The mediating role of operating performance on the association between BOD features and firm financial performance. An Applied Study on the Egyptian Stock Market

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Operating performance, financial performance, BOD characteristics

Abstract

Purpose: This paper examines the influence of operating performance as a mediator variable on the relationships between the various characteristics of the Board of directors and firms' financial performance, as measured by return on average total assets and the ratio of Earning per ordinary share, for nonfinancial firms listed on the Egyptian stock market.

Methodology: A multiple regression analysis and path analysis are performed to explain the four models employed for a sample of (26) non-financial Egyptian firms from 2018 to 2021. Five principal hypotheses are examined, H_{O1}: there is no statistically significant influence at the level of significance ($a \leq 0.05$) for the Board of Directors' characteristics on EPS. H_{O2}: there is no statistically significant influence at the level of significance ($a \leq 0.05$) for the Board of Directors' characteristics on ROA. H_{O3}: there is no statistically significant influence at the level of significance ($a \leq 0.05$) for the characteristics of the Board of Directors on ATO. H_{O4}: there is no statistically significant influence at the level of significance ($a \leq 0.05$) for the characteristics of the Board of Directors on OPM. H_{05}: operational performance has no significant impact on the relationship between the Board of Directors' characteristics and firm financial performance measured by ROA and EPS.

Findings: Consistent with the majority of prior research, this study's findings indicate that Board of director characteristics have a positive, significant influence on firm financial performance during the study period. Additionally, BOD characteristics affect operating performance in a positive direction, particularly asset turnover. In addition, a path analysis reveals that operating performance acts as a positive mediator in this relationship.

Introduction

The separation of ownership and management has resulted in various arguments regarding the relationship between the principal and the agent, resulting in the well-known agency problem (Stewardship theory). In addition, the recent financial crisis has revealed weaknesses in corporate governance, the complexity of the corporate governance structures of certain companies, their lack of transparency, and their inability to both respond to the crisis and determine the organizational chain of responsibility adequately. The board of directors and its characteristics are essential elements of corporate governance that contribute to mitigating this issue.

For that reason, Numerous researchers investigate the relation between BOD treats and firm performance, but most of the focus only on measuring financial performance and ignoring operating performance, Accordingly, the purpose of this paper is to validate the function of operating performance as a mediator variable affected by BOD actions and therefore influencing the financial performance of the firm applying to non-financial listed companies in the Egyptian stock market.

Literature Review

Since the term "Corporate Governance" encompasses so many different aspects of business, including economics, finance, organization, and society, economists, analysts, and legal experts have not been able

to settle on a single, universal definition. This has far-reaching implications for the economy and the social fabric. However, the main definition of corporate governance is still being worked on by various professional and scientific groups. Institutional governance is the system by which shareholders and directors monitor the actions of corporate management and direct it in areas such as the finance department. Characteristics of the board of directors (BOD) can also affect several managerial facets of a company (Yaseen and Amarneh,2013). Management, as defined by the International Monetary Fund, is the procedure by which businesses are guided and kept under watch. They also claim that excellent governance protects against poor management and contributes to the efficiency and effectiveness of businesses. In addition to increasing accountability and transparency to investors, it equips businesses with the resources necessary to address issues raised by other stakeholders. On the other hand, (Bouslimah, 2018)

Academics and researchers have pioneered the study of corporate governance in recent years and up to the present day. This is especially so now, because the Enron crisis marked a watershed moment for agricultural production everywhere. As a result, it is crucial for a business to establish its credibility, maintain operations, and attract as many investors as possible. This drives up the share price and helps slow the emergence of new competitors. Additionally, it raises the bar for corporate leadership. In addition to encouraging increased transparency on the part of businesses, this also boosts trust in the reliability of the financial reports those businesses publish. Institutional governance is the process by which an organization determines its mission and strategies for achieving that mission. It provides the Board of Directors with reasonable and suitable incentives to monitor and improve performance and the control process (Darmadi, 2013).Therefore, the BOD characteristic is a good tool that enables society to ensure that companies are well managed in a scientific and practical manner that leads to the protection of shareholders' funds, and the provision of fair and transparent information to all parties related to companies. Accordingly, it is considered a good tool for judging the performance of companies' boards of directors and holding them accountable. BOD characteristics aim to set principles and controls that provide the required transparency, and justice, and grant the right to the accountability of the company's management, thus achieving protection for shareholders and stakeholders, encouraging investment growth, increasing savings, and increasing profitability in order to create job opportunities.

Using different variables for BOD, such as the number of meetings, the board size, ownership concentration, executive non-executive members, and board diversity, many research papers have attempted to capture the relationship between BOD characteristics and firm performance for many years. In addition, financial performance is measured using a variety of metrics, including return on assets (ROA), return on equity (ROE), earnings per share (EPS), and the Tobin-Q ratio (Piece/Book), among others. In the following section, some of these studies will be presented in reverse chronological order.

