEO-board connections, institutional ownership, entrenchment effects, and CEO individual characteristics (Chowdhury, Xie, & Hasan, 2023; Lo & Shiah-Hou, 2022). Likewise, previous studies have also examined the direct effect of FO on IE, as well as the specific moderating role of FO between (1) corporate social responsibility (CSR) and IE, (2) corporate tax avoidance and IE, and (3) CEO overconfidence and IE (Anwar & Idris, 2025; Ben Saad, Garrouch, & Gaaya, 2026; Jin, Liu, Wu, & Zhang, 2023); however, limited empirical evidence is available on how FO shapes the CEO power and IE relationship. Therefore, our second objective is to assess whether FO negatively strengthens the relationship between CEO power and IE. On the other hand, Jin et al. (2023) noted that a strong institutional setting plays a crucial role in mitigating the adverse effect of family members. They found that the negative effect of FO on IE is weakened in

© 2026 Conscientia Beam. All Rights Reserved.

the presence of institutional ownership (IO). It is argued that since institutional investors possess voting rights and ownership stakes, they are more likely to challenge family owners pursuing self-serving investment decisions. Additionally, Duong, Phung, Pham, and Le (2024) further note that institutional owners may also demand transparency and stronger disclosures, which may further restrict family owners from entrenching powerful CEOs for their personal benefit. In this regard, we have found two streams of literature. First, some prior studies have examined the direct impact of FO and IE, and IO and IE (Moradi, Yazdifar, Eskandar, & Namazi, 2022; Wu, Zhang, Lu, & Chen, 2024). Second, previous studies have separately examined the moderating role of FO and IO. For instance, Jin et al. (2023) investigated the moderating effect of IO between FO and IE. Similarly, Alobaid, Qasem, and Al-Qadasi (2024) analyzed the separate moderating role of IO and FO between corporate social responsibility (CSR) and IE; however, there is a dearth of literature examining the combined moderating effect of FO and IO using a three-way interaction. Further, a two-way interaction model assumes that the moderating effect of FO remains constant across various governance settings. However, it is argued that the moderating effect of FO may vary depending upon the level of institutional ownership. In other words, institutional ownership acts as an additional governance force that may strengthen or weaken the negative influence of family ownership. This implies that a two-way interaction model seems to be restrictive and does not capture the complex relationship of different governance mechanisms operating simultaneously. Therefore, a three-way interaction model is required to assess how the impact of CEO power varies under different combinations of family and institutional ownership. Moreover, this relationship is grounded in type 2 agency theory, which explains the conflict of interest between dominant (majority) and minority shareholders. The theory suggests that the relationship between CEO power and IE depends upon varying levels of ownership structures. From a theoretical perspective, the three-way interaction may be explained in two forms. First, dominant family owners may strengthen the negative effect of CEO power and use it to make self-serving investment decisions at the cost of minority shareholders. Second, the presence of institutional ownership mitigates this negative effect. This is because institutional investors possess voting rights and ownership stakes in a firm. Moreover, they usually invest funds on behalf of beneficiaries. Therefore, to safeguard their financial interests, they may ensure strict monitoring and demand transparency, which may restrict controlling family members from entrenching powerful CEOs for personal benefit. Therefore, institutional investors act as a monitoring mechanism that may reduce the risk of a type 2 agency problem. Hence, the third objective of this study is to investigate whether IO amplifies the adverse moderating effect of FO between CEO power and IE relationship.

To achieve these research objectives, we employed a sample of listed non-financial firms in Pakistan, comprising 2,986 firm-year observations for the period from 2016 to 2025. Further, we also cross-validated our results using two alternative statistical techniques with different proxies of IE to ensure that our results are not affected by any specific measurement or regression technique. Lastly, our novel findings provide several contributions to the existing literature. First, we show that all the dimensions of CEO power reduce IE in the context of emerging economies, such as Pakistan. Second, we extend type 2 agency theory and provide evidence that FO strengthens the negative effect of CEO power on IE in concentrated ownership settings. Third, we report that IO weakens the negative moderating effect of FO between CEO power and IE using a three-way interaction methodology. The rest of the paper proceeds as follows: Section 2 describes the review of relevant literature, theoretical background, and hypothesis development, whereas the research methodology is presented in Section 3. Section 4 reports the regression results along with discussions. Lastly, Section 5 presents the study's conclusions, implications, and future directions.

2. REVIEW OF RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

2.1. Theoretical Foundation and Hypotheses Development

The literature identifies two major categories of agency problems: "Type 1 and Type 2 agency problems." The former explains the conflict between the principal (equity holders) and the agent (firm executives), whereas the latter explains the conflict between the principal (major shareholders) and the principal (minor shareholders). The

© 2026 Conscientia Beam. All Rights Reserved.

relationship between CEO power and IE may be described using Type 1 agency theory. The theory argues that powerful CEOs tend to reduce the board's monitoring capacity and invest in self-serving projects (Jensen & Meckling, 1979). To expand control and achieve higher compensation benefits, they tend to overinvest in large projects with low or negative returns. Similarly, they may underinvest in risky but innovative and value-added projects to secure their positions and personal wealth (Cid-Aranda & López-Iturriaga, 2023). In addition, it is asserted that powerful CEOs can become overconfident and underestimate related risks, leading them to pursue larger acquisitions that destroy shareholders' wealth. Therefore, the above discussion indicates that high CEO power may increase agency costs, leading to inefficient investments.

The existing literature has investigated CEO power but shows contradictory evidence on how it influences firm financial outcomes. Studies show that a powerful CEO has the ability to improve firm performance. For example, Javeed, Ong, Latief, Muhamad, and Soh (2021); Gunasekarage, Luong, and Truong (2020) and Yahaya (2025) documented a positive association between CEO power and firm performance. They argue that powerful CEOs ensure quick decisions and undertake strategic investments, which lead to enhanced firm performance. Conversely, several studies have documented that an increase in CEO power can deteriorate firm outcomes and CSR activities (Chu, Liu, & Chiu, 2023; Yan et al., 2024). Furthermore, recent studies have also analyzed the effect of CEO power on various corporate strategies (Brahma & Economou, 2024); however, the literature on the direct effect of CEO power on IE is limited, with mixed findings (Brahma & Economou, 2024; Ozgen, Mooney, & Zhou, 2025). For instance, Chowdhury et al. (2023); Majeed and Ullah (2020) and Lo and Shiah-Hou (2022) contend that CEO power is negatively related to IE. Their studies suggest that powerful CEOs tend to prefer their personal benefit over shareholders' wealth. This often increases entrenchment and reduces board monitoring, allowing powerful CEOs to make opportunistic investment decisions. Moreover, it is also asserted that a powerful CEO often becomes overconfident, disregards the opinions of board members, and tends to overinvest in less profitable projects. Furthermore, they often engage in earnings manipulation and invest in inefficient projects for personal gain. Similarly, manipulating earnings also increases the cost of equity, which further restricts the firm from opting for valuable investment opportunities.

Conversely, some studies exhibit a positive and significant association between CEO power and IE, indicating that powerful CEOs are considered stewards and critical resources of a company (Aibar-Guzmán & Frías-Aceituno, 2021; Arif, Isa, & Mustapha, 2023; Shepherd, Mooi, Elbanna, & Lou, 2023). They argue that CEOs with more power can enable swift decision-making, particularly under pressure; therefore, they are less prone to manipulating accounting and financial data. This tendency, in turn, enables efficient investment decisions, as firms can now obtain less costly external finance due to low information asymmetry. However, Shaheen et al. (2024) suggest that CEO power does not significantly affect IE in Jordanian non-financial firms, whereas Zhou, Zhu, Yang, and Zou (2021) suggest that CEO power enhances IE in early stages, but after gaining significant power, CEOs tend to make inefficient investments. Moreover, a review of the literature further suggests that the negative effects of CEO power are more pronounced in Pakistan due to weak corporate governance mechanisms (Shah, Mehmood, Khan, & Popp, 2024). Independent directors are considered effective monitors and play an important role in curbing the opportunistic behaviour of powerful CEOs. However, Ghaleb, Qaderi, and Al-Qadasi (2024) argue that board independence often remains symbolic in emerging markets. Independent directors are often appointed on the basis of networking and personal ties with top management, which reduces their ability to exercise objective monitoring. This further allows powerful CEOs to exert control over strategic decisions. Therefore, investment decisions may not undergo robust evaluation and tend to be dominated by managerial self-interest. Furthermore, in Pakistan, weak governance is also characterized by low transparency and poor disclosures, which may also amplify the negative effect of CEO power. In this regard, Duellman, Klaus, and Marquardt (2025) argue that when financial statements are opaque, CEOs may gain an information advantage, which may further restrict investors from properly evaluating the risk and return associated with the project. As a result, CEOs may face less scrutiny and be more likely to engage in value-destroying investment decisions for personal benefit. Additionally, the majority of studies examining the CEO power-IE

© 2026 Conscientia Beam. All Rights Reserved.

relationship have been conducted in the context of the USA and China; however, there is a scarcity of literature investigating the direct empirical relationship between CEO power and IE using a sample of listed firms in Pakistan.

Considering this lack of empirical evidence and inconsistent findings, a focused examination of the direct effect of CEO power on IE is required. Hence, the following hypothesis is developed.

H_1: CEO power exerts a significant negative influence on IE.

Moreover, these inconsistent findings further suggest that the relationship between CEO power and IE may vary across various contexts and institutional settings (Chowdhury et al., 2023). In this regard, several studies have analyzed a variety of such factors using moderators such as the external environment, financial constraints, internal governance, CEO characteristics, market competition, risk, and the information environment (Chowdhury et al., 2023; Huang & Qiu, 2023; Lo & Shiah-Hou, 2022; Majeed & Ullah, 2020). However, the literature provides limited evidence on the specific moderating effect of FO on the relationship between CEO power and IE. This omission is critical since FO can directly control or entrench CEO power. Family owners usually hold large equity stakes in a firm; therefore, they tend to dominate board composition and also act as stewards of a firm. Hence, FO is considered an internal corporate governance mechanism that can either reinforce or constrain CEO power. We argue that this moderating relationship may be explained using type 2 agency theory. The theory implies that dominant shareholders (family members) increase agency costs and tend to prioritize their private interests at the cost of minority (outside) shareholders (Young et al., 2008). It is contended that family owners may influence board composition and tend to appoint closely aligned or family CEOs (Galavotti, D'Este, & Cerrato, 2026). In this capacity, they often undertake investment decisions that may benefit family members instead of minority shareholders. For example, family owners provide job protection to CEOs, due to which they may undertake related-party transactions that may harm minority shareholders (Duong et al., 2024). In this capacity, they tend to support powerful CEOs to conceal private-benefit transactions and distort financial reports. Therefore, family members may support a powerful CEO to extract personal benefits. Additionally, Frisenna and Rizzotti (2025) argue that family-aligned CEOs may also undermine board effectiveness and avoid investment decisions that may threaten their authority and control over organizational resources. Furthermore, family members are more concerned with preserving the wealth of the family (Wang, Randolph, Su, & Memili, 2023). Therefore, they enable CEOs to avoid risky and innovative investments, which can cause underinvestment in value-added projects. Consequently, FO is likely to amplify the negative effect of CEO power on IE. Moreover, the inclusion of FO as a moderator may provide a theoretically relevant justification for the contradictory findings reported in the extant literature. Additionally, it also serves as an important but understudied mechanism in the relationship between CEO power and IE. Therefore, in light of the above discussion, we propose the following hypothesis.

H_2: FO negatively moderates the CEO power and IE relationship.

