**CEO Attributes, Investment Decisions and Firm Performance:**

**New Insights from Upper Echelons Theory**

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**Abstract**

The study examines the role of a CEO in enhancing a firm’s performance through the mediating effect of investment decisions in the emerging economy of Pakistan. Distinctly, fixed-effects panel regression method is employed to examine the said-nexus of non-financial firms listed at the Pakistan Stock Exchange. It is empirically unearthed that CEO attributes, namely age, tenure, ownership, financial education, and career experience are positively related to firm performance in general and capital investment decisions in particular. Secondly, capital investment decisions partially and significantly mediate the nexus between CEO attributes and firm performance with few exceptions that confirm the theoretical implications of upper echelons theory in an emerging economy context.

**Keywords**: CEO attributes; investment decision; firm performance; Pakistan; upper echelons theory

1. **Introduction**

Prior research is persistent in finding that CEOs do matter to firm performance. Indeed, there has been a sustained rise in the role of CEOs on firm performance (Quigley & Graffin, 2017). However, research has gradually shifted focus from the argument that CEOs’ role matters in driving firm performance (Wang et al., 2016). Taking insight from upper echelons theory Hambrick and Mason (1984), researchers have often argued that the extent of a firm’s performance can be explained by the background of its CEO (Zhu & Chen, 2015). In contrast, leadership scholars tend to link leadership styles with firm performance (Waldman et al., 2001), whilst other researchers have focused on mediating mechanisms to study how CEO attributes impact firm performance (Peterson et al., 2012).

Meanwhile, different strategic choices have been applied as mediating mechanisms in the past in the relationship between CEOs and firm performance. For example, Herrmann and Datta (2006) linked strategic decisions related to greenfield investment, joint ventures, and acquisitions to CEO age and experience, whilst Waldman et al. (2006) associated strategic choices related to corporate social responsibility investment with CEO leadership style. Miller and Le Breton-Miller (2011) associated firm’s risk-taking and innovation with CEO founder position. Simsek (2007) associated risk-taking and new start-ups with CEO tenure. Baron and Tang (2011) associated innovations frequency with CEO positive attributes. Liu (2016) linked capital structure choices with board attributes. However, few endeavors have been made to incorporate investment decisions to establish an increasingly comprehensive picture of existing literature regarding the mediating mechanisms between CEO attributes and firm performance.

One of the imperative reasons for firm performance is corporate investment policy; therefore, it is also worth answering: what factors might affect firms’ investment decisions. Moreover, in traditional financial literature, the relation between CEO attributes and corporate decisions has seen less attention (Ben Mohamed et al., 2014). The two clarifications used in the traditional finance literature for investment decisions are agency cost (Jensen & Meckling, 1976) and asymmetric information (Myers & Majluf, 1984). However, the recent finance literature has shown the CEO as a central player in a firm’s corporate policies (Malmendier & Tate 2005a; Malmendier & Tate 2005b).

Further, evidence is scarce from emerging economies. There are several convincing reasons to take Pakistan as an appropriate case for this investigation: Bloomberg declared Pakistan Stock Exchange (PSX) as the best market in Asia in 2016 and overall, fifth best. The PSX has reported recapturing its status of an emerging market from the MSCI ACWI (Mangi, 2016). Moreover, an economic programme like ‘China-Pakistan Economic Corridor’ (CPEC) by the Pakistani government, launched on 20 April 2015, has attracted worldwide investors to Pakistan’s investment community. In addition, the differences in market structure, regulations, market development, and cultural differences make Pakistan an appropriate research context to conduct this study.

Therefore, the key objective of this research study is to empirically test the mediating effect of investment decision on the link between CEO attributes and firm performance for a period between 2009-2018; building on a sample of Pakistan’s non-financial sector listed firms. For the said objective, the influence of CEO attributes on firm performance is determined. Then, the mediating impact of investment decision on the relation between CEO attributes and firm performance is tested. In particular, this study focused on key attributes of a CEO, namely age, tenure, ownership, financial education, and career experience. These attributes are picked as they are the most examined variables in upper echelons theory (UET) research, and also these attributes can be quantified. Further, past studies employing UET framework have resulted in mixed findings, and thereby justifying additional evidence.

This research seeks to contribute to the literature on the upper echelons theory. We find that CEO attributes (age, tenure, ownership, financial education, and career experience) influence firm’s performance not only directly, but also indirectly through a channel that passes through investment decisions. The previous findings focus on the direct impact of CEO attributes on firm performance. Further, if an indirect channel is considered in previous literature, it predicted that CEO attributes indirectly influence firm performance through a risk approach to innovation, leverage, or entrepreneurship. On the contrary, this paper has taken into consideration the risk of capital spending as it has received less attention to test the indirect aftermath of CEO attributes on firm performance.

1. **Literature review and hypotheses development**

***2.1 CEO age, investment decisions, and firm performance***

CEO age refers to the number of years a CEO has lived. Scholars suggest that age is a key demographic attribute that may be related to variability in firm performance. Sitthipongpanich and Polsiri (2015) empirically find that high experience that comes with age leads to effective decisions. Ben Mohamed et al. (2012) argued that older CEOs, because of experience, become more rational than young CEOs. Similarly, Carter et al. (2010) report a positive link between the age of CEO and firm performance. However, Horvath and Spirollari (2012) find empirical evidence of a negative relationship between board members’ age and firm performance. On the contrary, Wicaksana (2011) finds no relation between executives’ age and firm performance.

The effect of CEO age on corporate decisions has also reported mixed findings. One school of thought reports that older CEOs are expected to go for less risky investment options to protect their career reputation and status quo (Serfling, 2014). Older managers are more likely to go for investment decisions that reflect their old policies to protect their jobs and pension entitlements (Bertrand & Schoar, 2003). However, CEOs who are young are full of energy and enthusiasm, and therefore more likely to go for riskier investment decisions (Li et al., 2014). Wang et al. (2016) confirmed that older CEOs push firm performance down due to their outdated business strategies.

We propose the following hypotheses by linking the above arguments:

*Hypothesis* 1a. CEO age is positively related to firm performance.

*Hypothesis* 1b. CEO age is positively related to investment decision.

*Hypothesis* 1c. Investment decision mediates the relationship between CEO age and firm performance.

***2.2 CEO tenure, investment decisions, and firm performance***

CEO tenure is the length of time spent at a particular firm in a CEO role. CEOs’ tenure signals credibility of managers for investors in the market. In light of agency theory, the CEO term gives incentives to managers for expanding corporate worth. It might be a possibility that the long tenure can enable the CEO to build up large fame, prompting more devotion to the firm (Sitthipongpanich & Polsiri, 2015). Van Ness et al. (2010) reported that board members’ tenure and company performance are positively and significantly associated. However, the CEO who remains in his role for quite a while might feel excessively secure in his position (Fujianti, 2018). New CEOs can bring new changes that may make firms more competitive, hence, perform better (Shen & Cannella, 2002). Brochet et al. (2019) reported a hump-shaped relationship between the value of firm and tenure of a CEO.