Alodat et al., (2021), As measures of institutional governance, the study evaluated the impact of the characteristics of the board of directors, the audit committee, and the ownership structure on financial performance. The research validated the application of Resource dependency theory and agency theory to firms with sound corporate governance. Between 2014 and 2018, 81 non-financial public shareholding companies were listed on the Amman Stock Exchange. In addition to the Board of Directors and the Audit Committee, companies utilized return on equity (ROE) and the Tobin Q ratio as performance indicators. In addition to institutional ownership percentage and foreign ownership as indices of institutional governance, we also examine foreign ownership. The study indicated that the board of directors and audit committee have a good and moral impact on the study's metrics. In addition, it was found that ownership structure characteristics (foreign and institutional ownership) have a positive and moral effect on the return on equity (ROE), but a negative effect on the Tobin-Q ratio.

Guluma (2021), This research examines the influence of BOD characteristics (CG) metrics on business performance, highlighting the significance of management behavior in the Chinese listed corporation. From 2010 to 2018, panel data of 11,634 samples of Chinese listed enterprises was utilized. The paper builds a Generalized Method of Moments estimate model for the system. As a measure of internal CG, this CG mechanism evaluates internal and external corporate governance, independent board, dual board leadership, and ownership concentration. In contrast, debt finance and product market rivalry are external CG indicators. Concerning managerial arrogance, it was measured by corporate earnings estimates,

whereas the success of a company is measured by ROA and Tobin-Q ratio. This study revealed that ownership concentration and product market competitiveness have a favorable correlation with ROA and Tobin-Q ratio measures of firm performance. Dual leadership has a negative association with to the bin-Q ratio, and debt financing has a negative impact on ROA and Tobin-Q ratio. In addition, the data demonstrated that managerial overconfidence negatively affects the association between board independence, dual leaders and ownership concentration and, business performance. In contrast, it moderates a positive effect of debt financing on firm performance as measured by Tobin's-Q and a negative effect of debt funding on operational firm performance. Therefore, this study plays an essential management function for policymakers seeking to improve BOD features in emerging market economies.

Almusattar and Teker (2020), This study explored the correlation between commercial bank performance and corporate governance elements. During the period covered by (Financial Times Stock Exchange 100) (FTSE 100) data businesses, a study was undertaken on commercial banks listed on the London Stock Exchange (LSE) in the United Kingdom (2010-2019). As of December 2020, the sample comprised the ten largest LSE-listed banks by market capitalization. Using a data panel method with descriptive and correlational analysis the seven primary variables used to measure BOD characteristics are the size of the board of directors, its independence, the percentage of foreign ownership, the bank's ownership structure, the Audit committee ladies' council, financial leverage, and its impact on the financial performance of a commercial bank in the Kingdom. Financial success is measured using the return on average assets (ROA) ratio, the return on equity (ROE) ratio and to the bin-Q ratio. The internal BOD characteristics mechanism (the Council of management) has a significant influence on the performance of banks as assessed by ROA, ROE, and Tobin-Q ratio.

Al Alimat (2019), the study revealed the impact of BOD characteristics on the quality of financial reports in Iraqi commercial banks. The study population consisted of eleven banks, and 146 questions were distributed in Iraq to branch and finance managers, internal auditors, and the board of directors. The study employed descriptive Analytical methodology and hypothesis testing; The results demonstrated that BOD characteristics have a significant impact on the quality of financial reports in Iraqi commercial banks. The study recommended that the bank's commitment to corporate governance policies and principles be followed up with concrete actions.

Al-Ajmaa (2019) examined the extent to which the legal regulation of government-owned commercial companies is met, or the so-called public sector companies in both the Republic of Yemen and the Kingdom of Jordan, in accordance with the Principles of Public Sector Governance of the Organization for Economic Co-operation and Development (OECD) and the United Nations Convention against Corruption. This is accomplished by elucidating what is meant by good governance in the public sector and its role in supporting the economic systems of countries, in addition to the government's efforts to combat corruption, in order to determine if they are sufficient or if there are deficiencies in the legislative or constitutional rules needed to bring about the necessary change. The researcher has reached the conclusion that the Arab region, including Yemen, has not benefited as much as developed nations from globalization in the areas of governance and fighting corruption. The study presented a set of recommendations for achieving a situation comparable to that of other nations practicing good governance, namely the need to enact the necessary legislation to develop viable integrated work systems. The subsequent issue should be committed to, implemented, and evaluated openly.

Oyedokun (2019), The purpose of this study was to examine the effect of BOD characteristics on the quality of financial reports in Nigeria. In addition, it demonstrates the influence of BOD characteristics on the timing of financial reports for listed banks in Nigeria. As a statistical technique, the research employed a descriptive and correlational analysis. The findings revealed a correlation between BOD characteristics and the quality of financial reports in Nigeria. The size of the board of directors has a negative correlation with the timing of financial reports. In addition, there is a negative correlation between the independence of the board of directors and the frequency of financial reports. It was discovered that executive managers and the timing of financial reports are positively correlated.

Martín and Herrero (2018), Tested the association between board composition and firm success, as measured by economic profitability and Tobin's Q ratio. Good Governance is, on the other hand, determined by the size, independence, and diversity of boards. Regarding diversity, an index was

implemented that takes into account not only the gender but also the age and nationality of board members in relation to their expertise, experience, and skills. From 2010 to 2015, a sample of non-financial corporations listed on the Spanish Stock Markets Interconnection System was selected in order to identify the criteria that influence the composition of the board of directors and its impact on the development of value in Spanish corporations. The analysis revealed a high level of compliance with the criteria of the Good Governance Code and recommends that the performance of the advising and monitoring functions be considered when determining the board composition. Moreover, there is a significant and negative correlation between board independence and autonomy. However, the outcomes depend on the employed performance metrics.