Additionally, literature suggests that this negative moderating relationship further depends upon an external governance mechanism, such as IO (Jin et al., 2023). They found that the effect of inefficient investment in family-owned firms is lower in countries with strong institutional environments. In other words, the extent to which FO amplifies the negative effect of CEO power on IE further depends upon IO. Therefore, it is argued that a higher level of IO can mitigate the negative moderating effect of FO on the relationship between CEO power and IE. Hence, the moderating role of IO may be explained using type 2 agency theory, which implies that the presence of institutional investors can reduce the risk of a type 2 agency problem by monitoring the controlling family members (Young et al., 2008). First, institutional investors often manage investors' funds, so they are more likely to ensure stable returns; therefore, they may challenge inefficient investment decisions that may destroy firm value and invested funds. Second, they are usually considered minority shareholders in family-owned firms, where controlling family owners tend to prefer personal benefits at the cost of minority shareholders; therefore, they tend to use their collective power and voting rights to restrict inefficient decisions made by the controlling family members. Third, family owners may use powerful CEOs to conceal private-benefit transactions; therefore, institutional owners may demand transparency and

© 2026 Conscientia Beam. All Rights Reserved.

strong disclosures to mitigate the adverse effects of family owners. In this capacity, they act as external monitors and tend to reduce type 2 agency costs.

Therefore, it is argued that institutional investors may act as a countervailing force that may reduce the opportunistic behaviour of family owners, thereby weakening the negative moderating effect of FO between CEO power and IE. Therefore, based on the above discussion, the following hypothesis can be developed.

H_5: IO is likely to weaken the negative moderating effect of FO between CEO power and IE.

3. RESEARCH DATA AND METHODOLOGY

3.1. Data and Sample Construction

To test the hypothesis, we collected data from the listed non-financial companies of Pakistan for the financial years ending 2016–2025. The sample frame consists of a total of 5,240 firm-year observations. We excluded financial firms in line with previous studies that have analyzed firm IE (Biddle, Hilary, & Verdi, 2009; Gaio, Gonçalves, & Cardoso, 2023). Previous studies have excluded financial firms for several reasons. First, they operate under different regulatory requirements and investment environments, due to which they remain incomparable with non-financial firms. Second, financial firms usually invest in financial assets and generate revenue through financial asset investment. Therefore, their investment dynamics cannot be compared with those of non-financial firms that usually invest heavily in capital assets. Third, financial firms are expected to follow industry-specific conditions imposed by the State Bank of Pakistan, due to which their investment priorities often differ from those of non-financial firms. Similarly, consistent with previous studies, we also excluded non-capital-based firms (McNichols & Stubben, 2008; Richardson, 2006). These firms were excluded because their core operations do not require huge capital expenditures. Moreover, we also excluded those firms whose annual reports were not available for the study period. Finally, the remaining firm-year observations with inadequate or missing values were also excluded from the final sample.

After applying the above filters, the final dataset comprises an unbalanced panel of 2,986 firm-year observations. In accordance with Shahzad, Nazir, Morais, and Asghar Butt (2025), we have gathered financial data from one of the reliable databases, that is, Refinitiv Eikon, whereas governance-level data were obtained from the published audited annual reports of each company. Table 1 shows the attrition of the selected sample.

Table 1. Sample construction.

Description	Firm-year observations
Initial firm-year observations	5,240
Less: Financial firms	1,260
Non-capex-based firms	160
Firms with unavailable financial reports	770
Missing observations after screening	64
Final sample observations	2,986

3.2. Variables and Measurements

3.2.1. Investment Efficiency as Dependent Variable

Investment efficiency (IE) has been used in this study as the dependent variable. The literature defines IE as the firm's ability to accept projects with positive net present values (Gaio et al., 2023). It has been argued in the relevant literature that it is challenging to empirically measure the IE of a firm since we cannot observe the optimal capital allocation within a firm directly (Gao & Yu, 2020). However, Biddle et al. (2009) have attempted to empirically measure IE by estimating investment as a function of sales growth (growth opportunities) of the firm. With the help of this model, we can observe optimal capital investment through deviations from the predicted level of investment. Therefore, the following equation is used to predict IE.

$$I_{i,t} = \beta_0 + \beta_1 SG_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

© 2026 Conscientia Beam. All Rights Reserved.

Where $I_{i,t}$ represents net increase in non-current assets scaled by lagged total assets, whereas $SG_{i,t-1}$ represents the firm's growth opportunities, which are measured as sales growth of the firm from year t - 2 to year t - 1. The residuals of this model represent deviations from optimal investment. Positive residual values indicate overinvestment, whereas negative residuals represent underinvestment. To compute the value of IE, the absolute values of the residuals are then multiplied by -1; the higher value represents better IE.

3.2.2. CEO Power as Independent Variable

The independent variable used in this study is CEO power. Literature in this context does not provide a universally accepted definition or measure of CEO power and has used various proxies to empirically measure this concept (Abdullah, Zhu, Hashmi, & Shah, 2024). Therefore, we have employed four proxies, i.e., CEO pay slice (CEOP), CEO tenure (CEOT), CEO stock ownership (CEOS), and CEO family status (CEOF), to comprehensively measure the concept. Moreover, these proxies also cover the dimensions of power highlighted by Finkelstein (1992), that is, structural power, expert power, and ownership power.

CEOP represents the ratio of CEO compensation to the total compensation of all directors (Haq, Bahadar, Kamran, & Qazi, 2023). CEOT is captured by the number of years the CEO has served in a firm. Moreover, CEOS represents the percentage of stock equity owned by the CEO in a firm. Lastly, the variable CEOF takes the value 1 if the CEO is related to the founding family and 0 otherwise (Chowdhury et al., 2023).

3.2.3. Moderating Variables

The study has used family ownership (FO) and institutional ownership (IO) as moderating variables. FO is measured as the ratio of the total number of shares held by family members to the total number of shares outstanding, consistent with (Ab Aziz, Abdul Latiff, Osman, & Alshdaifat, 2025). Moreover, the percentage of shares held by institutional investors is used to measure IO (Gull, Ali, Ahsan, & Rehman, 2025).

3.2.4. Control Variables

The study has employed board independence (BI), board gender diversity (BGD), leverage (Lev), tangibility (TN), firm size (FS), and age (FA) as control variables, consistent with several previous studies. BI is measured as the percentage of independent directors on the board (Jafar, Basuki, Windijarto, & Setiawan, 2024), and BGD is measured as the percentage of female directors on the board (Bhutta et al., 2025). Moreover, the percentage of total debt to total assets is used to measure Lev, whereas FS is measured by the natural log of total assets, and FA is measured by the number of years since the firm's establishment (Chowdhury et al., 2023). Lastly, TN is proxied by the ratio of total fixed assets to total assets (Shaheen et al., 2024). Variable names, symbols, and descriptions are shown in Table 2.

3.3. Econometric Model Specification and Statistical Analysis

We use two statistical techniques to validate the hypotheses. First, a panel regression fixed-effects model is employed with robust standard errors to address the problem of heteroskedasticity within the data (Jochmans, 2022). It is noteworthy that, before running the final estimation, we also performed the Hausman test to decide between the fixed-effects and random-effects models. Second, in order to cross-validate our results, we also estimated the regression using an alternative technique, that is, the Driscoll and Kraay (1998) standard-errors fixed-effects model. The literature suggests that Driscoll-Kraay standard errors mitigate the potential impact of heteroskedasticity (Le & Tran-Nam, 2018). Moreover, Hoechle (2007) notes that this technique addresses the problem of missing values in the data and provides robust estimates for an unbalanced panel-data structure.

© 2026 Conscientia Beam. All Rights Reserved.

Table 2. Variable measurement.

Variable name	Symbols	Description
Dependent Variable		
Investment Efficiency	IE	Absolute residuals multiplied by -1.
Independent Variables		
CEO Pay Slice	CEOP	The proportion of total CEO compensation to total compensation of directors.
CEO Tenure	CEOT	The number of years the CEO has served in an organization.
CEO Stock	CEOS	The proportion of shares held by the CEO to total outstanding shares.
CEO Founder Status	CEOF	A dummy variable that takes the value 1 if the CEO is a founder or member of a founder family, and 0 otherwise.
Moderating Variables		
Family Ownership	FO	The proportion of shares held by family members to the total shares outstanding.
Institutional Ownership	IO	The proportion of shares held by institutional owners to the total shares outstanding
Control Variables		
Board Independence	BI	The proportion of independent directors on the board to the total number of directors.
Board Gender Diversity	BGD	The proportion of female directors on the board to the total number of directors.
Leverage	Lev	The ratio of total debt to total assets of the firm.
Tangibility	TN	The ratio of total fixed assets to total assets of the firm.
Firm Size	FS	The natural logarithm of total assets.
Firm Age	FA	The number of years since firm's inception

Models (1) through (4) are estimated to validate H1 in this study. Model (1) is estimated using the following econometric equation.

$$IE_{i,t} = \beta_0 + \beta_1 CEOP_{i,t} + \beta_2 Controls_{i,t} + \beta_3 Year\ Dummies_{i,t} + \varepsilon_{i,t} \quad (2)$$

CEOP is substituted by CEOT, CEOS, and CEOF in models (2), (3), and (4), respectively, to investigate the influence of other dimensions of CEO power on IE. Moreover, models (5) through (8) are estimated to test H2. Consistent with Dawson (2014), we have formulated the following equation to empirically test the moderating role of FO in the CEO power–IE relationship.

$$IE_{i,t} = \beta_0 + \beta_1 CEOP_{i,t} + \beta_2 FO_{i,t} + \beta_3 (CEOP\ x\ FO)_{i,t} + \beta_4 Controls_{i,t} + \beta_5 Year\ Dummies_{i,t} + \varepsilon_{i,t} \quad (3)$$

CEOP is replaced by CEOT, CEOS, and CEOF in models (6), (7), and (8), respectively, to investigate the influence of other dimensions of CEO power. Lastly, to estimate the three-way interaction and validate H3, we formulated the following econometric models (9)–(12), consistent with Abdullah et al. (2024); Dawson (2014) and Liu and McConnell (2013). These models investigate whether IO and FO oppose each other in influencing the effect of CEO power on IE.

$$IE_{i,t} = \beta_0 + \beta_1 CEOP_{i,t} + \beta_2 FO_{i,t} + \beta_3 IO_{i,t} + \beta_4 (CEOP\ x\ FO)_{i,t} + \beta_5 (CEOP\ x\ IO)_{i,t} + \beta_6 (FO\ x\ IO)_{i,t} + \beta_7 (CEOP\ x\ FO\ x\ IO)_{i,t} + \beta_8 Controls_{i,t} + \beta_9 Year\ Dummies_{i,t} + \varepsilon_{i,t} \quad (4)$$

Likewise, we have substituted CEOP with CEOT, CEOS, and CEOF in models (10), (11), and (12), respectively, to test the three-way interaction effect of other dimensions of CEO power.

4. EMPIRICAL RESULTS AND DISCUSSIONS

4.1. Descriptive Statistics

Table 3 reports the results of descriptive statistics. The average of IE is 0.281, with minimum and maximum values of 0.001 and 2.31, respectively. This suggests that sample firms, on average, deviate from optimal investment by 0.281. These results are consistent with Bhutta et al. (2025), who reported a similar mean of 0.274 for 205 listed non-financial firms over 12 years. Moreover, the results indicate that the mean values of CEOP, CEOT, CEOS, and CEOF are 0.328, 4.399, 0.087, and 0.62, respectively. These results suggest that CEOs of the sample firms receive

© 2026 Conscientia Beam. All Rights Reserved.