CEOs with short tenure have less power, lack of knowledge about organization and work environment. So, in turn they prefer less risky investments (Mezghanni, 2010). Another strand of the literature reports that CEOs with short tenure are aggressive in their investment policies. This may be because they wish to build their reputation in a short period with some big investment projects. The literature also documented that CEOs with long tenure avoid risk and lack the understanding of learning new dynamics of the financial world, leading to investment distortions (Graham et al., 2013). Paradoxically, Iossa & Rey (2014) documented that long tenure help CEOs to explore their abilities, and empirically argued that long-tenured CEOs tend to commit to increased investments.

We propose the following hypotheses by linking the above arguments:

*Hypothesis* 2a. CEO tenure is positively related to firm performance.

*Hypothesis* 2b. CEO tenure is positively related to investment decision.

*Hypothesis* 2c. Investment decision mediates the relationship between CEO tenure and firm performance.

***2.3 CEO ownership, investment decisions, and firm performance***

CEO ownership is regarded as a characteristic of power (Onali et al., 2016). Adams et al. (2005) reported that the CEO’s ownership and firm performance are positively related. However, few researchers have reported findings that are contrary to it; for example, Fahlenbrach (2009) reported that CEO ownership has a negative effect on firm performance. Paradoxically, Adams and Mehran (2012) showed no significant link between CEO ownership and firm performance.

Jensen (1986) documented that as managers’ ownership increases, their interests get aligned with those of shareholders. Further, the CEOs with larger ownership in firms tend to invest in riskier investments that pay off high returns (May, 1995). Pawlina et al. (2005) reported that as managers’ ownership increases, investment-cash flow sensitivity decreases as co-owner manager also aim towards shareholder wealth maximization. Therefore, agency theory postulates that managers with large stockholdings are more long-term oriented. Paradoxically, Ghosh et al. (2007) found that ownership concentration did not change capital expenditures.

We propose the following hypotheses by linking the above arguments:

*Hypothesis* 3a: CEO ownership is positively related to firm performance.

*Hypothesis* 3b: CEO ownership is positively to investment decision.

*Hypothesis* 3c: Investment decision mediates the relationship between CEO ownership and firm performance.

***2.4 CEO financial education, investment decisions, and firm performance***

Many studies’ subject of focus has been the top director’s education, particularly financial education and its impact on firm performance. CEOs’ with a background in business education show high financial performance (Bertrand & Schoar, 2003). Bhagat et al. (2010) found that managers with financial education help draft a better financial budget plan. However, Gottesman and Morey (2010) negated the above findings, indicating that firms managed by MBA degree holder CEOs’ do not outperform the firms managed by CEOs with no financial background. Koyuncu and Yilmaz (2010) reported that CEOs with technical education surpass performance than CEOs with financial backgrounds. Some studies also posit that a firm performance is not related to CEOs’ education (Fujianti, 2018).

Tyler and Steensma (1998) reported that CEOs with technical education are more aware of new technological advancement; thus, more likely to impact investment positively. Kimberly and Evanisko (1981) found no significant association between various education fields and different levels of innovative investments. However, Ben Mohamed et al. (2014), and Malmendier and Tate (2005) found that CEOs with financial education are less prone to irrational conduct as they understand business markets and macroeconomic policies. These CEOs help firms to reduce average cost as they manage the cost of finance effectively.

We propose the following hypotheses by linking the above arguments:

*Hypothesis* 4a: CEO financial education is positively to firm performance.

*Hypothesis* 4b: CEO financial education is positively related to investment decision.

*Hypothesis* 4c: Investment decision mediates the relationship between CEO financial education and firm performance.

***2.5 CEO career experience, investment decisions, and firm performance***

Career experience is a potent attribute that cannot be ignored in exploring its influence on firm performance. Wang et al. (2016) suggested that the CEO’s prior industry experience and firm’s performance are positively linked. Fischer and Pollock (2004) agree that firm efficiency improves with the depth of a CEO’s previous experiences. However, some studies documented that with more experienced CEOs, they may become overconfident (Ting et al., 2016), which may drag down firm value. Experienced CEOs bring their personal expertise with them and contacts with former colleagues and institutes (Geletkanycz and Boyd, 2011). In addition, extensive career experience leads to extensive social contacts. Hence, a variety of career experiences make executives formulate the right investment strategies by obtaining the right information (Granovetter, 1973). Existing literature also reported that highly experienced CEOs make large investments even if the available funds are not sufficient. This may be because of high experience in investment policies (Virany et al., 1992). Hu and Liu (2015) reported that social links lessen the information asymmetry and open opportunities for external sources of finance. Hence, diversely career experienced CEOs tend to exhibit lower investment-cash flow sensitivity.

We propose the following hypotheses by linking the above arguments:

*Hypothesis* 5a. CEO career experience is positively related to firm performance.

*Hypothesis* 5b. CEO career experience is positively related to investment decision.

*Hypothesis* 5c. Investment decision mediates the relationship between CEO career experience and firm performance.

***2.6 Investment decision and firm performance***

Simsek (2007) reported that firms opt for profitable options because of strategic actions. Investment is one of the strategic actions that can influence firm performance since, investment decisions are related to firm risk (Wang et al., 2016). Woolridge (1988) found an increase in stock price with rise in capital expenditures, R&D expenditures, or new product launches. McConnell and Muscrella (1985) argued that as firms increase their planned capital expenditures, the stock market starts responding positively and vice versa. To put it simply, markets, for the most part, see firm investment increment as a positive sign, which eventually translates into high value for the firm. Thus, we hypothesize as follows:

*Hypothesis* 6: Investment decision is positively related to firm performance.

1. **Data and methodology**

***3.1 Sample and Data Sources***

The initial sample includes all non-financial sector firms listed on the Pakistan Stock Exchange (PSX) as of December 31, 2018. Financial firms are excluded because of higher regulation and different standards for compilation and reporting. The non-financial sector is a crucial part of any stable economy. The purposive sampling technique is used in selecting the firms. From 360 actively trading firms, we screened the data by employing the given criteria: (1) the firm has a complete data of 10 years from 2009-2018; and (2) the firm has a complete data on CEO attributes. After screening the sample based on the mentioned criteria, the final numbers of observations were 1940. The financial information has been collected from firms' annual reports, Pakistan Stock Exchange, and State Bank of Pakistan. The information about CEO attributes has been collected from annual reports of firms and other publicly available/open access sources, such as company websites and LinkedIn profiles of CEOs.

***3.2 Methodology***

Panel data was selected from the non-financial sector of Pakistan’s listed firms during the period of 2009-2018 relating to fourteen different sectors. Fixed-effects panel regression method is used in this study. Baron and Kenny’s (1986) approach is followed to examine the mediating role of investment decision between attributes of the CEO and performance of the firm. Baron and Kenny’s (1986) mediation results were further confirmed by using Sobel test.