Balagobei (2018), The primary aim of this study is to determine the relationship between BOD characteristics measured by (the size of the board of directors, the independence of the board of directors, and the ownership structure) and the appropriate value of accounting information, given that its earnings per share (EPS) and Net Asset Value (NAV) are available (NAV). The hotel industry was selected as a sample for the study, which included twenty companies listed on the Colombo Financial Market throughout the specified time frame (2012-2016). The researcher used two regression models to test the hypotheses; the first model was connected to EPS and the second model was related to NAV. The study found a negative correlation between (the independence of the board of directors and the ownership structure) and the suitable value of accounting information, as well as a negative effect of financial leverage on the appropriate value of accounting information. Consequently, organizations adhering to the BOD characteristics standards are characterized by a high accounting information relevance.

Chen (2017), This study was designed to determine how the ownership structure and characteristics of the board of directors (BOD) influence the efficiency of Investments for China Stock Exchange-listed companies. The analysis relied on a sample of all financial businesses registered on the China Stock Exchange between 2004 and 2012, including 5,912 views of state-owned enterprises and 3,331 views of state-owned third-party companies. A model has been created for measuring the efficiency of investments and identifying instances of over- or under-investment. The least squares and linear regression analysis was utilized to assess the study's hypotheses. The results indicated that the ownership structure had a statistically significant detrimental influence on the investment efficiency of government-owned enterprises. Compared to other methods of institutional investment, incentive-based pay improves the efficiency of Investing, according to the study. Additionally, joint investment is more likely to have a favorable effect on investment efficiency.

Mahmoud (2017), This study examines the impact of BOD characteristics aspects on company financial performance measured by (ROA, ROE, and Debt Ratio) for non-financial companies included in the S&P Pan Arab Composite Index. 225 companies over 10 years, from 2006 to 2015, compiled from ORBIS, Reuters Eikon, DataStream, and annual and board reports in eleven Arab nations. The qualities of the board of directors are subdivided into board structure variables, such as board size, independence, duality separation, and diversity. Alternatively, ownership structure factors comprise Ownership concentration, Direct ownership, Institutional ownership, and foreign ownership. As a control variable, firm size, firm age, industry type, and auditor type are utilized. Utilizing ROA, ROE, and the debt ratio as a measure of firm leverage, the performance of a business is calculated. In the form of several models, regression analyses are illustrated. It was discovered that there is a significant positive association between board size, institutional ownership, audit style, and business performance, as evaluated by ROA. Additionally, a substantial negative correlation exists between dual ownership, foreign ownership, business size, and firm performance.

Abu Al-Riha (2016), The study revealed the influence of governance and transparency on bank performance evaluation. This objective was accomplished by measuring each variable's governance, transparency, and financial ratios, including capital adequacy, liquidity, leverage, return on assets and return on liabilities. The application of these indicators to a sample of private banks over two years, 2013-2014, led to the conclusion that governance and transparency influence the performance evaluation process for these banks, but transparency has a greater impact on performance than governance.

Othman and Bishops (2016), aimed to determine the impact of applying governance principles such as protecting shareholders' rights, Disclosure and transparency, the role of stakeholders, the

responsibilities of the board of directors, and ensuring an effective institutional governance framework on the institutional performance of a sample of (32) industrial companies listed on the Amman Stock Exchange at the end of 2013 using a sample of industrial companies. Based on the questionnaire designed to collect the necessary data on institutional governance and the extent of its application, it was determined that there is a statistical impact of applying the principles of governance on institutional performance and that BOD characteristics have an impact on the development and growth of companies and contribute to reducing risks and enhancing the effectiveness and efficiency of companies.

Al-Omari (2016) seeks to examine the effect of BOD characteristics (size of the board of directors, institutional ownership, independence of the board of directors, and presence of an audit committee) on the Tobin index (Tobin's Q) value of a company. The size of the company and return on assets were used as control variables in the study. All sixty Jordanian industrial firms listed on the Amman Stock Exchange at the end of 2012 were included in the study. To test hypotheses, the researchers utilized the ordinary least squares method. There is a statistically significant correlation between the presence of an audit committee and the value of a company, according to the findings of the study. In addition, there is a statistically significant positive correlation between the increase in the number of board members and the percentage of financial leverage and, the company's market value. In addition, there is no statistically significant correlation between Board independence, institutional ownership, company size, return on assets, and firm value.

Hidder et. al. (2015) The objective of this study was to determine the relationship between BOD procedures and financial performance for enterprises in the Islamic banking sector. This study's primary objective is to discover the many aspects of variables that influence the financial performance of the firm and the characteristics of the board of directors as measured by three indicators: board size, number of meetings, and audit committee size. The financial performance of the corporation is measured by three metrics: return on equity, return on assets, and earnings per share. The study found a positive correlation between BOD features and the financial performance of several industries.