32.8% of the total compensation paid to top management and that the average CEO tenure is 4.399 years. Furthermore, CEOs own 8.7% of the stock, and 62% of the sample firms have CEOs who are members of the controlling family. These mean values are closer to the values reported by Shahzad et al. (2025) and Arif et al. (2023). Furthermore, the average values of FO and IO are 0.482 and 0.106, respectively, implying that, on average, family members and institutional investors hold 48.2% and 10.6% of the shares in sample firms, respectively. Moreover, the results of the Shapiro-Wilk statistics show significant values for all variables except CEOF, which suggests that the data are not normally distributed. Finally, Table 3 reports the values of VIF, which further confirms that the data do not suffer from the problem of multicollinearity, since all the values are below 5 (Gujarati & Porter, 2009).

Table 3. Summary statistics.

Variables	Mean	SD	Min.	Max.	Shapiro-Wilk Statistics	VIF
IE	0.281	0.263	0.001	2.310	15.535	–
CEOP	0.328	0.390	0.000	1.631	13.703	1.14
CEOT	4.399	2.869	1.000	16.000	13.161	1.08
CEOS	0.087	0.154	0.000	0.810	17.835	1.07
CEOF	0.620	0.486	0.000	1.000	6.745	1.11
FO	0.482	0.256	0.000	0.998	11.370	1.55
IO	0.106	0.029	0.000	0.469	9.793	1.52
BI	0.117	0.293	0.000	0.670	9.557	1.07
BGD	0.157	0.125	0.000	0.350	9.994	1.09
Lev	0.514	0.317	0.000	0.682	13.657	1.06
TN	0.402	0.209	0.056	0.813	15.703	1.02
FS	17.853	3.872	7.060	25.400	8.248	1.10
FA	39.551	15.543	8.000	69.000	8.834	1.07

Note: All Shapiro-Wilk statistic values except CEOF are significant at 1%.

© 2026 Conscientia Beam. All Rights Reserved.

Table 4. Correlation coefficient table.

Variables	IE	CEOP	CEOT	CEOS	CEOF	FO	IO	BI	BGD	Lev	TN	Fage	FSize
IE	1.000												
CEOP	-0.033***	1.000											
CEOT	-0.013	0.130***	1.000										
CEOS	-0.046**	0.081***	0.099***	1.000									
CEOF	-0.016	0.057*	0.201***	0.161***	1.000								
FO	-0.051**	0.043*	0.045**	0.004	0.097***	1.000							
IO	0.106***	0.016	0.042	0.021	-0.109***	-0.571***	1.000						
BI	0.034**	-0.144***	0.042	0.025	0.026	-0.097***	0.006	1.000					
BGD	0.015	-0.064**	-0.066***	0.007	-0.010	0.006	0.088***	0.073**	1.000				
Lev	-0.043*	-0.004	0.023	-0.015	-0.017	-0.021	0.031	0.056*	0.034	1.000			
TN	-0.003	-0.008	-0.003	-0.033	-0.028	0.022	0.004	-0.095***	-0.091***	-0.014	1.000		
Fage	-0.156***	-0.068***	-0.128***	-0.012	-0.048*	-0.045*	-0.033	0.003	0.041	0.031	0.009	1.000	
Fsize	-0.150***	0.084***	-0.024	-0.075***	0.013	0.187***	-0.140***	0.009	0.078***	0.108***	-0.017	-0.037	1.000

Note: ***, **, * indicate significance at 1%, 5%, and 10% respectively.

© 2026 Conscientia Beam. All Rights Reserved.

4.2. Correlation Matrix

Correlation coefficient values are illustrated in Table 4. The results imply that IE has a statistically significant inverse correlation with FO (r = -0.051), CEOP (r = -0.033), and CEOS (r = -0.046). These results suggest that family-owned firms and firms with powerful CEOs are likely to suppress IE. Moreover, the results also indicate a significant negative association between IE and Lev (r = -0.043), Fage (r = -0.156), and Fsize (r = -0.150), which shows that larger, older, and highly leveraged firms exhibit misallocation of capital and reduce IE. However, IE is positively correlated with BI (r = 0.034). This shows that independent boards tend to enhance IE.

The correlation values of the independent and moderating variables meet our expectations. The results reveal that most of the proxies for CEO power, such as CEOP (r = 0.043), CEOS (r = 0.045), and CEOF (r = 0.097), have a significant positive correlation with FO. This indicates that firms with high FO are likely to exhibit greater CEO power. Furthermore, the significant negative correlation between FO and IO (r = -0.571) suggests a countervailing association between the two ownership structures.

Moreover, it is noteworthy that the coefficients of all the independent variables are lower than 0.8, which suggests that no pair of independent variables is suspected of multicollinearity.

© 2026 Conscientia Beam. All Rights Reserved.

Table 5. Baseline regression results using the Biddle et al. (2009) model.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors- fixed effects			
	(Model-1) IE	(Model-2) IE	(Model-3) IE	(Model-4) IE	(Model-1) IE	(Model-2) IE	(Model-3) IE	(Model-4) IE
CEOP	-0.0019*** (0.0004)				-0.0004** (0.0002)			
CEOT		- 0.0009*** (0.0002)				-0.0005*** (0.0002)		
CEOS			-0.0018*** (0.0006)				-0.0019*** (0.0004)	
CEOF				- 0.0561*** (0.0101)				-0.0578*** (0.0087)
BI	0.0073*** (0.0004)	0.0159*** (0.0025)	0.0114*** (0.0039)	0.0181*** (0.0002)	0.0069*** (0.0010)	0.0077*** (0.0020)	0.0079*** (0.0025)	0.0044*** (0.0004)
BGD	0.0030*** (0.0004)	0.0025*** (0.0003)	0.0012*** (0.0002)	0.0020*** (0.0006)	0.00006*** (0.00002)	0.0017*** (0.0002)	0.0014*** (0.0001)	0.0018*** (0.0006)
Lev	-0.00133** (0.0006)	-0.0485*** (0.015)	-0.0509*** (0.0093)	-0.0686*** (0.0097)	-0.0296*** (0.0049)	-0.0252*** (0.0031)	-0.0254*** (0.0032)	-0.0304*** (0.0087)
TN	-0.0002 (0.0006)	-0.0016* (0.0009)	-0.0018** (0.0009)	0.0021* (0.0011)	-0.0004 (0.0015)	-0.0009 (0.0041)	-0.0004 (0.0029)	0.00008 (0.0020)
Fsize	-0.0026*** (0.0008)	-0.0108*** (0.0029)	-0.0129*** (0.0009)	-0.0102*** (0.0011)	-0.00006 (0.00010)	-0.0116*** (0.0035)	-0.0285*** (0.0028)	0.00002 (0.0002)
Fage	-0.0483*** (0.0129)	-0.0010 (0.0016)	-0.0009 (0.0015)	0.0008 (0.0016)	-0.0024 (0.0029)	-0.0045 (0.0039)	-0.0027 (0.0020)	0.0051 (0.0040)
Constant	0.6291*** (0.0152)	0.3976*** (0.0391)	0.4306*** (0.0255)	0.3994*** (0.0454)	0.5979*** (0.0175)	0.5989*** (0.0101)	0.5079*** (0.0153)	0.6523*** (0.0345)
F-statistic	14.56***	47.29***	51.37***	49.91***	929.87***	92.89***	220.20***	117.62***
R^2	0.1699	0.2264	0.2401	0.2397	'N/A'	'N/A'	'N/A'	'N/A'
Adjusted/Within R^2	0.1385	0.1941	0.2057	0.1945	0.0137	0.0189	0.0227	0.0179
Year Dummies	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Firm-year obs.	2986	2986	2986	2986	2986	2986	2986	2986

Note: ***, **, and * show significance at 1%, 5%, and 10%, respectively, while standard errors are in parentheses.

© 2026 Conscientia Beam. All Rights Reserved.

4.3. Regression Results

The results of the baseline regression are reported in Table 5 using the Biddle et al. (2009) IE model. Before the final estimation, we performed several diagnostic tests, including normality, multicollinearity, heteroskedasticity, and autocorrelation. The Breusch-Pagan test further indicated the presence of heteroskedasticity χ^2=297.80, ρ<0.01, whereas the Wooldridge test revealed that the error terms of the model are not autocorrelated, $F(1, 95) = 0.592$, ρ >0.05. Moreover, the results of the Hausman test (χ^2=15.80, ρ<0.01) suggested that the fixed-effects model is more appropriate for our model. To account for heteroskedasticity, we estimated a fixed-effects model with robust standard errors (Stock & Watson, 2008). Meanwhile, we also employed Driscoll-Kraay standard errors in the fixed-effects model to cross-check our results.

The results indicate that CEOP, CEOT, CEOS, and CEOF have a significant negative effect on IE across all models, i.e., models 1 through 4 (β= -0.0019, ρ<0.01;β= -0.0009,ρ<0.01;β= -0.0018, ρ<0.01;β= -0.0561,ρ<0.01). These results remain consistent using an alternate statistical technique.

The results suggest that CEOs' structural, expert, and ownership power tend to reduce IE. The results are consistent with previous literature and agency theory (Chowdhury et al., 2023; Jensen & Meckling, 1979). Agency theory suggests that powerful CEOs misuse corporate resources for their private benefits, which tends to reduce IE (Bzeouich, Depoers, & Lakhal, 2023). Moreover, it has also been argued in the literature that CEO compensation is often linked with company size; therefore, they often invest excessively in large ventures to attain greater compensation benefits, which ultimately results in overinvestment (Dai, Robinson, & Shen, 2025). Similarly, literature also suggests that long-tenured CEOs accumulate firm-specific knowledge and gain influence over board decisions. This increases CEOs' entrenchment, due to which they tend to resist expert advice and make self-serving investment decisions (Cid-Aranda & López-Iturriaga, 2023). Accordingly, Shaheen et al. (2024) argued that CEOs' wealth is often tied to the firm, due to which they become more risk-averse and avoid value-added investment projects, leading to sub-optimal investments. Meanwhile, they further explained that when a CEO is family-oriented or closely tied to the controlling family, their interests are more likely to align with the controlling family. In this capacity, they mainly invest to maintain control, expand firm size, or protect family prestige and legacy, which often results in inefficient investment. Additionally, the value of TN remains insignificant across most of the models. This is because the banking system in Pakistan provides collateral-based lending (Hussain, Durand, & Harris, 2021). Therefore, tangibility may enable firms' ability to secure external funds, but efficient utilization of funds is often dominated by managerial discretion and concentrated family owners who may utilize external funds for private benefit, resulting in overinvestment. On the other hand, it may also help in alleviating underinvestment in firms with strong governance mechanisms. Therefore, tangibility affects investment efficiency in opposing ways, leading to a net insignificant impact in linear regression.

Table 6. Marginal effects calculations for CEO power dimensions under fixed effect regression.