***3.3 Variables Description***

Table 1 offers a summary definition of the variables employed.

[Insert Table 1 about here]

***3.4 Model specifications***

In this research, the models are measured with the industry fixed-effects. Industry fixed-effects is estimated to control for time-specific and industry-specific factors that might impact firm performance. Thus, to examine the mediating effect of investment decisions on the relation between CEO attributes and firm performance, the following models are formulated:

*Model 1: CEO attributes and firm performance*

To test the influence of CEO attributes on the firm performance Model (1) is established as follows:

 (1)

where α represents intercept of the model which reflects the constant value of the model;  represents coefficient of respective independent and control variable;  represents four firm performance measures, namely *ROA, ROE, EPS* and *MKTCAP*; represents five CEO attributes namely CEO age, tenure, ownership, financial education and career experience; represents control variable, namely firm age;  represents industry dummy;  represents year dummy; and  represents error term.

*Model 2: CEO attributes and investment decision*

Model (2) is established to test the influence of CEO attributes on investment decisions, replacing firm performance in the model (1).

 (2)

Where represents investment measures of firm *i* at time *t*, namely fixed asset investment. Other notations are the same as in model (1).

*Model 3: Investment decision and firm performance*

To test the effect of investment decisions on the firm performance model (3) is established as follows:

 (3)

Notations used in the model (3) are defined in the model (1) and (2) explanation.

*Model 4: Investment decision as a mediator between CEO attributes and firm performance*

By combining model (2) and (3), we ﬁnd that CEO attributes impact ﬁrm performance through investment decisions. To test the mediating effect of investment decisions on the link between CEO attributes and firm performance, investment; specifically, fixed-asset investment is added in the model (1).

(4)

Where *β*n, where n = z, y, j, k, and represent coefficients of mediating, independent, and control variables respectively. Other notations are explained above.

1. **Empirical results and analysis**

***4.1 Descriptive statistics***

Table 1, presents the descriptive statistics of the sample. The average market capitalization is 21.33. The average *ROA* of 0.09 indicates profit generated from total assets. The *ROE* mean value of 0.09 indicates efficiency of firm’s shareholder equity. The mean for *EPS* is 7.95 and it shows proportion of net income allocated to each common share stock. The average 52.66 of CEO age shows that the majority of CEOs age revolves around 50. The average CEO tenure is about 10.91 years. Furthermore, the average of CEO ownership of 7.153, and it is relatively high. About 47.8 percent of the CEO’s educational background is in finance, economics, or accounting. In terms of career experience, 65.7 percent of CEOs served as chief officer. The average of fixed asset investment is 6.19e+09. The average firm age is approximately 36 years.

[Insert table 2 about here]

***4.2 Correlation Matrix***

The result of correlation analysis is shown in Table 2. The level of statistical significance is checked at the level of 5%. Overall, there is a significant correlation between explanatory variables and firm performance.

[Insert table 3 about here]

***4.3 Regression Results***

*4.3.1 CEO age, investment decisions and firm performance*

Results in Table 3, indicate that the CEO age is positively related with *ROE, EPS, MKTCAP*, and fixed asset investment but negatively related with ROA. Thus, *H1a* is supported broadly and *H1b* in particular. Table 3, results also indicate positive impact of fixed asset investment on *ROA, ROE, EPS*, and *MKTCAP*. Thus, *H6* is supported. As hypothesis, *H1a* has indicated insignificant result with firm measure of *ROA* and *ROE*, the overall results indicate that fixed asset investment does not mediate the relationship of CEO age with *ROA* and *ROE*. With the addition of fixed asset investment, as the regression coefficient of CEO age is reduced from Model (1) to Model (4) with firm measure of *EPS, P/E* and *MKTCAP* so fixed asset investment partially mediate the relationship between CEO age with *EPS* and *MKTCAP*. Thus, overall results lend partial support to *H1c*.

[Insert table 4 about here]

*4.3.2 CEO tenure, investment decisions and firm performance*

Results in Table 4, indicate that CEO tenure is positively related with *ROA, ROE, MKTCAP*, and fixed asset investment but negatively related with *EPS*. Thus, *H2a* is supported broadly and *H2b* in total. With the addition of fixed asset investment, the regression coefficient of CEO tenure is reduced from Model (1) to Model (4) with firm measure of *ROA* and *MKTCAP*, so fixed asset investment partially mediates the relationship between CEO age with *ROA* and *MKTCAP*. As hypothesis, *H2a* has indicated insignificant result with firm measure of *ROE*, the overall results indicate that fixed asset investment does not mediate the relationship of CEO tenure with *ROE*. As hypothesis, *H2a* has not been supported with firm measure of *EPS*, the overall results indicate that fixed asset investment does not mediate the relationship between CEO tenure and *EPS*. These mixed findings lend partial support to *H2c*.

[Insert table 5 about here]

*4.3.3 CEO ownership, investment decision and firm performance*

Results in Table 5, indicate that CEO ownership is positively related with *ROA, ROE, EPS, MKTCAP*, and fixed asset investment. Thus, *H3a* and *H3b* are supported. With the addition of fixed asset investment, CEO ownership impact on *ROA* and *EPS* becomes insignificant. As a result, fixed asset investment has a significant mediating effect between CEO tenure with firm measure of *ROA* and *EPS*. With the addition of fixed asset investment, the regression coefficient of CEO ownership is reduced from Model (1) to Model (4) with firm measure of *ROE* and *MKTCAP*, so fixed asset investment partially mediates the relationship between CEO ownership with firm measure of *ROE* and *MKTCAP*. Thus, *H3c* is supported broadly.

[Insert table 6 about here]

*4.3.4 CEO financial education, investment decision and firm performance*

Results in Table 6, indicate that CEO financial education is positively related with *ROE, EPS, MKTCAP*, and fixed asset investment but negatively related with ROA. Thus, *H4a* is supported broadly and *H4b i*n total. As hypothesis, H4a has indicated insignificant result with firm measure of *ROA*, the overall results indicate that fixed asset investment does not mediate the relationship of CEO financial education with *ROA*. With the addition of fixed asset investment, CEO financial education impact on *EPS* and *MKTCAP* becomes insignificant. As a result, fixed asset investment has a significant mediating effect between CEO financial education with firm measure of *EPS* and *MKTCAP*. Thus, overall *H4c* is partially supported.

[Insert table 7 about here]

*4.3.5 CEO career experience, investment decisions and firm performance*

Results in Table 7, indicate that CEO career experience is positively related with *ROA, EPS, MKTCAP*, and fixed asset investment but negatively related with *ROE*. Thus, *H5a* is supported broadly and *H5b* in total. As hypothesis, H5a has not been supported with firm measure of *ROE*, the overall results indicate that fixed asset investment does not mediate the relationship between CEO career experience and *ROE*. As hypothesis, *H5a* has indicated insignificant result with firm measure of *ROA* and *EPS*, the overall results indicate that fixed asset investment does not mediate the relationship of CEO career experience with firm measure of *ROA* and *EPS.* However, with the addition of fixed asset investment, the regression coefficient of CEO career experience is reduced from Model (1) to Model (4) with firm measure *MKTCAP*, so fixed asset investment partially mediates the relationship of CEO career experience with *MKTCAP*. Thus, overall result indicates *H5c* is partially supported with only market measure of firm performance.