Wahba, (2015), The emphasis of this study was either board composition or board leadership structure. From 2008 to 2010, a panel data analysis utilizing the generalized least squares method was performed on a sample of forty Egyptian publicly traded enterprises. It was revealed that increasing the proportion of non-executive members to the total number of directors has a negative impact on the financial performance of a company when the CEO and chairman are the same people. Additionally, BOD characteristic structures cannot operate in a vacuum. Second, a failure to appreciate the fundamental interdependency of BOD characteristics processes may result in claims that some BOD characteristics designs are accountable for bad financial performance. Thirdly, there is no single best structure for board governance, but there are preferred approaches.

Al-Daas, and Masoud, (2015), This study aimed to examine the impact of BOD characteristics on the performance of companies listed on the Amman Stock Exchange in order to determine the degree of difference in the level of application of the principles of institutional governance among selected companies and to demonstrate the relationship between the principles of BOD characteristics pertaining to Characteristics of the Board of Directors and the performance of the company. The researchers conducted a field study with a sample of 205 businesses registered on the Amman Stock Exchange in the four major economic sectors: services, industries, banking, and insurance.

Emile et. al., (2014), The subject of the study was the connection between BOD dimensions and firm performance in the Egyptian market. Both book and market measures are employed to evaluate success. Based on the dataset between 2004 and 2010. It was determined that board members have no effect on company performance, as neither board size, duality, nor independence has any bearing on the functioning of the firms that leads to high or low performance. Besides The external environment has a greater impact on Egyptian firms than the internal environment, and Egyptian investors are less protected.

Mohamed et. al., (2013), This paper evaluated the impact of BOD features on company performance, as BOD traits play a crucial role in cleaning corporate reporting and fostering public confidence in global financial markets. Using cross-sectional data from non-financial companies listed on the Egyptian Stock Exchange and a sample of 88 non-financial companies on the EGX100 index of listed companies on the

Egyptian Stock Market, OLS regression analysis was used to examine the relationship between ownership structure, board structure, and audit function as control variables and firm performance. There was found to be no correlation between ownership structure and company performance. Board independence has a significant impact on the firm's market performance, whereas both board independence and CEO duality impact the firm's book value performance. The impacts of business size and leverage on market performance and book value are distinct.

Al-Swidi et. al., (2012), Seeks to determine the association between board qualities and the performance of non-financial enterprises listed in Kuwait. A sample of 136 companies for the 2009 fiscal year was chosen, and SPSS 18.0 was used to conduct a multiple linear regression analysis. The company's size and leverage were used as control variables. In the meantime, variables such as CEO duality, COE tenure, audit committee size, the board size, and board composition served as indicators of business performance as evaluated by return on assets (ROA). The research uncovered the negative effects of CEO tenure and leverage on business performance, as the well as beneficial benefits of CEO duality and audit committee size on ROA.

Gois (2009), This study evaluated the relationship between the quality of financial reports and the features of Portuguese company boards of directors. This study utilized descriptive and correlational analysis on a sample of 39 out of 234 Portuguese stock exchange-listed firms. The results suggested that BOD features impact the quality of accounting data, whereas the independence of BOD characteristics has no effect on accounting information.

Based on the majority of previous studies, the different BOD characteristics have been found to have a positive effect on firm performance. However, the mediator roles of operating performance have not been tested, particularly on Egyptian companies, which gives this paper its novelty and opens a discussion about the relationship between operating performance and BOD traits, as well as their impacting role on financial performance in non-financial companies listed on the Egyptian stock market.

Research Problem

Nowadays, Societies have witnessed the important role of institutional governance within the Industrial sector as it is the main sector among the other sectors for its contribution to the economy and investors. Applying the rules of institutional BOD characteristics may be one of the criteria that can be used to find out the efficiency and effectiveness of the company's management in implementing the procedures and laws taken. Consequently, the primary objective of the research is to determine the impact of applying the rules of BOD characteristics measured by the board of directors' composition on the financial and operational performance of Egyptian listed companies in the Egyptian stock exchange, and whether compliance with these rules will lead to an improvement in financial and operational performance above the normal rate, or if it has no real impact. On this basis, the issue can be regarded as a major question.

Does operating performance have an impact on the relationship between the board of director features and firm financial performance in Egypt?

Research Objectives

The main aim of this study is to develop a theoretical and practical framework for Egyptian companies listed on the EGX in order to demonstrate the effect of operational performance on the relationship between BOD features and firm financial performance. This main objective can be extracted to sub-objectives such as:

To Recognize the influence of BOD traits on the financial success of Egyptian industrial enterprises, as measured by return on equity and earnings per share and reveal the impact of operating performance on this relationship.

To Contribute to supporting industrial sector company management in understanding the effects of complying with the norms of corporate governance.

Informing the official and professional authorities in Egypt about the impact of adhering to the rules of corporate governance on financial and operational performance, thereby enhancing their ability in the

areas of planning, control, and decision-making rational decisions and enhancing their competitive position on the local and global markets.

Research Hypotheses

H_{O1}: There is no statistically significant influence at the level of significance (a ≤ 0.05) for the Board of Directors' characteristics on EPS

H_{O2}: There is no statistically significant influence at the level of significance (a ≤ 0.05) for the Board of Directors' characteristics on ROA

H_{O3}: There is no statistically significant influence at the level of significance (a ≤ 0.05) for the characteristics of the Board of Directors on ATO

H_{O4}: There is no statistically significant influence at the level of significance (a ≤ 0.05) for the characteristics of the Board of Directors on OPM

H_{05}: Operational performance has no significant impact on the relationship between the Board of Directors' characteristics and firm financial performance measured by ROA and EPS.