Variables	Coefficient	Standard Deviation	Marginal Effect	IE-Mean (%)	Reduction in IE
CEOP	-0.0019	0.390	-0.000741	0.281	-0.26%
CEOT	-0.0009	2.869	-0.002580	0.281	-0.92%
CEOS	-0.0018	0.154	-0.000277	0.281	-0.10%
CEOF	-0.0561	0.486	-0.027270	0.281	-9.70%

To assess economic significance, we have also incorporated marginal effect calculations for all the CEO power dimensions in Table 6. The results show that a one-standard-deviation increase in CEOP, CEOT, CEOS, and CEOF reduces IE by -0.26%, -0.92%, -0.10%, and -9.70%, respectively. The marginal effect calculations further indicate that CEOF substantiates the largest effect on investment efficiency, implying that CEOF can reduce IE more sharply compared with other CEO power dimensions. This is because CEOF represents a broader form of informal authority that may have greater influence over board decisions even when formal compensation, tenure, and stock ownership

© 2026 Conscientia Beam. All Rights Reserved.

are limited. A family CEO may not primarily require high compensation, tenure, and stock ownership to exert control over organizational resources because his or her authority is largely embedded in the controlling family structure. A family CEO may not hold significant shares in the firm, but his or her family members may hold substantial ownership that may indirectly enhance his or her power. As a result, a newly appointed family CEO may be more powerful than a long-tenured non-family CEO. Furthermore, in a family-controlled business, strategic decisions are mainly influenced by dominant family members, so a family CEO can receive more support than a non-family-affiliated CEO having significant compensation, tenure, and stock ownership. It is also argued that in a family-controlled business, board members are often influenced by family members; therefore, a family CEO can influence board decisions without significant ownership or tenure. Alternatively, the smaller effects of other CEO power dimensions suggest that CEOP, CEOT, and CEOS may reflect formal and narrower sources of power, as well as possible measurement limitations in continuous CEO power proxies. This is because CEOP, CEOT, and CEOS may not fully capture the informal authority and family-backed influence. This further suggests that a non-family CEO can have greater compensation, tenure, and stock ownership, but his or her decision-making authority may be more limited than that of a family CEO who may possess broader informal power due to family affiliation.

© 2026 Conscientia Beam. All Rights Reserved.

Table 7. Two-way moderation results using Biddle et al. (2009) model.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors- fixed effects			
	(Model-5) IE	(Model-6) IE	(Model-7) IE	(Model-8) IE	(Model-5) IE	(Model-6) IE	(Model-7) IE	(Model-8) IE
CEOP	-0.0020** (0.0009)				-0.0024*** (0.0006)			
CEOT		-0.0009*** (0.0002)				-0.0007*** (0.00008)		
CEOS			-0.0081*** (0.0012)				-0.0042*** (0.0009)	
CEOF				-0.0228* (0.0129)				-0.0331* (0.0192)
FO	-0.0055** (0.0024)	-0.0143*** (0.0047)	-0.0077*** (0.0015)	-0.0076*** (0.0017)	-0.0051*** (0.0019)	-0.0093** (0.0039)	-0.0004** (0.0002)	-0.0037** (0.0016)
CEOP x FO	-0.0113*** (0.0040)				-0.0069*** (0.0022)			
CEOT x FO		-0.0014** (0.0006)				-0.0008** (0.0004)		
CEOS x FO			-0.0157** (0.0067)				-0.0075* (0.0041)	
CEOF x FO				-1.0023** (0.5040)				-0.9617** (0.3991)
Constant	0.3147*** (0.0417)	0.6421*** (0.0478)	0.6587*** (0.0481)	0.6879*** (0.0471)	0.4826*** (0.0162)	0.5146*** (0.0395)	0.5465*** (0.0210)	0.5126 (0.0165)
F-statistic	50.19***	23.71***	26.89***	24.45***	56.44***	819.31***	523.63***	841.59***
R^2	0.2301	0.1587	0.1425	0.1257	N/A	N/A	N/A	N/A
Adjusted/Within R^2	0.1945	0.1217	0.1132	0.0968	0.0672	0.0168	0.0141	0.0269
Controls	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Year Dummies	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Firm-year obs.	2986	2986	2986	2986	2986	2986	2986	2986

Note: ***, **, and * show significance at 1%, 5%, and 10% levels, respectively, while standard errors are reported in parentheses.

© 2026 Conscientia Beam. All Rights Reserved.

Table 8. Marginal effects calculations (slope analysis) at high and low values of FO.

Variables	Low FO	t-values	High FO	t-values
CEOP	-0.00460	-2.66	-0.01030	-2.79
CEOT	-0.00120	-3.72	-0.00190	-3.08
CEOS	-0.01160	-4.57	-0.01970	-3.34
CEOF	-0.24930	-2.00	-0.76250	-1.98

The results of two-way interactions are reported in Table 7 and 8. The results indicate that FO negatively strengthens all the dimensions of CEO power and IE in models 5 through 8 (β = -0.0113, ρ <0.01;β = -0.0014, ρ <0.01;β = -0.0157, ρ <0.01;β = -1.0023, ρ <0.05). The results of all interaction terms remain consistent across alternative specifications. Moreover, we also reported the values of marginal effects for high (+1 SD) and low (-1 SD) levels of FO. The results indicate that the marginal effect of all the dimensions of CEO power tends to be higher at a high level of FO (CEOP = -0.01030, ρ <0.01; CEOT = -0.00190, ρ <0.01; CEOS = -0.01970, ρ <0.01; CEOF = -0.76250, ρ <0.05) compared with a low level of FO (CEOP = -0.00460, ρ <0.01; CEOT = -0.00120, ρ <0.01; CEOS = -0.01160, ρ <0.01; CEOF = -0.24930, ρ <0.05). This suggests that the negative effect of CEO power on IE increases at a high level of FO. To the extent of our understanding, prior research has not reported such novel findings. Moreover, such findings are in line with various studies suggesting that FO tends to increase Type-2 agency conflicts, prioritize self-interest over minority shareholders, favor managerial entrenchment, reduce IE, and create an environment where board decisions are made to protect family legacy and control (Amin, Ali, Ur Rehman, & Elamer, 2025; Jafar et al., 2024; Purkayastha, Veliyath, & George, 2022). The novel evidence can be explained as follows: First, family members are likely to support managerial entrenchment for personal benefits, which increases agency conflicts (Wang et al., 2023). Therefore, they are unlikely to challenge inefficient investments made by powerful CEOs, which ultimately increases the negative effects of CEOP, CEOT, CEOS, and CEOF on IE. Second, family owners undermine board effectiveness and tend to avoid investment projects that dilute or reduce their control. Therefore, they are most likely to strengthen the negative influence of CEOP, CEOT, CEOS, and CEOF on IE. Third, it has also been argued in relevant studies that family members act as a source of support and protection for CEOs, due to which they are likely to be retained regardless of performance (Frisenna & Rizzotti, 2025). Hence, family owners favor low-performing CEOs to extract private benefits, which intensifies IE. Fourth, family owners enable powerful CEOs to manipulate earnings, distort financial reports, and conceal private-benefit transactions (Duong et al., 2024). Therefore, family owners increase the probability of information opacity, which can either lead to over- or under-investment. Fifth, it has also been observed that when a CEO is closely aligned with a controlling family, monitoring becomes symbolic to attain personal benefits. In that case, FO reinforces the negative consequences of CEO power, which may hinder efficient capital allocation.

© 2026 Conscientia Beam. All Rights Reserved.

Table 9. Three-way moderation results using Biddle et al. (2009) model.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors- fixed effects			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
CEOP	-0.0418*** (0.0070)				-0.0407*** (0.0065)			
CEOT		-0.0002 (0.0005)				-0.0003 (0.0004)		
CEOS			-0.0212 (0.0229)				-0.0205 (0.0779)	
CEOF				-1.4073* (0.8014)				-1.8712** (0.8219)
FO	-0.1063*** (0.0143)	-0.0405** (0.0198)	-0.0248 (0.0280)	-0.0072 (0.0300)	-0.0275** (0.0120)	0.0251 (0.0310)	0.0134 (0.0891)	-0.0218* (0.0128)
IO	0.0117 (0.0115)	0.0788*** (0.0134)	0.0719*** (0.0112)	0.0801*** (0.0125)	0.0024 (0.0019)	0.0653*** (0.0131)	0.0801*** (0.0093)	0.08736*** (0.0098)
CEOP x FO	-0.1175*** (0.0201)				-0.0804*** (0.0281)			
CEOT x FO		-0.0079*** (0.0021)				-0.0031 (0.0025)		
CEOS x FO			-0.0210 (0.0646)				-0.0395 (0.0382)	
CEOF x FO				-0.0610 (0.0615)				-2.5631 (2.2041)
CEOP x IO	0.0885*** (0.0151)				0.0915*** (0.0210)			
CEOT x IO		0.0046** (0.0019)				0.0023 (0.0019)		
CEOS x IO			0.0541 (0.0412)				0.0477** (0.0213)	
CEOF x IO				2.7285* (1.4657)				4.3181*** (1.1987)
FO x IO	-0.3561*** (0.0756)	-0.1179* (0.0651)	-0.0485 (0.0703)	0.0023 (0.0431)	-0.1036* (0.0561)	0.0358 (0.0353)	0.0368** (0.0167)	0.05681*** (0.0179)
CEOP x FO x IO	-0.0021*** (0.0007)				-0.0018*** (0.0006)			
CEOTx FO x IO		-0.0006** (0.0003)				-0.0004*** (0.0001)		

© 2026 Conscientia Beam. All Rights Reserved.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors- fixed effects			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
CEOS x FO x IO			-0.0042*** (0.0011)				-0.0068*** (0.0021)	
CEOFx FO x IO				-0.0098* (0.0051)				-0.6581*** (0.2249)
Constant	0.3079*** (0.0362)	0.6137*** (0.0577)	0.4835*** (0.0561)	0.6962*** (0.0641)	0.6975*** (0.0341)	0.8765*** (0.0287)	0.6928*** (0.0281)	0.6697*** (0.0236)
F-statistic	45.98***	23.74***	53.64***	29.21***	971.21***	1858.41***	989.71***	483.36***
R^2	0.2418	0.1513	0.2468	0.1415	N/A	N/A	N/A	N/A
Adjusted/Within R^2	0.2128	0.1281	0.2161	0.1124	0.0201	0.0141	0.0214	0.0279
Controls	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Year Dummies	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Firm-year obs.	2986	2986	2986	2986	2986	2986	2986	2986

Note: ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively, while standard errors are reported in parentheses.

© 2026 Conscientia Beam. All Rights Reserved.

Table 10. Marginal effects calculations (slope analysis) at high and low values of FO and IO.

Variables	Low FO and Low IO	Low FO and High IO	High FO and Low IO	High FO and High IO
CEOP	-0.06160	-0.05650	-0.12180	-0.11680
CEOT	-0.00164	-0.00138	-0.00571	-0.00547
CEOS	-0.02185	-0.01877	-0.03277	-0.02981
CEOF	-1.21120	-1.05300	-1.24280	-1.08490