[Insert table 8 about here]

Table 9 Hypotheses Summary

[Insert table 9 about here]

***4.4 Sobel test for significance of investment decision mediation***

Table 9, reports the Sobel test results for significance of investment decision mediation between CEO attributes and firm performance. Panel A *p*-values confirm that fixed asset investment mediates between CEO tenure and *ROA* in all the said relationships. Fixed asset investment reports no mediation between CEO attributes of age, financial education, and career experience with *ROA*. For CEO ownership, there exists a significant mediation of fixed asset investment between CEO ownership and *ROA*.

Panel B *p*-values confirm that fixed asset investment mediate between CEO attributes of ownership and financial education with *ROE* in the said relationships. Fixed asset investment reports no mediation with CEO attributes of age, tenure, and career experience with *ROE*.

Panel C *p*-values confirm that fixed asset investment mediate between CEO age and *ROE* in the said relationships. Fixed asset investment reports significant mediation between CEO ownership and CEO financial education with *EPS*. Fixed asset investment reports no mediation between CEO attributes of tenure and career experience with *EPS*.

Panel D *p*-values confirm that fixed asset investment mediates the link between CEO attributes and *MKTCAP* in all the said relationships. With fixed asset investment as a mediator between CEO financial education and *MKTCAP*, there exists a significant mediation.

[Insert table 10 about here]

**4.5 *Robustness check***

In order to further confirm that the main results of this study are consistent with alternative prime variables a robustness test was performed. Specifically, following Firth et al. (2012) we have examined capital expenditures as stated in the cash ﬂow statement as an alternative measure for capital investment. For instance, this alternative measure test either the mediating role of investment decision remains evident. We have found results overall similar to those reported in the regression results (Table 11a-11e).

1. **Conclusion**

This research investigates the mediating effect of investment decisions between CEO attributes and firm performance. For the said empirical examination, Pakistan’s non-financial sector listed firms from 2009-2018 are explored. This study gives empirical evidence that CEO attributes are positively related with firm performance in general and investment decisions in particular. The important finding is that capital investment partially or significantly mediates between CEO age, tenure, ownership, financial education, and firm performance broadly, and with market-based measures in particular. However, capital investment partially mediates between CEO career experience and market-based performance measures only.

The ensuing results of this investigation could be relied upon in understanding why and how managers matter. The impacts of investment decisions on living standards of a society cannot be denied as it opens the doors for new jobs and paves way for economic growth. It is found that CEOs with long tenure, age, and high ownership; perform better. Moreover, CEOs who are financially educated and have more career experience outperform their counterparts with less education and career experience. We argue that these outcomes can help firm decision makers in their selection and retention of CEOs with particular attributes contingent on firm’s specific needs. Thus, results suggest that refined, active and an independent corporate governance structure may help in enhancing firm performance in emerging economies.

This study will be valuable to many of the firm stakeholders in taking appropriate steps in resolving some of the shareholder's conflict the firm may face concerning the executives. The findings will help shareholders make an informed decision in selecting the right CEO to manage the firm. Further examinations may consider using a few models in setting up the connection between the CEO qualities and firm qualities by utilizing diverse models. Further, emerging economies may need to invest in human capital by creating attractive employment and entrepreneur opportunities to enhance the link between CEO attributes and firm performance. Moreover, favorable external opportunities for long-term investments like tax exemptions, grants, interest free loan, research facilities, and structural reforms like value addition and technology advancement also helps in enhancing the relationship between CEO attributes and firm performance. These measures can eventually help emerging economies governments in achieving macroeconomic objective of lower unemployment and improved economic growth.

This research is not without limitations. The study considers investment decisions as a mediating variable. However, small scale actions by CEOs can also explain firm performance. Future research can focus on mediating roles of cash flow and inventory management. Moreover, the study used only traditional performance measures of the firm. Future research can consider the firm performance measures that have received less attention, for example, firm growth or sales growth, liquidation, etc. Further, the study employed a sample of Pakistan’s non-financial sector firms listed on the stock exchange. It can be extended to other sectors and economies.

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**Table 1.** Variables Description

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Categories** | **Variables** | **Notations** | **Expected Sign** | **Description** |
| Firm Performance | Market Capitalization | MKTCAP | + | It is share price into shares outstanding |
| Return on Asset | ROA | +/- | It is ratio of EBIT to total assets. |
| Return on Equity | ROE | +/- | It is the ratio of net income to shareholder’s equity. |
| Earnings Per Share | EPS | + | It is the ratio of net income to shares issued. |
| CEO  Attributes | CEO age | CEO\_AGE | + | It is calculated by taking the log of age of CEO |
| CEO tenure | CEO\_TEN | + | It is measured as the number of years the CEO maintains the title in the firm. |
| CEO ownership | CEO\_OWN | + | It is calculated as a percentage of shares kept by the CEO to shares outstanding. |
| CEO financial  education | CEO\_FE | + | FE will be 1 if the CEO has a degree in finance or related fields, e.g., economics, commerce, CA, CFA, MBA, otherwise 0. |
| CEO career  experience | CEO\_CE | + | CE takes 1 if the CEO as a chief officer in another firm and 0 otherwise. |
| Investment | Fixed  asset  investment | FAI | + | It is measured as net tangible fixed assets plus depreciation |
| Control  Variable | Firm Age | FA | +/- | It is measured as a log of the current year minus firm incorporation year. |

Data sources: Annual reports of firms, Pakistan Stock Exchange, State Bank of Pakistan and other open sources.

**Table 2.** Descriptive statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables | Obs. | Mean | SD | Min. | Max. |
| MKTCAP | 1940 | 21.33 | 2.21 | 14.98 | 28.01 |
| ROA | 1940 | 0.09 | 0.07 | -0.01 | 0.20 |
| ROE | 1940 | 0.09 | 0.11 | -0.08 | 0.29 |
| EPS | 1940 | 7.95 | 10.51 | 2.38 | 29.74 |
| CEO\_AGE | 1940 | 52.66 | 8.78 | 22 | 78 |
| CEO\_TEN | 1940 | 10.91 | 9.47 | 0 | 32 |
| CEO\_OWN | 1940 | 7.15 | 11.14 | 0 | 39.05 |
| CEO\_FE | 1940 | 0.48 | 0.5 | 0 | 1 |
| CEO\_CE | 1940 | 0.66 | 0.47 | 0 | 1 |
| FAI | 1940 | 6.19e+09 | 2.07e+10 | -4.90e+10 | 2.09e+11 |
| FA | 1940 | 35.91 | 0.83 | 11 | 69 |