Research Variables: as shown in table No. (1) below

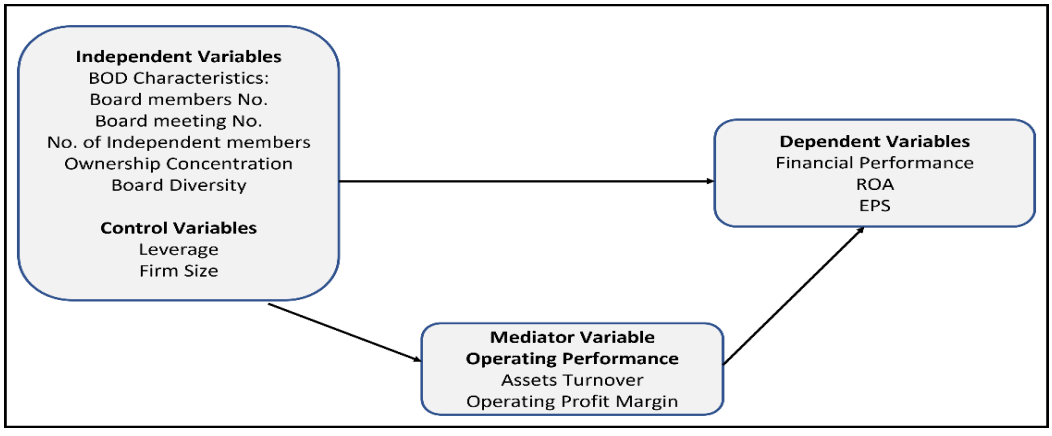
Table (1) Research Variable

Independent Variables	Variable	Measure
Board of Director Characteristics	Board Size	No. of board members
	No. of meeting	No. of meeting hold per year
	Independent of members	The ratio of No. of independent member to all board member
	Ownership concentration	Percentage of ownership of more than 5%
	Board Diversity	No. of women on the board to No. of board members
Control Variable	Leverage Ratio	The ratio of Assets to Equity
	Firm Size	Log total assets
Dependent Variable		
Operating Performance	Operating Profit Margin (OPM)	Operating Income to Net Sales
	Assets Turnover Ratio (AT)	Sales to Average Total Assets
Financial Performance	Return on Average Assets (ROA)	Net income to Average total Assets
	Earnings Per Share (EPS)	Net Income available to common Shareholder to Weighted Average No. of Shareholders

Source: Prepared by researchers

Research Model:

Figure (1) Research model



Source: Prepared by researchers

Methodology

The study employed a deductive methodology to test the data and analyze the results based on a population consisting of every Egyptian company listed on the Egypt Stock Exchange between 2018 and 2021, as well as a sample of 26 non-financial firms included in the EGX30 index. Then, the Residuals Heteroskedasticity Test, Normality of Residuals test, Multi-Linear Correlation, Multicollinearity, Autocorrelation test, and multiple regression methods were utilized to determine the type of relationship between the study variables and the validity of the study's hypotheses.

Proposed Measurement Model

To evaluate the influence of Board of Directors Characteristics on Financial Performance, as revealed by the literature review, the following regression models are utilized to determine the nature of the relationship and quantify its magnitude:

$EPS_{it} = a + \beta_1 Bsize_{it} + \beta_2 NoM_{it} + \beta_3 Indep_{it} + \beta_4 OwC_{it} + \beta_5 Bd_{it} + \beta_6 Size_{it} + \beta_7 AE_{it} + \varepsilon$ (1)

$ROA_{it} = a + \beta_1 Bsize_{it} + \beta_2 NoM_{it} + \beta_3 Indep_{it} + \beta_4 OwC_{it} + \beta_5 Bd_{it} + \beta_6 Size_{it} + \beta_7 AE_{it} + \varepsilon$ (2)

$ATO_{it} = a + \beta_1 Bsize_{it} + \beta_2 NoM_{it} + \beta_3 Indep_{it} + \beta_4 OwC_{it} + \beta_5 Bd_{it} + \beta_6 Size_{it} + \beta_7 AE_{it} + \varepsilon$ (3)

$OPM_{it} = a + \beta_1 Bsize_{it} + \beta_2 NoM_{it} + \beta_3 Indep_{it} + \beta_4 OwC_{it} + \beta_5 Bd_{it} + \beta_6 Size_{it} + \beta_7 AE_{it} + \varepsilon$ (4)

Multicollinearity and skewness factors

To ensure that there is no strong correlation between independent variables (Multicollinearity), Variance Inflation Factor and Tolerance testing were performed on each independent variable.

Variance Inflation Factor (VIF) <= 10

Tolerance > 0.05

In addition, skewness factors are calculated to check whether the data follow the normal distribution, where the null hypothesis asserts that the data follow the Normal distribution if the skewness factor is less than 1, table (2) displays the results of these tests.