Under three-way moderation analysis, the lower-order interactions, such as (CEOS x FO), (CEOF x FO), (CEOS x IO), (CEOT x FO), and (CEOT x IO), may become insignificant because the model examines the combined moderating effect of family and institutional ownership on the relationship between CEO power and IE. Therefore, the results are interpreted using three-way (higher-order) interactions and simple slope analysis, which are reported in Tables 9 and 10, respectively. The variables of interest in the table are the effects of the three-way (higher-order) interaction terms, namely (CEOP x FO x IO), (CEOT x FO x IO), (CEOS x FO x IO), and (CEOF x FO x IO). The results reveal that the coefficient of the three-way interaction is negative; however, it is noteworthy that three-way interaction coefficients are not interpreted in isolation. Therefore, the results are interpreted using slope analysis in Table 10 at high (+SD) and low (-SD) levels of family and institutional ownership, which reveals the marginal effect calculations at different levels of IO. The results show that the negative effect of all the dimensions of CEO power is higher when FO is high and IO is low (CEOP = -0.12180, CEOT = -0.00571, CEOS = -0.03277, CEOF = -1.24280). However, when IO is high at the same level of FO, the negative effect of all CEO power dimensions becomes weaker (CEOP = -0.11680, CEOT = -0.00547, CEOS = -0.02981, CEOF = -1.08490). Similarly, under low FO and high IO, the effect seems to be less negative (CEOP = -0.05650, CEOT = -0.00138, CEOS = -0.01877, CEOF = -1.05300) compared to low FO and low IO levels (CEOP = -0.06160, CEOT = -0.00164, CEOS = -0.02185, CEOF = -1.21120). These results imply that the conditional analysis at varying levels shows that institutional ownership weakens the negative effect of CEO power on IE. Therefore, institutional ownership acts as a counterbalancing force that weakens the negative effect of family ownership on the relationship between CEO power and IE. Moreover, to our knowledge, previous studies have not reported such combined but countervailing effects of FO and IO. These novel results align with Type 2 agency theory, which suggests that IO plays a vital role in reducing Type 2 agency conflicts between dominant (family owners) and minority (outside) shareholders. The literature suggests that institutional investors act as external monitoring mechanisms that can help improve transparency and governance outcomes and reduce the negative effects of family members (Duong et al., 2024). Through active involvement and voting rights, IO has the capacity to monitor the opportunistic decisions made by dominant family members (Drobetz, El Ghoul, Guedhami, & Yu, 2025). Therefore, IO can act as a counterbalancing force that may restrict value-destroying decisions made by family members for their private benefits. In addition, the findings are also consistent with previous literature that discusses the relevance of FO and IO. Studies suggest that IO can protect the rights of minority shareholders by curbing the negative effect of entrenched family members (Drobetz et al., 2025; Kałdoński & Jewartowski, 2025; Velte, 2024; Yang, Lien, & Huang, 2025). Therefore, these findings offer novel insights by incorporating the opposing moderating relationship between two ownership structures. The results can be interpreted as follows. First, the negative moderating effect of FO on the relationship between all the dimensions of CEO power and IE becomes weaker in the presence of IO, which is clearly observed from the lower coefficient values in all the interaction terms. Second, IO would restrict FO in mitigating the negative effect of CEO structural, ownership, and expert power on IE. Third, IO weakens the negative effect of FO by voting on key decisions such as board appointments and major investment proposals. Therefore, FO would be less likely to engage in value-destroying decisions by reinforcing CEO power. Lastly, FO may recognize that its opportunistic behaviour is being monitored by IO; therefore, the adverse moderating influence of FO on the association between CEO power dimensions and IE becomes weaker in the presence of IO. In other words, the presence of IO in family-owned firms helps reshape board-power dynamics and influence key strategic decision-making, which can reduce Type-II agency problems.

© 2026 Conscientia Beam. All Rights Reserved.

4.4. Three-Way Interaction Plots

The three-way interaction plots are presented in Figure 1. These plots visually demonstrate that IO weakens the negative effect of FO in influencing the relationship between different CEO power dimensions and IE. The downward slopes in all the plots indicate a negative relationship between all the CEO power dimensions and IE. Moreover, the steeper lines further show that this negative effect is found to be stronger under high FO. However, in the presence of high IO, the lines become less steep and shift upward, which shows that the negative relationship gets weakened at higher levels of IO. Overall, these three-way interaction plots provide a visual representation of moderating effects between the variables and support our empirical findings.

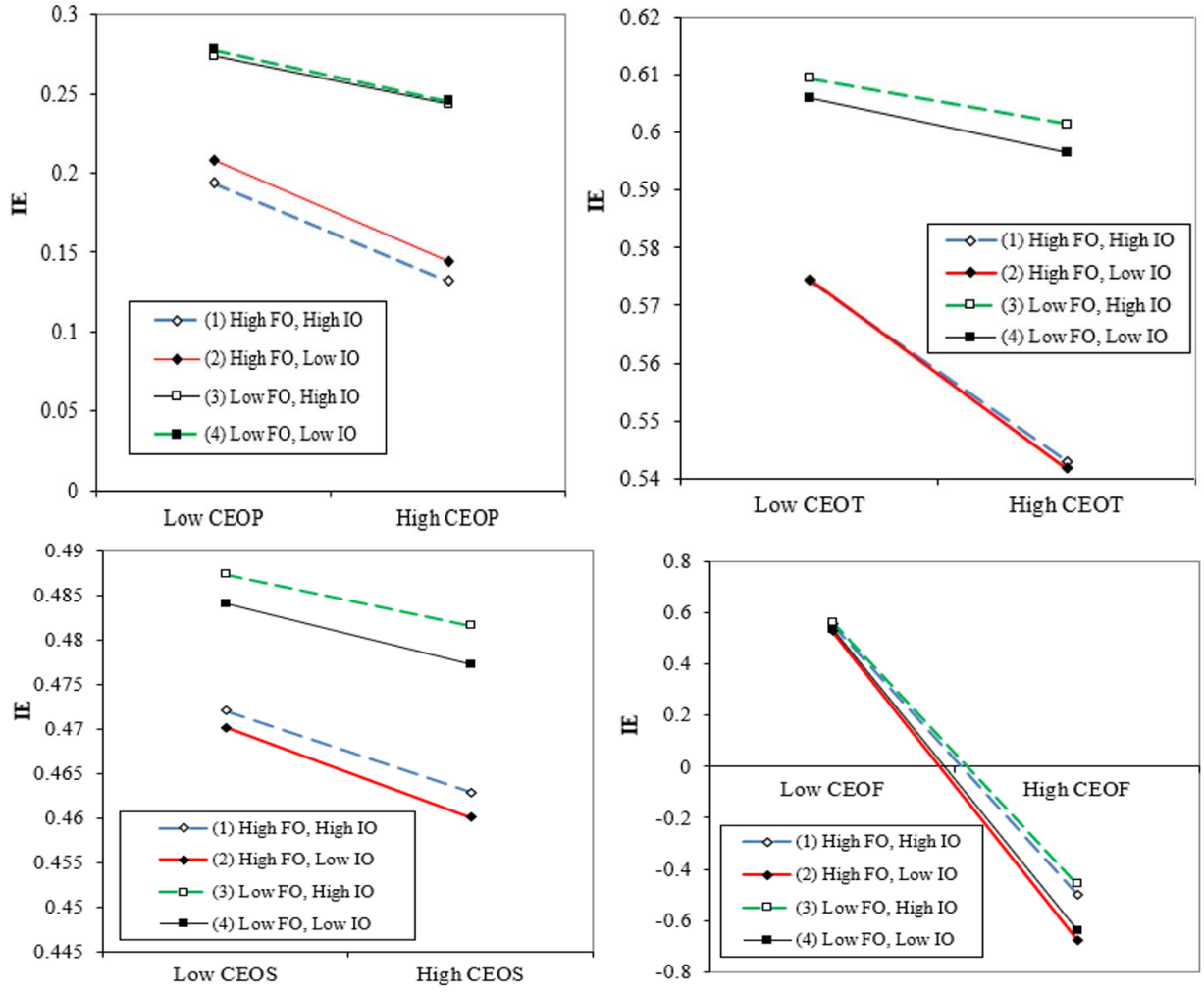


Figure 1. Three-way interaction plots.

4.5. Re-Specification of Models Using Mean-Centering Approach for Scaling Conformity

To address scaling concerns, we re-estimated the baseline, two-way, and three-way interaction models using a mean-centering approach. The results are reported in Tables 11 and 12, respectively, which suggest that the signs and significance levels of all the variables of interest remain consistent. This further suggests that the results of all the models, including three-way interactions, are not driven by scaling differences.

© 2026 Conscientia Beam. All Rights Reserved.

Table 11. Re-estimation of baseline model using mean-centered variables.

Variables / Model Statistics	Panel regression-fixed effect with robust standard errors			
	(Model-1) IE	(Model-2) IE	(Model-3) IE	(Model-4) IE
CEOP	-0.0019*** (0.0004)			
CEOT		-0.0009*** (0.0002)		
CEOS			-0.0018*** (0.0006)	
CEOF				-0.0561*** (0.0101)
Constant	0.6586** (0.0076)	0.4529*** (0.0083)	0.5944*** (0.0081)	0.5618*** (0.0098)
F-statistics	14.56***	47.29***	51.37***	49.91***
R^2	0.1699	0.2264	0.2401	0.2397
Adjusted R^2	0.1385	0.1941	0.2057	0.1945
Controls	'Yes'	'Yes'	'Yes'	'Yes'
Year Dummies	'Yes'	'Yes'	'Yes'	'Yes'
Firm-year obs.	2986	2986	2986	2986

Note: ***, **, and * indicate statistical significance at 1%, 5% and 10% respectively, while standard errors are shown in parenthesis."

© 2026 Conscientia Beam. All Rights Reserved.

Table 12. Re-estimation of two-way interaction model using mean-centered variables.

Variables/Model Statistics	Two-way interactions				Three-way interactions			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
CEOP	-0.0024*** (0.0009)				-0.0425*** (0.0074)			
CEOT		-0.0011*** (0.0003)				-0.0008 (0.0009)		
CEOS			-0.0108*** (0.0014)				0.0253 (0.0213)	
CEOF				-0.0205* (0.0122)				1.2531* (0.8823)
FO	-0.0051** (0.0022)	-0.0079*** (0.0024)	-0.0084** (0.0036)	-0.0087*** (0.0033)	-0.0776** (0.0344)	-0.0446** (0.0186)	-0.0234 (0.0195)	-0.0048 (0.0194)
IO					0.0092 (0.0276)	0.0704*** (0.0142)	0.0721*** (0.0211)	0.0642*** (0.0221)
CEOP x FO	-0.0057** (0.0031)				-0.2251*** (0.0193)			
CEOT x FO		-0.0043*** (0.0006)				-0.0084** (0.0038)		
CEOS x FO			-0.0055*** (0.0009)				-0.0385 (0.0625)	
CEOF x FO				-1.0035** (0.5461)				-0.0533 (0.0597)
CEOP x IO					0.0871*** (0.0165)			
CEOT x IO						0.0040 (0.0034)		
CEOS x IO							-0.0581 (0.0402)	
CEOF x IO								3.2165 (2.1658)
FO x IO					0.33895*** (0.0528)	0.0768 (0.0582)	0.0486 (0.0682)	0.0085 (0.0852)
CEOP x FO x IO					-0.0018* (0.0010)			
CEOTx FO x IO						-0.0021*** (0.0008)		
CEOS x FO x IO							-0.0024**	

© 2026 Conscientia Beam. All Rights Reserved.

Variables/Model Statistics	Two-way interactions				Three-way interactions			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
							(0.0010)	
CEOFx FO x IO								-0.0921* (0.0513)
Constant	0.4481*** (0.0081)	0.7641*** (0.1210)	0.7687*** (0.0089)	0.8128*** (0.0065)	0.4668*** (0.0125)	0.7425*** (0.0223)	0.4534*** (0.0207)	0.7622*** (0.0076)
F-statistics	49.28***	22.82***	27.68***	25.64***	46.87***	22.98***	55.65***	28.35***
R^2	0.2238	0.1588	0.1499	0.1297	0.2438	0.1596	0.2465	0.1436
Adjusted R^2	0.1935	0.1257	0.1184	0.0955	0.2120	0.1252	0.2163	0.1125
Controls	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'
Year	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'
Firm-year obs.	2986	2986	2986	2986	2986	2986	2986	2986

Note: ***, **, and * show significance at 1%, 5%, and 10% levels, respectively, while standard errors are reported in parentheses.

© 2026 Conscientia Beam. All Rights Reserved.