**Table 3.** Correlation Matrix

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ROA | ROE | EPS | MKTCAP | CEO\_  OWN | CEO\_  CE | CEO\_  TEN | CEO\_  AGE | CEO\_  FE | FAI | FA |
| ROA | 1 |  |  |  |  |  |  |  |  |  |  |
| ROE | 0.67\* | 1 |  |  |  |  |  |  |  |  |  |
| EPS | 0.56\* | 0.59\* | 1 |  |  |  |  |  |  |  |  |
| MKTCAP | 0.35\* | 0.28\* | 0.34\* | 1 |  |  |  |  |  |  |  |
| CEO\_OWN | 0.1\* | 0.07\* | 0.16\* | 0.26\* | 1 |  |  |  |  |  |  |
| CEO\_CE | 0.05 | -0.01 | 0.05 | 0.2\* | -0.06\* | 1 |  |  |  |  |  |
| CEO\_TEN | 0.12\* | 0.05 | -0.01 | 0.28\* | 0.28\* | -0.27\* | 1 |  |  |  |  |
| CEO\_AGE | -0.02 | 0.01 | 0.02\* | 0.02\* | -0.04 | 0.11\* | 0.37\* | 1 |  |  |  |
| CEO\_FE | -0.03 | 0.03\* | 0.1\* | 0.11\* | 0.02 | -0.04 | -0.08\* | -0.36\* | 1 |  |  |
| FAI | 0.01\* | 0.01\* | 0.01\* | 0.4\* | 0.13\* | 0.15\* | 0.16\* | 0.02\* | 0.34\* | 1 |  |
| FA | 0.05\* | 0.61\* | 0.15\* | 0.14\* | 0.29\* | 0.39\* | 0.37\* | 0.29\* | 0.68\* | 0.25\* | 1 |