Table (2) Result of Multicollinearity and skewness factors

Variables	VIF	Tolerance	skewness
Bsize	1.674	0.756535	0.51641
NoM	1.893	0.885807	0.39324
Indep	1.207	0.620257	0.7345
OWC	1.870	0.83846	0.56387
Bd	1.294	0.604211	0.68252
Size	1.563	0.640371	0.39437
A/E	1.911	0.814391	0.93903

Source: outputs of Stata V15 program

The results of the previous table indicate to:

Variance Inflation Factor (VIF) between 1.207 and 1.911 this value indicates is not their correlation between a given explanatory variable and any other explanatory variables in the model.

Tolerance values for all variables were greater than (0.05) and ranged from (0.604211 - 0.885807), indicating that there was no high correlation between independent variables (Multicollinearity) that could lead to misleading results when analyzing regression,

The results of the skewness factor also indicate that the data follow the Normal distribution where the values of the coefficient range from (0.39324 to 0.93903) which is less than 1.

Table (3) Matrix Correlation between study variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Bsize	1.000									
(2) NoM	0.317	1.000								
(3) Indep	0.678	0.523	1.000							
(4) OwC	0.263	0.549	0.579	1.000						
(5) Bd	0.110	0.085	0.148	0.038	1.000					
(6) AE	-0.040	0.179	0.100	0.149	-0.404	1.000				
(7) Size	-0.100	0.061	-0.060	0.288	-0.184	-0.235	1.000			
(8) OPM	0.210	0.392	0.364	0.172	-0.090	0.167	-0.140	1.000		
(9) ATO	-0.179	-0.174	-0.329	-0.192	0.201	0.076	-0.290	-0.436	1.000	
(10) ROA	0.272	0.241	0.181	0.210	0.445	0.368	0.293	0.503	0.146	1.000
(11) EPS	0.143	0.323	0.167	0.119	0.226	0.545	0.103	0.439	0.124	0.446

Source: outputs of Stata V15 program

Correlation results show that there is a moderate relationship between the dependent variable ROA and EPS with the independent variables (Bsize – NoM – Indep – OwC – Bd- - Size - A/E) where the values of the correlation factor ranged from (0.143 to 0.545).

Descriptive Statistics

Table (4) result of Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Bsize	100	9.37	4.039	0	19
NoM	100	9.01	6.263	0	24
Indep	100	.715	.25	0	.929
OwC	100	.61	.278	0	1
Bd	100	.091	.088	0	.339
EPS	100	1.095	3.263	-11.82	20.95
ROA	100	.074	.081	-.189	.349
AE	100	2.748	4.45	-15.195	26.725
Size	100	4.029	.566	2.988	5.142
OPM	100	.182	.163	-.108	.685
ATO	100	.788	.653	.111	3.495

Source: outputs of Stata V15 program

The previous table shows, the mean and standard deviation for all variables (Bsize 9.37/4.03, Nom 9.01/6.263, Indep 0.715/0.25, OwC 0.61/0.278, Bd 0.091/0.088, EPS 1.095/3.263, ROA 0.074/0.081, AE 2.748/4.45, Size 4.029/0.566, OPM 0.182/ 0.163, ATO 0.788/0.653).

Hypotheses Testing and Result Discussion

The study aims to examine the following Hypotheses.

H_{O1}: there is no statistically significant influence at the level of significance (a ≤ 0.05) for the Board Directors' characteristics on EPS

Before assessing the relationship to the proposed model, the Doornik-Hansen test and the Heteroskedasticity test are performed to examine the distribution of the Residual of the model and to ensure the validity of the estimated model variables for the study.

1-Doornik-Hansen test: Doornik-Hansen test is based on the normality of multiple variables, it is based on skewness testing and Kurtosis of study variable data it examines the characteristics of variables in terms of independence, so it is better than the Shapiro-Wilk test when examining the normal distribution for a proposed regression model, and in terms of testing assumptions:

H_0: Residual follows a normal distribution if the p-value is greater than 0.05 (P>0.05)

H_1: Residual do not follow a normal distribution if the p-value is less than 0.05 (P< =0.05)

2-Heteroskedasticity test: The importance of the test is that Heteroskedasticity Residual or Error Terms in the standard model are linked in one form or another to the Endogenous or Dependent Variable in the original model.

H_0: Residual has no problem heteroskedasticity if the P-value > 0.05

H_1: Residual has a Heteroskedasticity problem if P-value < 0.05

The following are the results of the Doornik-Hansen test to confirm the validity of multiple regression model variables, and the results of the Breusch Pagan Godfrey test for Heteroskedasticity testing

Figure (2) Results of study model examination tests

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Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of EPS
        chi2(1)      =    27.82
        Prob > chi2  =    0.5642