4.6. Endogeneity Concerns

Literature suggests that the relationship between CEO power and IE might be affected by endogeneity (Chowdhury et al., 2023). Firms exhibiting higher investment efficiency may enhance CEO compensation, tenure, and ownership stakes (Chowdhury et al., 2023; Huang & Qiu, 2023). In order to address this concern, we have used the two-stage least squares (2SLS) technique, the results of which are reported in Tables 13 and 14 for the baseline and interaction models. Consistent with Chowdhury et al. (2023), we have used lagged values and industry averages as instruments for endogenous variables. CEO power tends to be persistent, meaning a powerful CEO last year is more likely to retain his influence in the current year. Moreover, firms tend to follow industry norms; therefore, corporate boards are more likely to grant similar authority to their own CEO, which may directly affect a firm's CEO power. Furthermore, to validate the instruments, we have performed instrument overidentification tests. All the values of the Sargan and Basmann statistics are found to be insignificant in Tables 13 and 14, which confirms the validity of our instruments. It is important to note that the results remain consistent after controlling for possible endogeneity, which further ensures the reliability of our findings.

Table 13. Two-stage least squares regression (2SLS) for baseline models.

Variables/Model Statistics	Baseline models with 2SLS			
	(Model-1) IE	(Model-2) IE	(Model-3) IE	(Model-4) IE
CEOP	-0.0018*** (0.0001)			
CEOT		-0.0010*** (0.0003)		
CEOS			-0.0097*** (0.0006)	
CEOF				-0.0399*** (0.0019)
Constant	0.5785*** (0.0133)	0.3866*** (0.0219)	0.4096*** (0.0154)	0.3599*** (0.0352)
Sargan test	0.9234	0.3652	0.2543	0.6652
ρ -values	0.3360	0.5451	0.6141	0.4140
Basmann test	0.9230	0.3649	0.2539	0.6647
p -values	0.3370	0.5460	0.6150	0.4150
Controls	'Yes'	'Yes'	'Yes'	'Yes'
Year and industry dummies	'Yes'	'Yes'	'Yes'	'Yes'
Firm-year obs.	2986	2986	2986	2986

Note: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively, while standard errors are in parentheses.

© 2026 Conscientia Beam. All Rights Reserved.

Table 14. Two-stage least squares regression (2SLS) for two-way and three-way interaction models.

Variables/Model Statistics	Two-way interactions				Three-way interactions			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
CEOP	-0.0057* (0.0033)				-0.0036 (0.0043)			
CEOT		-0.0086*** (0.0007)				-0.0021** (0.0011)		
CEOS			-0.0076*** (0.0009)				-0.0882*** (0.0113)	
CEOF				-0.1928*** (0.0257)				-0.9154** (0.4136)
FO	0.0244*** (0.0057)	0.0068* (0.0040)	0.0025 (0.0038)	0.0246*** (0.0029)	0.0653* (0.0368)	0.3725*** (0.0658)	0.3710*** (0.0610)	-0.0026 (0.0253)
IO					-0.0556* (0.0310)	0.1829*** (0.0521)	0.1534*** (0.0301)	-0.0535*** (0.0071)
CEOP x FO	-0.0354*** (0.0116)				-0.0521** (0.0254)			
CEOT x FO		-0.0047*** (0.0005)				-0.0218** (0.0113)		
CEOS x FO			-0.0323*** (0.0121)				-0.3505*** (0.0653)	
CEOF x FO				-3.1049*** (1.1024)				1.9394* (1.1124)
CEOP x IO					-0.0314 (0.1952)			
CEOT x IO						-0.0275*** (0.0025)		
CEOS x IO							-0.3014*** (0.0553)	
CEOF x IO								-8.8564** (4.2643)
FO x IO					-0.1864*** (0.0641)	-0.6425*** (0.1048)	-0.6438*** (0.1258)	-0.0032 (0.0414)
CEOP x FO x IO					-0.0193*** (0.0024)			
CEOTx FO x IO						-0.0021* (0.0011)		
CEOS x FO x IO							-0.0058***	

© 2026 Conscientia Beam. All Rights Reserved.

Variables/Model Statistics	Two-way interactions				Three-way interactions			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
							(0.0012)	
CEOFx FO x IO								-1.5279* (0.8485)
Constant	0.5286*** (0.0121)	0.5298*** (0.0113)	0.5123*** (0.0108)	0.9126*** (0.0091)	0.4935*** (0.0134)	0.6385*** (0.0384)	0.5919*** (0.0155)	0.5381*** (0.0118)
Sargan test	0.0369	1.0836	1.2071	1.5381	0.0687	0.0819	0.4234	2.6342
ρ-value	0.8490	0.2980	0.2720	0.2140	0.7930	0.7760	0.5150	0.1040
Basmann test	0.0366	1.0816	1.2002	1.5375	0.0681	0.0813	0.4215	2.6092
ρ -value	0.8490	0.2980	0.2731	0.2141	0.7940	0.7750	0.5151	0.1060
Controls	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'
Year, Industry Dummies	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'	'Yes'
Firm-year obs.	2986	2986	2986	2986	2986	2986	2986	2986

Note: ***, **, and * show significance at 1%, 5%, and 10% levels, respectively, while standard errors are reported in parentheses.

© 2026 Conscientia Beam. All Rights Reserved.

4.7. Robustness Test with Chen, Hope, Li, and Wang (2011) Model of Investment Efficiency

Consistent with Chen et al. (2011), we have estimated investment efficiency using the following equation.

$$Investment_{i,t} = \beta_0 + \beta_1 SG_{i,t-1} + \beta_2 NG_{i,t-1} + \beta_3 SG_{i,t-1} \text{ X } NG_{i,t-1} + FE + \varepsilon_{i,t} \quad (5)$$

According to this model, the relationship between growth opportunities and investment levels depends upon positive or negative revenue growth. Therefore, to ensure the robustness of the results, we estimated the baseline, two-way, and three-way interaction models by using an alternate proxy of IE. The estimation would further ensure that the results remain unaffected by any particular measurement of IE. Tables 15,16 and 17 show the results for the baseline, two-way, and three-way interactions, respectively. The baseline regression results show that the direction and significance levels of all the dimensions of the CEO power variable remain consistent across both statistical techniques. Similarly, the results for the variables of interest in the two-way and three-way interaction models also remain consistent across both estimations, which further confirms the reliability of our results.

© 2026 Conscientia Beam. All Rights Reserved.

Table 15. Baseline regression results using Chen et al. (2011) model.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors- fixed effects			
	(Model-1) IE	(Model-2) IE	(Model-3) IE	(Model-4) IE	(Model-1) IE	(Model-2) IE	(Model-3) IE	(Model-4) IE
CEOP	-0.0025* (0.0014)				-0.0039*** (0.0008)			
CEOT		-0.0013*** (0.0005)				-0.0008*** (0.0003)		
CEOS			-0.0083*** (0.0014)				-0.0032* (0.0019)	
CEOF				-0.0891*** (0.0253)				-0.3158** (0.1586)
Constant	-0.0805 (0.0620)	-0.0682 (0.0526)	-0.1353** (0.0658)	-0.1784*** (0.0651)	-0.8014*** (0.0313)	-0.7925*** (0.0519)	-0.7038*** (0.0841)	-0.5617*** (0.0824)
F-statistic	97.19***	75.51***	79.83***	83.57***	1466.47***	1373.29***	2320.65***	939.51***
Adjusted/Within R^2	0.5105	0.5875	0.5862	0.6041	0.5653	0.5935	0.5948	0.5901
Controls	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Year Dummies	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"

Note: ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively, while standard errors are reported in parentheses.

Table 16. Two-way moderation results using the Chen et al. (2011) model.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors- fixed effects			
	(Model-5) IE	(Model-6) IE	(Model-7) IE	(Model-8) IE	(Model-5) IE	(Model-6) IE	(Model-7) IE	(Model-8) IE
CEOP	-0.0081*** (0.0025)				-0.0050*** (0.0006)			
CEOT		-0.0009*** (0.0003)				-0.0029*** (0.0003)		
CEOS			-0.0052* (0.0029)				-0.0036* (0.0020)	
CEOF				-2.2556*** (0.3859)				-0.00951*** (0.0022)
FO	-0.0371*** (0.0071)	-0.0356*** (0.0065)	-0.0089*** (0.0028)	-0.0230*** (0.0051)	-0.0088*** (0.0031)	-0.0324*** (0.0032)	-0.0071*** (0.0018)	-0.0092*** (0.0034)
CEOP x FO	-0.0373***				-0.0147***			

© 2026 Conscientia Beam. All Rights Reserved.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors- fixed effects			
	(Model-5) IE	(Model-6) IE	(Model-7) IE	(Model-8) IE	(Model-5) IE	(Model-6) IE	(Model-7) IE	(Model-8) IE
	(0.0087)				(0.0056)			
CEOT x FO		-0.0049*** (0.0010)				-0.0026*** (0.0004)		
CEOS x FO			-0.0225*** (0.0031)				-0.0083* (0.0049)	
CEOF x FO				-3.3267*** (1.1301)				-2.8165*** (1.0125)
Constant	-0.3428*** (0.0674)	0.0804** (0.0402)	-0.1904*** (0.0687)	0.1122** (0.0611)	-0.8914*** (0.0713)	-0.7921*** (0.0826)	-0.7629*** (0.0590)	-0.8253*** (0.0795)
F-statistic	124.83***	108.71***	119.87***	94.68***	11121.53***	10569.89***	4756.73***	3753.63***
Adjusted/Within R^2	0.5871	0.5769	0.5881	0.5221	0.5926	0.5241	0.5917	0.6037
Controls	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Year Dummies	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"

Note: ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively, while standard errors are shown in parentheses.

Table 17. Three-way moderation results using the Chen et al. (2011) model.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors, fixed effects			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
CEOP	-0.0089 (0.0078)				-0.0146*** (0.0049)			
CEOT		-0.0079*** (0.0029)				-0.0001 (0.0009)		
CEOS			0.0058 (0.0327)				-0.0369*** (0.0072)	
CEOF				-1.6805 (2.5536)				-1.7821 (1.1649)
FO	-0.0196 (0.0516)	-0.2728*** (0.0567)	-0.0804*** (0.0258)	-0.0765** (0.0312)	-0.0614** (0.0301)	-0.0581* (0.0322)	-0.0245 (0.0331)	0.0407 (0.0333)
IO	0.0784*** (0.0139)	0.3121*** (0.0481)	0.0884*** (0.0312)	0.0927*** (0.0314)	-0.0043 (0.0041)	0.00518*** (0.0017)	0.0411*** (0.0121)	0.0741*** (0.0211)
CEOP x FO	-0.2123*** (0.0234)				-0.0639*** (0.0216)			

© 2026 Conscientia Beam. All Rights Reserved.

Variables/Model Statistics	Panel regression- fixed effects with robust standard errors				Driscoll-Kraay standard errors, fixed effects			
	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE	(Model-9) IE	(Model-10) IE	(Model-11) IE	(Model-12) IE
CEOT x FO		-0.0128 (0.0090)				-0.0231** (0.0113)		
CEOS x FO			-0.1898* (0.1140)				0.01355 (0.0878)	
CEOF x FO				0.1509 (0.1548)				-0.4175*** (0.1186)
CEOP x IO	0.00002 (0.0165)				0.0349 (0.0279)			
CEOT x IO		0.0322*** (0.0071)				0.0021 (0.0030)		
CEOS x IO			0.0092 (0.0673)				0.0878*** (0.0323)	
CEOF x IO				1.7801 (3.1324)				3.2161 (4.201)
FO x IO	-0.0322 (0.2115)	-0.3821*** (0.1125)	-0.1225** (0.0565)	-0.1368* (0.0731)	-0.1243* (0.0692)	-0.1407** (0.0601)	0.0518 (0.0563)	0.0718 (0.0717)
CEOP x FO x IO	-0.0165*** (0.0054)				-0.0036** (0.0016)			
CEOTx FO x IO		-0.0028*** (0.0009)				-0.0010** (0.0005)		
CEOS x FO x IO			-0.0105** (0.0053)				-0.0045** (0.0020)	
CEOFx FO x IO				-2.4651** (1.1251)				-1.7966* (1.0015)
Constant	-0.1898*** (0.0405)	0.1602*** (0.0458)	-0.3221*** (0.0406)	0.8987*** (0.0189)	-0.9179*** (0.0681)	-0.8563*** (0.0675)	-0.9382*** (0.0697)	-0.8709*** (0.0681)
F-statistic	115.21***	67.59***	105.41***	104.32***	1651.18***	2461.25***	869.29***	1161.08***
Adjusted/Within R^2	0.5877	0.5713	0.5724	0.5785	0.6172	0.6120	0.6175	0.6112
Controls	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"
Year Dummies	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"	"Yes"

Note: ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively, while standard errors are presented in parentheses.