**Note: \*** 5% significance level.

**Table 4.** Mediation Analysis: CEO age, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  FAI | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO age | -0.0004  (-0.83) | 0.057\*  (0.16) |  | -0.005  (-0.34) | 0.001  (1.19) |  | 0.018  (0.67) | 0.091\*  (1.93) |  | 0.036\*  (1.94) | 0.049\*\*\*  (7.28) |  | 0.031\*\*\*  (5.59) |
| FAI |  |  | 0.002\*  (1.8) | 0.002\*  (1.8) |  | 0.007\*  (0.1) | -0.000  (-0.01) |  | 0.4\*\*\*  (3.1) | 0.398\*\*\*  (3.1) |  | 0.106\*\*\*  (6.94) | 0.106\*\*\*  (6.98) |
| Firm age | -0.047\*\*\*  (-4.55) | 2.169\*\*\*  (10.19) | -0.019\*\*  (-2.19) | -0.018\*\*  (-1.97) | 0.047\*\*\*  (-2.45) | 0.297  (0.46) | -0.009  (-0.54) | 3.234\*\*\*  (3.7) | 2.482\*\*  (2.28) | 1.78  (1.55) | 2.917\*\*\*  (19.44) | 2.845\*\*\*  (22.02) | 2.606\*\*\*  (19.3) |
| Constant | 0.246\*\*\*  (7.17) | 12.59\*\*\*  (9.46) | 0.198\*\*\*  (6.16) | 0.214\*\*\*  (3.68) | 0.174\*\*\*  (2.71) | -0.997  (-0.42) | 0.058  (0.55) | -10.473\*\*\*  (-3.14) | -8.41\*\*  (-2.13) | 19.94\*\*\*  (-2.79) | 8.433\*\*\*  (16.76) | 9.555\*\*\*  (20.39) | 5.631\*\*\*  (6.69) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.066 | 0.013 | 0.013 | 0.009 | 0.002 | 0.003 | 0.103 | 0.13 | 0.093 | 0.309 | 0.284 | 0.297 |
| F-stats | 4.99 | 58.85 | 5.39 | 3.63 | 2.31 | 0.13 | 0.19 | 38.44 | 9.94 | 7.89 | 109.33 | 327.81 | 232.95 |
| *p*-value | 0.000 | 0.000 | 0.005 | 0.013 | 0.032 | 0.879 | 0.903 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 5.** Mediation Analysis: CEO tenure, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | | (2)  FAI | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO tenure | 0.005\*\*  (2.02) | 0.01\*  (0.17) | |  | 0.002\*  (1.87) | 0.009  (0.91) |  | 0.009  (1.96) | -0.005  (-0.11) |  | 0.332  (1.13) | 0.029\*\*\*  (4.3) |  | 0.013\*  (1.85) |
| FAI |  |  | | 0.002\*  (1.8) | 0.002\*  (1.85) |  | 0.007\*  (0.1) | 0.0002\*  (0.08) |  | 0.4\*\*\*  (3.1) | 0.369\*\*\*  (2.77) |  | 0.106\*\*\*  (6.94) | 0.197\*\*\*  (11.27) |
| Firm age | -0.047\*\*\*  (-4.55) | 2.33\*\*\*  (10.59) | | -0.019\*\*  (-2.19) | -0.028\*\*\*  (-2.92) | -0.047\*\*\*  (-2.45) | 0.297  (0.46) | -0.022  (-1.28) | 3.234\*\*\*  (3.7) | 2.482\*\*  (2.28) | 1.87  (1.6) | 2.917\*\*\*  (19.44) | 2.845\*\*\*  (22.02) | -0.017  (-1.23) |
| Constant | 0.246\*\*\*  (7.17) | 12.157\*\*\*  (16.3) | | 0.198\*\*\*  (6.16) | 0.219\*\*\*  (6.48) | 0.174\*\*\*  (2.71) | -0.997  (-0.42) | 0.152\*\*  (2.49) | -10.473\*\*\*  (-3.14) | -8.41\*\*  (-2.13) | -6.326  (-1.53) | 8.433\*\*\*  (16.76) | 9.555\*\*\*  (20.39) | 17.18\*\*\*  (47.88) |
| Obs. | 1940 | 1940 | | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.071 | | 0.013 | 0.019 | 0.009 | 0.002 | 0.004 | 0.103 | 0.13 | 0.108 | 0.309 | 0.284 | 0.53 |
| F-stats | 4.99 | 57.23 | | 5.39 | 6.00 | 2.31 | 0.13 | 1.67 | 38.44 | 9.94 | 5.25 | 109.33 | 327.81 | 44.86 |
| *p*-value | 0.000 | 0.000 | | 0.005 | 0.000 | 0.032 | 0.879 | 0.903 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 6.** Mediation Analysis: CEO ownership, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  FAI | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO ownership | 0.001\*\*  (2.26) | 0.02\*  (0.04) |  | 0.026  (1.25) | 0.006\*\*  (2.4) |  | 0.001\*  (1.73) | 0.19\*\*  (2.49) |  | 3.198  (1.25) | 0.020\*  (1.87) |  | 0.012\*\*\*  (3.5) |
| FAI |  |  | 0.002\*  (1.8) | 0.002\*  (1.82) |  | 0.007\*  (0.1) | 0.0002\*  (0.01) |  | 0.4\*\*\*  (3.1) | 0.4\*\*\*  (3.1) |  | 0.106\*\*\*  (6.94) | 0.194\*\*\*  (10.87) |
| Firm age | -0.047\*\*\*  (-4.55) | 2.184\*\*\*  (10.85) | -0.019\*\*  (-2.19) | -0.019\*\*  (-2.12) | -0.047\*\*\*  (-2.45) | 0.297  (0.46) | -0.005  (-0.28) | 3.234\*\*\*  (3.7) | 2.482\*\*  (2.28) | 2.513\*\*  (2.31) | 2.917\*\*\*  (19.44) | 2.845\*\*\*  (22.02) | -0.017  (-1.28) |
| Constant | 0.246\*\*\*  (7.17) | 12.765\*\*\*  (18.58) | 0.198\*\*\*  (6.16) | 0.198\*\*\*  (6.17) | 0.174\*\*\*  (2.71) | -0.997  (-0.42) | 0.118\*\*  (2.04) | -10.473\*\*\*  (-3.14) | -8.41\*\*  (-2.13) | -8.263\*\*  (-2.1) | 8.433\*\*\*  (16.76) | 9.555\*\*\*  (20.39) | 17.104\*\*\*  (47.17) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.066 | 0.013 | 0.007 | 0.009 | 0.002 | 0.01 | 0.103 | 0.13 | 0.142 | 0.309 | 0.284 | 0.658 |
| F-stats | 4.99 | 58.92 | 5.39 | 4.07 | 2.31 | 0.13 | 1.03 | 38.44 | 9.94 | 7.15 | 109.33 | 327.81 | 45.16 |
| *p*-value | 0.000 | 0.000 | 0.005 | 0.007 | 0.032 | 0.879 | 0.376 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 7.** Mediation Analysis: CEO financial education, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  FAI | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO financial education | -0.002  (-0.16) | 0.285\*  (1.49) |  | -0.011  (-1.36) | 0.028\*  (1.47) |  | 0.003\*  (0.21) | 1.883\*\*  (2.09) |  | 0.333  (0.33) | 0.419\*\*\*  (2.83) |  | 0.212  (1.58) |
| FAI |  |  | 0.002\*  (1.8) | 0.002\*  (1.75) |  | 0.007\*  (0.1) | 0.0002\*  (0.01) |  | 0.4\*\*\*  (3.1) | 0.401\*\*\*  (3.11) |  | 0.106\*\*\*  (6.94) | 0.19\*\*\*  (11.33) |
| Firm age | -0.047\*\*\*  (-4.55) | 2.141\*\*\*  (10.57) | -0.019\*\*  (-2.19) | -0.018\*\*  (-2.02) | -0.047\*\*\*  (-2.45) | 0.297  (0.46) | -0.006  (-0.37) | 3.234\*\*\*  (3.7) | 2.482\*\*  (2.28) | 2.524\*\*  (2.3) | 2.917\*\*\*  (19.44) | 2.845\*\*\*  (22.02) | -0.018  (-1.33) |
| Constant | 0.246\*\*\*  (7.17) | 12.771\*\*\*  (18.62) | 0.198\*\*\*  (6.16) | 0.197\*\*\*  (6.14) | 0.174\*\*\*  (2.71) | -0.997  (-0.42) | 0.116\*\*  (2.01) | -10.473\*\*\*  (-3.14) | -8.41\*\*  (-2.13) | -8.418\*\*  (-2.14) | 8.433\*\*\*  (16.76) | 9.555\*\*\*  (20.39) | 17.46\*\*\*  (51.11) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.068 | 0.013 | 0.019 | 0.009 | 0.002 | 0.002 | 0.103 | 0.13 | 0.119 | 0.309 | 0.284 | 0.575 |
| F-stats | 4.99 | 58.98 | 5.39 | 4.21 | 2.31 | 0.13 | 0.06 | 38.44 | 9.94 | 6.66 | 109.33 | 327.81 | 45.55 |
| *p*-value | 0.000 | 0.000 | 0.005 | 0.006 | 0.032 | 0.879 | 0.982 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 8.** Mediation Analysis: CEO career experience, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  FAI | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO career experience | 0.017  (1.33) | 0.142\*  (0.69) |  | 0.014  (1.31) | -0.022  (-0.9) |  | 0.0007  (0.04) | 0.857  (0.82) |  | 0.742  (0.69) | 0.378\*\*  (1.97) |  | 0.223\*\*  (2.36) |
| FAI |  |  | 0.002\*  (1.8) | 0.002\*  (1.82) |  | 0.007\*  (0.1) | -7.85  (-0.00) |  | 0.4\*\*\*  (3.1) | 0.401\*\*\*  (3.12) |  | 0.106\*\*\*  (6.94) | 0.193\*\*\*  (11.53) |
| Firm age | -0.047\*\*\*  (-4.55) | 2.166\*\*\*  (10.75) | -0.019\*\*  (-2.19) | -0.02\*\*  (-2.21) | -0.047\*\*\*  (-2.45) | 0.297  (0.46) | -0.006  (-0.34) | 3.234\*\*\*  (3.7) | 2.482\*\*  (2.28) | 5.576\*\*  (2.36) | 2.917\*\*\*  (19.44) | 2.845\*\*\*  (22.02) | -0.018  (-1.36) |
| Constant | 0.246\*\*\*  (7.17) | 12.919\*\*\*  (18.31) | 0.198\*\*\*  (6.16) | 0.189\*\*\*  (5.67) | 0.174\*\*\*  (2.71) | -0.997  (-0.42) | 0.116\*  (1.92) | -10.473\*\*\*  (-3.14) | -8.41\*\*  (-2.13) | -9.25\*\*  (-2.29) | 8.433\*\*\*  (16.76) | 9.555\*\*\*  (20.39) | 17.21\*\*\*  (47.27) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.065 | 0.013 | 0.008 | 0.009 | 0.002 | 0.002 | 0.103 | 0.13 | 0.131 | 0.309 | 0.284 | 0.541 |
| F-stats | 4.99 | 58.36 | 5.39 | 4.41 | 2.31 | 0.13 | 0.04 | 38.44 | 9.94 | 6.92 | 109.33 | 327.81 | 46.42 |
| *p*-value | 0.000 | 0.000 | 0.005 | 0.006 | 0.032 | 0.879 | 0.988 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 9.** Sobel test results

|  |  |  |  |
| --- | --- | --- | --- |
| Panel A: Return on assets | | | |
| Variable | Fixed asset investment | | |
| t-statistics | standard error | p-value |
| CEO tenure | 1.6452 | 0.004 | 0.0518 |
| Panel B: Return on equity | | | |
| Variable | Fixed asset investment | | |
| t-statistics | standard error | p-value |
| CEO ownership | 2.1807 | 0.0015 | 0.0292 |
| CEO financial education | 1.7581 | 0.1023 | 0.0567 |
| Panel C: Earnings per share | | | |
| Variable | Fixed asset investment | | |
| t-statistics | standard error | p-value |
| CEO age | 1.9287 | 0.1399 | 0.0706 |
| Panel D: Market capitalisation | | | |
| Variable | Fixed asset investment | | |
| t-statistics | standard error | p-value |
| CEO age | 1.1630 | 0.8370 | 0.0704 |
| CEO tenure | 1.7457 | 0.1678 | 0.0561 |
| CEO ownership | 2.047 | 0.0519 | 0.0374 |
| CEO career experience | 2.497 | 0.1363 | 0.012 |