Test for multivariate normality
   Doornik-Hansen              chi2(2) =    51.078    Prob>chi2 =   0.28320
```

The previous figure shows that the Residual value of the Doornik-Hansen test was 0.28320, which is greater than 0.05, indicating that the regression model follows the normal distribution and accordingly accepts the null Hypothesis that "the Residual follows the normal distribution if the p-value for Residual is greater than 0.05", and we reject the alternative Hypotheses. The test results also show that the value of the Breusch Pagan Godfrey test was 0.5642, which is greater than 0.05, indicating that the Residual does not have a Heteroskedasticity problem and therefore accepts null Hypotheses and rejects the alternative Hypotheses.

Linear regression

Table (5) Results of the estimated regression for Model 1

EPS	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Bsize	.05	.111	5.45	.004	.17	.27	**
NoM	.188	.064	2.92	.004	.06	.316	**
Indep	.506	2.203	4.23	.009	3.869	4.881	**
OwC	1.862	1.684	3.11	.002	5.206	1.482	**
Bd	1.094	4.335	4.25	.001	9.705	7.517	**
AE	.016	.09	3.18	.006	.162	.194	**
Size	.78	.685	2.14	.008	.581	2.14	**
Constant	-3.38	3.062	4.10	.002	9.461	2.7	**
Mean dependent var		1.095	SD dependent var			3.263	
R-squared		0.729	Number of obs			100	
F-test		7.944	Prob > F			0.001	
Akaike crit. (AIC)		521.547	Bayesian crit. (BIC)			542.389	

**** p<.01, ** p<.05, * p<.1*

Source: outputs of Stata V15 program

Table (5) displays the results of the Multiple Regression Test, which was conducted to determine the effect of independent variable characteristics of the Board of Directors (Bsize – NoM – Indep – OwC – Bd) and control variables (Size - AE) on EPS. The R-squared coefficient of determination is 0.729, which indicates that 72.9% of the variations in EPS are explained. Due to the change in characteristics of the Board of Directors (Bsize - NoM - Indep - OwC - Bd) and control variables (Size - AE), the remainder of the ratio is attributable to factors that are not correlated with the variables under study.

The preceding table demonstrates that the model's F test value, which has reached 0.001, is significant at the 0.05 level, indicating that the proposed model has great convenience and interpretive power, thus rejecting the null hypothesis. HO1: There is no statistically significant influence at the level of significance (a 0.05) for the characteristics of the Board of Directors on EPS. In addition to accepting the Alternative Hypotheses

The coefficients of characteristics of the Board of Directors (Bsize – NoM – Indep – OwC – Bd) and control variables (Size - AE) are significant at 5%, with p-values ranging from (0.001 to 0.009), confirming the significance of the impact of characteristics of the Board of Director's variables on EPS. Therefore, the following regression equation can be found:

$EPS_{it} = -3.38 + 0.05\ Bsize_{it} + 0.188\ NoM_{it} + 0.506\ Indep_{it} + 1.862\ OwC_{it} + 1.094\ Bd_{it} + 0.78\ Size_{it} + 0.016\ AE_{it} + \varepsilon$ (1)

By studying the beta coefficient values for study model variables, we infer that Bsize, and EPS have a positive relationship. If Bsize increases by 100%, earnings per share will increase by 5%. In addition, there is an 18% significant connection between No. of board members and EPS, and a 50% positive relation between independent members and the dependent variable. also, OwC by 1.8, and Board Diversity, Board Size, and leverage by 1.09, 0.78, and 0.016, respectively.

The second main Hypotheses H_{O2}: *there is no statistically significant influence at level of significance (a ≤ 0.05) for the Board of Directors' characteristics on ROA*

The following are the results of the Doornik-Hansen test to confirm the validity of multiple regression model variables, and the results of the Breusch Pagan Godfrey test for Heteroskedasticity testing

Figure (3) Results of study model examination tests

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of ROA
        chi2(1)      =     1.07
        Prob > chi2  =   0.3021

Test for multivariate normality
    Doornik-Hansen              chi2(2) =   5.078   Prob>chi2 =  0.6208
```

The previous figure shows that the Residual value of the Doornik-Hansen test was 0.6208, which is greater than 0.05, indicating that the regression model follows the normal distribution and accordingly accepts the null hypothesis that "the Residual follows the normal distribution if the p-value for Residual is greater than 0.05", and we reject the alternative Hypotheses. The test results also show that the value of the Breusch Pagan Godfrey test was 0.3021, which is greater than 0.05, indicating that the Residual does not have a Heteroskedasticity problem and therefore accepts null Hypotheses and rejects the alternative Hypotheses.

Table (6) Results of the estimated regression for Model 2

Linear regression

ROA	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Bsize	.062	.003	3.83	.001	0	.01	**
NoM	.041	.002	2.35	.001	.001	.007	**
Indep	.034	.053	5.64	.005	.138	.071	**
OwC	.014	.04	7.36	.002	.094	.065	**
Bd	.06	.103	4.58	.004	.265	.146	**
AE	.001	.002	6.44	.006	.005	.003	**
Size	.043	.016	2.64	.001	.076	.011	**
Constant	.211	.073	2.88	.005	.066	.356	**
Mean dependent var		0.074	SD dependent var			0.081	
R-squared		0.696	Number of obs			100	
F-test		3.195	Prob > F			0.004	
Akaike crit. (AIC)		225.677	Bayesian crit. (BIC)			204.836	

**** p<.01, ** p<.05, * p<.1*

Source: outputs of Stata V15 program

Table (6) displays the results of the Multiple Regression Test, which was conducted to determine the impact of independent variable characteristics of the Board of Directors (Bsize – NoM – Indep – OwC - Bd) and control variables (Size - AE) on ROA.