© 2026 Conscientia Beam. All Rights Reserved.

5. CONCLUSION, IMPLICATIONS, AND FUTURE DIRECTIONS

The study examines the interrelationship between CEO power, ownership structure, and IE of listed non-financial firms in Pakistan for the financial years ended 2016–2025. Particularly, the study found that CEO power negatively influences IE.

Subsequently, the results also report that FO strengthens the relationship between CEO power and IE, while the marginal effect analysis further reveals that IO weakens the adverse moderating effect of FO at varying levels and reduces the negative impact of various dimensions of CEO power on IE. We have also re-estimated all the regression models using a mean-centering approach to confirm that our results are not affected by scaling differences. Additionally, we have found that our results are consistent across alternate proxies and various statistical techniques, which further strengthens the reliability of our findings.

The study offers various theoretical and practical implications. From a theoretical perspective, this study extends type 2 agency theory by integrating FO and IO in the context of emerging economies. In this regard, our study offers new insights that FO tends to increase type 2 agency costs by exacerbating the negative effect of CEO power on IE. Moreover, we extend the theory by introducing a complex governance perspective by showing that the moderating effect of FO on the CEO power–IE relationship is further dependent upon the presence of IO. In this perspective, the study finds that IO can diminish the negative effect of FO and help to reduce type 2 agency costs. In this way, we extend the argument of type 2 agency theory by providing multifaceted evidence of how FO and IO can increase and decrease agency costs, respectively, to shape corporate outcomes.

The study offers several practical implications. First, regulators should strengthen governance rules and ensure active participation of institutional investors, particularly in family-owned businesses, to mitigate their adverse effects on corporate outcomes. Second, policymakers should also assess family-controlled businesses and ensure active involvement of institutional investors to protect the interests of minority shareholders. Third, corporate boards should strengthen monitoring mechanisms by facilitating the activism of institutional investors to control the negative effects of family control. Fourth, investors should also consider the ownership structure of the firm, as the presence of institutional ownership can mitigate the negative effects of CEO power in family-owned businesses. Lastly, the findings would also assist institutional investors in ensuring strict monitoring and challenging sub-optimal investments in family-owned businesses to benefit minority shareholders.

The study has some limitations which can be addressed by researchers in future studies. First, we have employed the data set from Pakistan; therefore, findings may not be extended across multiple countries. Therefore, later investigations may be conducted using the proposed three-way interaction model to examine how the relationship differs across different legal systems and institutional environments where diverse governance structures and investor protection regulations may influence the results. Second, we have used multiple proxies for measuring CEO power, but these measurements may not fully reflect the real influence of CEO power over strategic decisions. For example, CEO pay slice may also be affected by compensation policies, rather than genuine authority, which may create a possible measurement bias. Third, we have excluded financial firms due to their different regulatory structure and investment behaviour; however, this exclusion exhibits another limitation. The findings of our research may not apply to studies that include financial firms.

Therefore, future studies may develop sector-specific proxies for measuring IE to examine the moderating effect of ownership structure between CEO power and IE. Fourth, the study considers only two ownership structures, that is, FO and IO. Future research could also examine how the combination of other ownership structures may influence the CEO power and IE relationship. Fourth, researchers can also extend our framework by examining how board characteristics can affect this relationship. Fifth, future research can also explore how CEOs can use intellectual capital resources to enhance IE.

© 2026 Conscientia Beam. All Rights Reserved.

Funding: This study received no specific financial support.
Institutional Review Board Statement: Not applicable.
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Data Availability Statement: The corresponding author can provide the supporting data of this study upon a reasonable request.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: Both authors contributed equally to the conception and design of the study. Both authors have read and agreed to the published version of the manuscript.
Disclosure of AI Use: The authors have used ChatGPT (version 5.0) for improving the sentence structure and grammar. Moreover, all the information was duly verified by the authors.
Acknowledgements: Authors would like to acknowledge sincere gratitude to Karachi Institute of Economics and Technology (KIET) for providing a research environment and institutional support necessary to carry out this study.

REFERENCES

Ab Aziz, N. H., Abdul Latiff, A. R., Osman, M. N. H., & Alshdaifat, S. M. (2025). The interaction effect of family ownership, board gender and skills on CSR strategy with ESG performance: Evidence from ASEAN-5 countries. *Corporate Governance: The International Journal of Business in Society*, *25*(4), 948-961. https://doi.org/10.1108/CG-02-2024-0113

Abdullah, Zhu, N., Hashmi, M. A., & Shah, M. H. (2024). CEO power, board features and ESG performance: An extensive novel moderation analysis. *Corporate Social Responsibility and Environmental Management*, *31*(6), 5627-5655. https://doi.org/10.1002/csr.2886

Aibar-Guzmán, B., & Frías-Aceituno, J.-V. (2021). Is it necessary to centralize power in the CEO to ensure environmental innovation? *Administrative Sciences*, *11*(1), 27. https://doi.org/10.3390/admsci11010027

Ali, S., Rehman, A. U., Jawad, M., & Naz, M. (2024). Product market competition and investment efficiency nexus with mediating effect of firm risk-taking in Pakistan. *International Journal of Disclosure and Governance*, *21*(3), 488-499. https://doi.org/10.1057/s41310-023-00211-6

Alobaid, R. O. H., Qasem, A., & Al-Qadasi, A. A. (2024). Corporate social responsibility, ownership structure, and firm investment efficiency: Evidence from the Saudi stock market. *Sustainability*, *16*(15), 6584. https://doi.org/10.3390/su16156584

Amin, A., Ali, R., Ur Rehman, R., & Elamer, A. A. (2025). Nonfamily executives in family firms and dividend payout: Evidence from Pakistan. *Corporate Governance: The International Journal of Business in Society*, *25*(7), 1559-1582. https://doi.org/10.1108/CG-10-2024-0512

Anwar, R., & Idris, A. (2025). Does corporate social responsibility increase investment efficiency during economic policy uncertainty? Exploring the moderating role of family and non-family firms. *Sage Open*, *15*(2), 21582440251335520. https://doi.org/10.1177/21582440251335520

Arif, K., Isa, C. R., & Mustapha, M. Z. (2023). Do powerful CEOs benefit firm performance in Pakistan? *Asian Journal of Business and Accounting*, *16*(2), 75-106. https://doi.org/10.22452/ajba.vol16no2.3

Ben Saad, I., Garrouch, H., & Gaaya, S. (2026). Corporate tax avoidance and investment efficiency: Does family control matter? *Journal of Applied Accounting Research*, *27*(3), 658-679. https://doi.org/10.1108/JAAR-07-2024-0268

Bhutta, A. I., Abid, A., Anees, F., & Sheikh, M. F. (2025). Female directors and capital allocation efficiency: A reassessment of investment decisions. *Asian Review of Accounting*, 1-33. https://doi.org/10.1108/ARA-05-2025-0153

Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to investment efficiency? *Journal of Accounting and Economics*, *48*(2-3), 112-131. https://doi.org/10.1016/j.jacceco.2009.09.001

Brahma, S., & Economou, F. (2024). CEO power and corporate strategies: A review of the literature. *Review of Quantitative Finance and Accounting*, *62*(3), 1069-1143. https://doi.org/10.1007/s11156-023-01231-7

Bzeouich, B., Depoers, F., & Lakhal, F. (2023). Do overconfident CEOs make efficient investment decisions? *Management & Prospective*, *40*(6), 169-185. https://doi.org/10.3917/g2000.406.0152

Chen, F., Hope, O.-K., Li, Q., & Wang, X. (2011). Financial reporting quality and investment efficiency of private firms in emerging markets. *The Accounting Review*, *86*(4), 1255-1288. https://doi.org/10.2308/accr-10040

© 2026 Conscientia Beam. All Rights Reserved.

Chowdhury, M. R. U., Xie, F., & Hasan, M. M. (2023). Powerful CEOs and investment efficiency. *Global Finance Journal*, *58*, 100886. https://doi.org/10.1016/j.gfj.2023.100886

Chu, H.-L., Liu, N.-Y., & Chiu, S.-C. (2023). CEO power and CSR: The moderating role of CEO characteristics. *China Accounting and Finance Review*, *25*(1), 101-121. https://doi.org/10.1108/CAFR-03-2022-0027

Cid-Aranda, C., & López-Iturriaga, F. (2023). C.E.O. characteristics and corporate risk-taking: Evidence from emerging markets. *Economic Research-Ekonomska Istraživanja*, *36*(2), 2175008. https://doi.org/10.1080/1331677X.2023.2175008

Dai, H., Robinson, D., & Shen, Y. (2025). CEO-employee pay disparity, risk-taking incentives, and financial reporting choices. *Journal of Financial Stability*, *81*, 101476. https://doi.org/10.1016/j.jfs.2025.101476

Dawson, J. F. (2014). Moderation in management research: What, why, when, and how. *Journal of Business and Psychology*, *29*(1), 1-19. https://doi.org/10.1007/s10869-013-9308-7

Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics*, *80*(4), 549–560. https://doi.org/10.1162/003465398557825

Drobetz, W., El Ghoul, S., Guedhami, O., & Yu, X. (2025). Beyond ownership: The role of institutional investors in international corporate governance. *Corporate Governance: An International Review*, *33*(5), 1024–1038. https://doi.org/10.1111/corg.12635

Duellman, S., Klaus, J. P., & Marquardt, B. B. (2025). Accounting reporting complexity as a source of insider information advantage: Evidence from insider trades. *Journal of Business Finance & Accounting*, *52*(3), 1328-1348. https://doi.org/10.1111/jbfa.12845

Duong, K. D., Phung, Y. N. N., Pham, H., & Le, N. A. N. (2024). CEO overpower and real earning manipulation in family businesses: Do ownership structures matter? *Sage Open*, *14*(3), 1-15. https://doi.org/10.1177/21582440241266922

Finkelstein, S. (1992). Power in top management teams: Dimensions, measurement, and validation. *Academy of Management Journal*, *35*(3), 505-538. https://doi.org/10.5465/256485

Frisenna, C., & Rizzotti, D. (2025). The effects of family entrenchment and board independence on CEO turnover. *Journal of Management and Governance*, *29*(4), 977-1005. https://doi.org/10.1007/s10997-025-09758-8

Gaio, C., Gonçalves, T. C., & Cardoso, J. (2023). Investment efficiency and earnings quality: European evidence. *Journal of Risk and Financial Management*, *16*(4), 224. https://doi.org/10.3390/jrfm16040224

Galavotti, I., D'Este, C., & Cerrato, D. (2026). A size-based contingency approach to family firms' performance: The role of family power. *Journal of Management and Governance*, *30*(1), 155-190. https://doi.org/10.1007/s10997-025-09736-0

Gao, R., & Yu, X. (2020). How to measure capital investment efficiency: A literature synthesis. *Accounting & Finance*, *60*(1), 299-334. https://doi.org/10.1111/acfi.12343

Ghaleb, B. A., Qaderi, S. A., & Al-Qadasi, A. A. (2024). Independent female directors and integrated reporting quality: The moderating role of family ownership. *Corporate Social Responsibility and Environmental Management*, *31*(4), 3429-3443. https://doi.org/10.1002/csr.2755

Goh, J., Choi, W., & Cho, J. (2016). Changes in chaebol firms' overinvestment after the Asian financial crisis: A long-term perspective. *Asia-Pacific Journal of Accounting & Economics*, *23*(1), 75-111. https://doi.org/10.1080/16081625.2014.983632

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). Boston, MA: McGraw-Hill/Irwin.