Table 10: Hypotheses Summary

|  |  |  |
| --- | --- | --- |
| **No.** | **Statement** | **Remarks** |
| H1 | CEO attributes is positively related to firm performance. | Generally Supported |
| H2 | CEO attributes is positively to investment decision. | Supported |
| H3 | Investment decision is positively to firm performance. | Supported |
| H4 | Investment decision mediates the relationship between CEO attributes and firm performance. | Partially supported |

**Table 11a.** Mediation Analysis: CEO age, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  CAPEX | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO age | -0.0004  (-0.83) | 0.014\*  (1.89) |  | -0.000  (-0.42) | 0.001  (1.19) |  | 0.0004  (0.8) | 0.091\*  (1.93) |  | 0.064\*\*  (1.74) | 0.049\*\*\*  (7.28) |  | 0.029\*\*\*  (6.98) |
| CAPEX |  |  | 0.002\*\*  (2.4) | -0.001  (-0.42) |  | 0.006\*\*\*  (4.51) | 0.003  (1.51) |  | 0.568\*\*\*  (4.65) | 0.558\*\*\*  (4.56) |  | 0.162\*\*\*  (11.49) | 0.162\*\*\*  (11.51) |
| Firm age | -0.047\*\*\*  (-4.55) | 0.892\*\*\*  (4.04) | -0.008  (-1.57) | -0.23\*\*  (-2.56) | 0.047\*\*\*  (-2.45) | -0.002  (-0.3) | -0.015  (-0.9) | 3.234\*\*\*  (3.7) | 2.831\*\*\*  (2.68) | 2.215\*\*  (1.99) | 2.917\*\*\*  (19.44) | 2.938\*\*\*  (24.07) | 2.658\*\*\*  (21.4) |
| Constant | 0.246\*\*\*  (7.17) | 14.902\*\*\*  (20.51) | 0.083\*\*\*  (3.59) | 0.19\*\*\*  (5.71) | 0.174\*\*\*  (2.71) | -0.016  (-0.43) | 0.074  (1.21) | -10.473\*\*\*  (-3.14) | -12.15\*\*\*  (-3.02) | -13.215\*\*\*  (-3.25) | 8.433\*\*\*  (16.76) | 8.324\*\*\*  (17.86) | 6.987\*\*\*  (7.97) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.016 | 0.067 | 0.005 | 0.009 | 0.132 | 0.035 | 0.103 | 0.219 | 0.199 | 0.309 | 0.319 | 0.315 |
| F-stats | 4.99 | 13.92 | 7.78 | 3.06 | 2.31 | 20.31 | 1.09 | 38.44 | 16.13 | 11.78 | 109.33 | 394.43 | 215.87 |
| *p*-value | 0.000 | 0.000 | 0.02 | 0.027 | 0.032 | 0.000 | 0.351 | 0.000 | 0.000 | 0.0000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 11b.** Mediation Analysis: CEO tenure, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | | (2)  CAPEX | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO tenure | 0.005\*\*  (2.02) | 0.025\*  (0.42) | |  | 0.001\*  (1.74) | 0.009  (0.91) |  | 0.007\*  (1.7) | -0.005  (-0.11) |  | 0.293  (1.00) | 0.029\*\*\*  (4.3) |  | 0.017\*\*  (2.48) |
| CAPEX |  |  | | 0.002\*\*  (2.4) |  |  | 0.006\*\*\*  (4.51) |  |  | 0.568\*\*\*  (4.65) |  |  | 0.162\*\*\*  (11.49) | 0.205\*\*\*  (11.96) |
| Firm age | -0.047\*\*\*  (-4.55) |  | | -0.008  (-1.57) | 0.0008\*  (0.81) | -0.047\*\*\*  (-2.45) | -0.002  (-0.3) | 0.003  (1.39) | 3.234\*\*\*  (3.7) | 2.831\*\*\*  (2.68) | 0.564\*\*\*  (0.45) | 2.917\*\*\*  (19.44) | 2.938\*\*\*  (24.07) | -0.014  (-1.06) |
| Constant | 0.246\*\*\*  (7.17) | 1.101\*\*\*  (4.85) | | 0.083\*\*\*  (3.59) | -0.33\*\*\*  (-3.57) | 0.174\*\*\*  (2.71) | -0.016  (-0.43) | -0.024  (-1.43) | -10.473\*\*\*  (-3.14) | -12.15\*\*\*  (-3.02) | 2.325\*\*  (2.06) | 8.433\*\*\*  (16.76) | 8.324\*\*\*  (17.86) | 17.27\*\*\*  (52.39) |
| Obs. | 1940 | 14.924\*\*\*  (19.37) | | 1940 | 0.212\*\*\*  (6.11) | 1940 | 1940 | 0.115\*  (1.81) | 1940 | 1940 | -10.923\*\*  (-2.58) | 1940 | 1940 | 1940 |
| Industry dummy | Yes | 1940 | | Yes | 1940 | Yes | Yes | 1940 | Yes | Yes | 1940 | Yes | Yes | Yes |
| Year dummy | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | Yes | | 0.067 | Yes | 0.009 | 0.132 | Yes | 0.103 | 0.219 | Yes | 0.309 | 0.319 | 0.505 |
| F-stats | 4.99 | 0.015 | | 7.78 | 0.011 | 2.31 | 20.31 | 0.006 | 38.44 | 16.13 | 0.203 | 109.33 | 394.43 | 50.67 |
| *p*-value | 0.000 | 11.77 | | 0.02 | 5.32 | 0.032 | 0.000 | 1.97 | 0.000 | 0.000 | 9.49 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 11c.** Mediation Analysis: CEO ownership, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  CAPEX | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO ownership | 0.001\*\*  (2.26) | 0.095\*  (0.21) |  | 0.023  (1.24) | 0.006\*\*  (2.4) |  | 0.0004\*  (1.29) | 0.19\*\*  (2.49) |  | 1.542  (0.69) | 0.020\*  (1.87) |  | 0.014\*\*\*  (3.5) |
| CAPEX |  |  | 0.002\*\*  (2.4) | 0.001\*  (0.59) |  | 0.006\*\*\*  (4.51) | 0.003\*  (1.54) |  | 0.568\*\*\*  (4.65) | 0.568\*\*\*  (0.42) |  | 0.162\*\*\*  (11.49) | 0.194\*\*\*  (10.87) |
| Firm age | -0.047\*\*\*  (-4.55) | 1.03\*\*\*  (4.93) | -0.008  (-1.57) | -0.024\*\*\*  (-2.78) | -0.047\*\*\*  (-2.45) | -0.002  (-0.3) | -0.01  (-0.63) | 3.234\*\*\*  (3.7) | 2.831\*\*\*  (2.68) | 2.85\*\*\*  (2.7) | 2.917\*\*\*  (19.44) | 2.938\*\*\*  (24.07) | -0.017  (-1.28) |
| Constant | 0.246\*\*\*  (7.17) | 15.15\*\*\*  (21.21) | 0.083\*\*\*  (3.59) | 0.188\*\*\*  (5.72) | 0.174\*\*\*  (2.71) | -0.016  (-0.43) | 0.082  (1.36) | -10.473\*\*\*  (-3.14) | -12.15\*\*\*  (-3.02) | -12.095\*\*\*  (-3.0) | 8.433\*\*\*  (16.76) | 8.324\*\*\*  (17.86) | 17.104\*\*\*  (47.17) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.014 | 0.067 | 0.006 | 0.009 | 0.132 | 0.074 | 0.103 | 0.219 | 0.228 | 0.309 | 0.319 | 0.658 |
| F-stats | 4.99 | 12.19 | 7.78 | 3.45 | 2.31 | 20.31 | 1.42 | 38.44 | 16.13 | 10.91 | 109.33 | 394.43 | 45.16 |
| *p*-value | 0.000 | 0.000 | 0.02 | 0.016 | 0.032 | 0.000 | 0.236 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 11d.** Mediation Analysis: CEO financial education, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  CAPEX | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO financial education | -0.002  (-0.16) | 0.097\*  (0.49) |  | -0.008  (-0.97) | 0.028\*  (1.47) |  | 0.013\*  (0.87) | 1.883\*\*  (2.09) |  | 0.046  (0.42) | 0.419\*\*\*  (2.83) |  | 0.389\*\*\*  (2.93) |
| CAPEX |  |  | 0.002\*\*  (2.4) | -0.0006  (-0.59) |  | 0.006\*\*\*  (4.51) | 0.003\*  (1.56) |  | 0.568\*\*\*  (4.65) | 0.568\*\*\*  (4.65) |  | 0.162\*\*\*  (11.49) | 0.202\*\*\*  (12.45) |
| Firm age | -0.047\*\*\*  (-4.55) | 1.041\*\*\*  (4.94) | -0.008  (-1.57) | -0.023\*\*\*  (-2.7) | -0.047\*\*\*  (-2.45) | -0.002  (-0.3) | -0.013  (-0.79) | 3.234\*\*\*  (3.7) | 2.831\*\*\*  (2.68) | 2.825\*\*\*  (-2.56) | 2.917\*\*\*  (19.44) | 2.938\*\*\*  (24.07) | -0.016  (-1.2) |
| Constant | 0.246\*\*\*  (7.17) | 15.167\*\*\*  (21.25) | 0.083\*\*\*  (3.59) | 0.188\*\*\*  (5.72) | 0.174\*\*\*  (2.71) | -0.016  (-0.43) | 0.08  (1.34) | -10.473\*\*\*  (-3.14) | -12.15\*\*\*  (-3.02) | -12.14\*\*\*  (-3.01) | 8.433\*\*\*  (16.76) | 8.324\*\*\*  (17.86) | 17.431\*\*\*  (56.15) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.014 | 0.067 | 0.006 | 0.009 | 0.132 | 0.049 | 0.103 | 0.219 | 0.22 | 0.309 | 0.319 | 0.52 |
| F-stats | 4.99 | 12.21 | 7.78 | 3.31 | 2.31 | 20.31 | 1.13 | 38.44 | 16.13 | 10.74 | 109.33 | 394.43 | 55.57 |
| *p*-value | 0.000 | 0.000 | 0.02 | 0.02 | 0.032 | 0.000 | 0.336 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.