Gulen, H., & Ion, M. (2016). Policy uncertainty and corporate investment. *The Review of Financial Studies*, *29*(3), 523-564. https://doi.org/10.1093/rfs/hhv050

Gull, A. A., Ali, R., Ahsan, T., & Rehman, R. U. (2025). Institutional ownership and waste management: International evidence. *Journal of Accounting Literature*, 1-29. https://doi.org/10.1108/JAL-11-2024-0335

Gunasekarage, A., Luong, H., & Truong, T. T. (2020). Growth and market share matrix, CEO power, and firm performance. *Pacific-Basin Finance Journal*, *59*, 101257. https://doi.org/10.1016/j.pacfin.2019.101257

Haq, M. U., Bahadar, K., Kamran, M., & Qazi, M. W. (2023). Unpacking CEO power: A comprehensive analysis of its impact on corporate social responsibility and firm value. *International Journal of Business and Economic Affairs*, *8*(4), 12-35.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *The Stata Journal*, *7*(3), 281-312. https://doi.org/10.1177/1536867X0700700301

© 2026 Conscientia Beam. All Rights Reserved.

Huang, Y., & Qiu, J. (2023). The power influence of executives and corporate investment efficiency: Empirical evidence from Chinese state-owned enterprises. *Humanities and Social Sciences Communications*, *10*(1), 586. https://doi.org/10.1057/s41599-023-02107-w

Hussain, I., Durand, R. B., & Harris, M. N. (2021). Relationship lending: A source of support or a means of exploitation? *Global Finance Journal*, *48*, 100549. https://doi.org/10.1016/j.gfj.2020.100549

Iqbal, S. (2025). *Private sector borrowing hits Rs710bn in FY25. Dawn.* Retrieved from https://www.dawn.com/news/1921546?utm_source

Jafar, R., Basuki, B., Windijarto, W., & Setiawan, R. (2024). Family control and corporate performance: The role of independent commissioners in reducing agency problems. *Gestão & Produção*, *31*, e7923. https://doi.org/10.1590/1806-9649-2024v31e7923

Javeed, S. A., Ong, T. S., Latief, R., Muhamad, H., & Soh, W. N. (2021). Conceptualizing the moderating role of CEO power and ownership concentration in the relationship between audit committee and firm performance: Empirical evidence from Pakistan. *Sustainability*, *13*(11), 6329. https://doi.org/10.3390/su13116329

Jensen, M. C., & Meckling, W. H. (1979). Theory of the firm: Managerial behavior, agency costs, and ownership structure. In K. Brunner (Ed.), *Economics social institutions: Insights from the conferences on analysis & ideology* (pp. 163–231). Dordrecht, Netherlands: Springer. https://doi.org/10.1007/978-94-009-9257-3_8

Jin, L., Liu, M., Wu, Z., & Zhang, Z. (2023). The difference of investment efficiency between family and non-family firms: An international scope. *Journal of International Financial Markets, Institutions and Money*, *88*, 101839. https://doi.org/10.1016/j.intfin.2023.101839

Jochmans, K. (2022). Heteroscedasticity-robust inference in linear regression models with many covariates. *Journal of the American Statistical Association*, *117*(538), 887-896. https://doi.org/10.1080/01621459.2020.1831924

Kałdoński, M., & Jewartowski, T. (2025). Are institutional investors effective monitors in a country where closely held firms predominate? Insights from agency problem-driven dividend payouts. *Research in International Business and Finance*, *77*, 102976. https://doi.org/10.1016/j.ribaf.2025.102976

Khan, R., & Viganola, D. (2023). *Pakistan's private sector: Going into the nuts and bolts.* Retrieved from https://blogs.worldbank.org/en/endpovertyinsouthasia/pakistans-private-sector-going-nuts-and-bolts

Le, T.-H., & Tran-Nam, B. (2018). Trade liberalization, financial modernization and economic development: An empirical study of selected Asia–Pacific countries. *Research in Economics*, *72*(2), 343-355. https://doi.org/10.1016/j.rie.2017.03.001

Lei, Q., & Chen, H. (2019). Corporate governance boundary, debt constraint, and investment efficiency. *Emerging Markets Finance and Trade*, *55*(5), 1091-1108. https://doi.org/10.1080/1540496X.2018.1526078

Liu, B., & McConnell, J. J. (2013). The role of the media in corporate governance: Do the media influence managers' capital allocation decisions? *Journal of Financial Economics*, *110*(1), 1-17. https://doi.org/10.1016/j.jfineco.2013.06.003

Lo, H.-C., & Shiah-Hou, S.-R. (2022). The effect of CEO power on overinvestment. *Review of Quantitative Finance and Accounting*, *59*(1), 23-63. https://doi.org/10.1007/s11156-022-01060-0

Majeed, M. A., & Ullah, I. (2020). Impact of CEO power on investment efficiency: Evidence from China. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4120396

McNichols, M. F., & Stubben, S. R. (2008). Does earnings management affect firms' investment decisions? *The Accounting Review*, *83*(6), 1571-1603. https://doi.org/10.2308/accr.2008.83.6.1571

Menshawy, I. M., Basiruddin, R., Mohd-Zamil, N. A., & Hussainey, K. (2023). Strive towards investment efficiency among Egyptian companies: Do board characteristics and information asymmetry matter? *International Journal of Finance & Economics*, *28*(3), 2382-2403. https://doi.org/10.1002/ijfe.2540

Moradi, M., Yazdifar, H., Eskandar, H., & Namazi, N. R. (2022). Institutional ownership and investment efficiency: Evidence from Iran. *Journal of Risk and Financial Management*, *15*(7), 290. https://doi.org/10.3390/jrfm15070290

Nisar, A., Li, H., Shah, S. S. A., & Rafique, R. (2024). Regional digital finance and inefficient corporate investments: Empirical evidence from China. *Cogent Economics & Finance*, *12*(1), 2390943. https://doi.org/10.1080/23322039.2024.2390943

Ozgen, S., Mooney, A., & Zhou, Y. (2025). CEO power: A review, critique, and future research directions. *Journal of Management*, *51*(1), 132-171. https://doi.org/10.1177/01492063241241302

Purkayastha, S., Veliyath, R., & George, R. (2022). Type I and type II agency conflicts in family firms: An empirical investigation. *Journal of Business Research*, *153*, 285-299. https://doi.org/10.1016/j.jbusres.2022.07.054

© 2026 Conscientia Beam. All Rights Reserved.

Richardson, S. (2006). Over-investment of free cash flow. *Review of Accounting Studies*, *11*(2), 159-189. https://doi.org/10.1007/s11142-006-9012-1

Shah, I. A., Ali Shah, S. Z., Nouman, M., Khan, F. U., Badulescu, D., & Cismas, L.-M. (2021). Corporate governance and cash holding: New insights from concentrated and competitive industries. *Sustainability*, *13*(9), 4816. https://doi.org/10.3390/su13094816

Shah, S. F., Mehmood, S., Khan, M. A., & Popp, J. (2024). Earnings management opportunistic or efficient in Pakistan? The role of corporate governance practices. *Cogent Business & Management*, *11*(1), 2398716. https://doi.org/10.1080/23311975.2024.2398716

Shaheen, L., Alatyat, Z., Aldabbas, Q., Abu Shihab, R. N., & Abuaddous, M. (2024). The impact of CEO characteristics on investment efficiency in Jordan: The moderating role of political connections. *Journal of Risk and Financial Management*, *17*(12), 540. https://doi.org/10.3390/jrfm17120540

Shahzad, A., Nazir, M. S., Morais, F., & Asghar Butt, A. (2025). Ownership structure, board composition and CEO dominance: What does really matters to corporate deleveraging policies? *Corporate Governance: The International Journal of Business in Society*, *25*(4), 786-814. https://doi.org/10.1108/CG-07-2023-0329

Shepherd, N., Mooi, E., Elbanna, S., & Lou, B. (2023). Fast and high-quality decision-making: The role of behavioral integration. *European Management Review*, *20*(4), 679-697. https://doi.org/10.1111/emre.12573

Stock, J. H., & Watson, M. W. (2008). Heteroskedasticity-robust standard errors for fixed effects panel data regression. *Econometrica*, *76*(1), 155-174. https://doi.org/10.1111/j.0012-9682.2008.00821.x

Stoughton, N. M., Wong, K. P., & Yi, L. (2017). Investment efficiency and product market competition. *Journal of Financial and Quantitative Analysis*, *52*(6), 2611-2642. https://doi.org/10.1017/S0022109017000746

Velte, P. (2024). Institutional ownership and board governance. A structured literature review on the heterogeneous monitoring role of institutional investors. *Corporate Governance: The International Journal of Business in Society*, *24*(2), 225-263. https://doi.org/10.1108/CG-10-2022-0414

Wang, Z., Randolph, R., Su, E., & Memili, E. (2023). How does the founding family matter in corporate governance? A study of the entrenchment heterogeneity among S&P 1,500 firms. *Journal of Business Research*, *154*, 113362. https://doi.org/10.1016/j.jbusres.2022.113362

Wu, M., Zhang, X., Lu, J., & Chen, Y. (2024). De-familiarization governance and family firm investment efficiency. *Finance Research Letters*, *62*, 105219. https://doi.org/10.1016/j.frl.2024.105219

Yahaya, O. A. (2025). CEO power and firm performance: The mediating role of board independence. *Review of Management Sciences*, *14*(2), 1–31.

Yan, Q., Yan, J., Zhang, D., Bi, S., Tian, Y., Mubeen, R., & Abbas, J. (2024). Does CEO power affect manufacturing firms' green innovation and organizational performance? A mediational approach. *Sustainability*, *16*(14), 6015. https://doi.org/10.3390/su16146015

Yang, H.-H., Lien, Y.-C., & Huang, B.-H. (2025). The impact of family business governance on environmental, social, and governance performance. *Sustainability*, *17*(8), 3472. https://doi.org/10.3390/su17083472

Young, M. N., Peng, M. W., Ahlstrom, D., Bruton, G. D., & Jiang, Y. (2008). Corporate governance in emerging economies: A review of the principal–principal perspective. *Journal of Management Studies*, *45*(1), 196-220. https://doi.org/10.1111/j.1467-6486.2007.00752.x

Zhou, Y., Zhu, H., Yang, J., & Zou, Y. (2021). Does CEO power backfire? The impact of CEO power on corporate strategic change. *Sustainability*, *13*(16), 8847. https://doi.org/10.3390/su13168847

Zhuang, J., Edwards, D., Webb, D., & Capulong, M. V. (2000). *Corporate governance and finance in East Asia: A study of Indonesia, Republic of Korea, Malaysia, Philippines, and Thailand* (Vol. 1). Manila, Philippines: Asian Development Bank.

Views and opinions expressed in this article are the views and opinions of the author(s), The Economics and Finance Letters shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.

© 2026 Conscientia Beam. All Rights Reserved.