**Table 11e.** Mediation Analysis: CEO career experience, investment decision, and firm performance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1)  ROA | (2)  CAPEX | (3)  ROA | (4)  ROA | (1)  ROE | (3)  ROE | (4)  ROE | (1)  EPS | (3)  EPS | (4)  EPS | (1)  MKTCAP | (3)  MKTCAP | (4)  MKTCAP |
| CEO career experience | 0.017  (1.33) | 0.56\*\*  (2.57) |  | 0.006  (0.69) | -0.022  (-0.9) |  | 0.004  (0.22) | 0.857  (0.82) |  | 0.072  (0.07) | 0.378\*\*  (1.97) |  | 0.072  (0.39) |
| CAPEX |  |  | 0.002\*\*  (2.4) | -0.0006  (-0.62) |  | 0.006\*\*\*  (4.51) | 0.003  (1.53) |  | 0.568\*\*\*  (4.65) | 0.567\*\*\*  (4.63) |  | 0.162\*\*\*  (11.49) | 0.202\*\*\*  (12.37) |
| Firm age | -0.047\*\*\*  (-4.55) | 1.046\*\*\*  (5.01) | -0.008  (-1.57) | -0.025\*\*\*  (-2.92) | -0.047\*\*\*  (-2.45) | -0.002  (-0.3) | -0.011  (-0.68) | 3.234\*\*\*  (3.7) | 2.831\*\*\*  (2.68) | 2.843\*\*\*  (-2.56) | 2.917\*\*\*  (19.44) | 2.938\*\*\*  (24.07) | -0.016  (-1.19) |
| Constant | 0.246\*\*\*  (7.17) | 14.729\*\*\*  (20.1) | 0.083\*\*\*  (3.59) | 0.187\*\*\*  (5.59) | 0.174\*\*\*  (2.71) | -0.016  (-0.43) | 0.079  (1.29) | -10.473\*\*\*  (-3.14) | -12.15\*\*\*  (-3.02) | -12.22\*\*\*  (-2.98) | 8.433\*\*\*  (16.76) | 8.324\*\*\*  (17.86) | 17.57\*\*\*  (54.67) |
| Obs. | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R2 | 0.02 | 0.018 | 0.067 | 0.006 | 0.009 | 0.132 | 0.066 | 0.103 | 0.219 | 0.22 | 0.309 | 0.319 | 0.612 |
| F-stats | 4.99 | 15.45 | 7.78 | 3.35 | 2.31 | 20.31 | 0.9 | 38.44 | 16.13 | 10.75 | 109.33 | 394.43 | 52.44 |
| *p*-value | 0.000 | 0.000 | 0.02 | 0.018 | 0.032 | 0.000 | 0.442 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

The values presented in the table against each variable are the standardized coefficients of the explained variables; t-values in parentheses. \*, \*\*, \*\*\* denote statistically significant at the 10%, 5% and 1% significance level respectively.