The R-squared coefficient of determination is 0.696, indicating that 69.6% of the changes in ROA are accounted for. Due to the change in characteristics of the Board of Directors (Bsize - NoM - Indep - OwC - Bd) and control variables (Size - AE), the remainder of the ratio is attributable to factors that are not correlated with the variables under study.

The preceding table demonstrates that the model's F test value, which has reached 0.004, is significant at the 0.05 level, indicating that the proposed model has great convenience and interpretive power, thus rejecting the null hypothesis. HO2: There is no statistically significant influence at the level of significance (a 0.05) for the characteristics of the Board of Directors on ROA. In addition to accepting the Alternative Hypotheses

The results of the regression test for the study's hypothesis indicate that the coefficients of characteristics of the Board of Directors (Bsize – NoM – Indep – OwC – Bd) and control variables (Size - AE) are significant at 5%, with p-values ranging from (0.001 to 0.006), confirming the significance of the impact of characteristics of the Board of Director's variables on ROA. Consequently, the following regression equation can be drawn: $ROA_{it} = 0.211 + 0.06\ Bsize_{it} + 0.04\ NoM_{it} + 0.034\ Indep_{it} + 0.014\ OwC_{it} + 0.06\ Bd_{it} + 0.043\ Size_{it} + 0.011\ AE_{it} + \varepsilon$ (1)

By examining the beta coefficient values for study model variables, we infer that Bsize, and ROA have a positive relationship. ROA grows by 6 percent if Bsize increases by 100 percent. Also, there is a positive impact between Nom and ROA, where it is affected by 4%, and Indep, where it affects the dependent variable by 3%; OwC is affected by 1%, and BD, Size, and AE are affected by 6%, 4%, and 0.1%, respectively.

The third main Hypotheses H_{O3}: *there is no statistically significant influence at the level of significance (a ≤ 0.05) for the characteristics of the Board of Directors on ATO*

Heteroskedasticity testing

Figure (4) Results of study model examination tests

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of ATO
        chi2(1)      =    7.81
        Prob > chi2  =    0.3648

Test for multivariate normality
    Doornik-Hansen                chi2(2) =    5.669    Prob>chi2 =   0.4304
```

The preceding figure demonstrates that the Residual value of the Doornik-Hansen test was 0.4304, which is greater than 0.05, indicating that the regression model follows the normal distribution. Consequently, we accept the null hypothesis that "the Residual follows the normal distribution if the p-value for Residual is greater than 0.05" and reject the alternative Hypotheses. The test results also indicate that the value of the Breusch Pagan Godfrey test was 0.3648, which is greater than 0.05, indicating that the Residual does not have a Heteroskedasticity problem; consequently, the null Hypotheses should be accepted, and the alternative Hypotheses should be rejected.

Table (7) Results of the estimated regression for Model 2

ATO	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Bsize	.019	.02	6.97	.006	.02	.059	**
NoM	.061	.012	5.48	.006	.029	.018	**
Indep	.446	.399	2.63	.000	2.238	.654	**
OwC	.382	.305	5.25	.003	.223	.987	
Bd	.18	.785	2.78	.007	.621	3.739	**
AE	.026	.016	2.62	.008	.006	.059	**
Size	.298	.124	3.41	.008	.545	.052	**
Constant	2.39	.554	4.31	.000	1.289	3.491	**
Mean dependent var		0.788	SD dependent var			0.653	
R-squared		0.687	Number of obs			100	
F-test		5.278	Prob > F			0.000	
Akaike crit. (AIC)		179.741	Bayesian crit. (BIC)			200.582	

****p<.01, **p<.05, *p<.1*

Source: outputs of Stata V15 program

The previous table shows the results of the Multiple Regression Test, to determine the influence of independent variable characteristics of the Board of Directors (Bsize – NoM – Indep – OwC - Bd) and control variables (Size - AE) on ATO.

The R-squared coefficient of determination is 0.687%, which indicates that 68.7% of the changes in ATO can be accounted for. Due to the change in characteristics of the Board of Directors (Bsize - NoM - Indep - OwC - Bd) and control variables (Size - AE), the remainder of the ratio is attributable to factors that are not correlated with the variables under study.

The preceding table demonstrates that the model's F test value, which has reached 0.000, is significant at the 0.05 level, indicating that the proposed model has great convenience and interpretive power, thus rejecting the null hypothesis. "HO3: There is no statistically significant influence at the 0.05 level for the characteristics of the Board of Directors on ATO" In addition to accepting the Alternative Hypotheses

The results of the regression test for the study's hypothesis indicate that the coefficients of characteristics of the Board of Directors (Bsize – NoM – Indep – OwC – Bd) and control variables (Size - AE) are significant at the 5% level, with p-values ranging from (0.000 to 0.008), confirming the significant influence of characteristics of the Board of Director's variables on ATO, and indicating that the coefficients of characteristics of the Board of Directors are Consequently, we can deduce the following regression equation:

$ATO_{it} = 2.39 + 0.019\ Bsize_{it} + 0.06\ NoM_{it} + 0.446\ Indep_{it} + 0.382\ OwC_{it} + 0.18\ Bd_{it} + 0.298\ Size_{it} + 0.026\ AE_{it} + \varepsilon$ (3)

By examining the beta coefficient values for study model variables, we conclude that Bsize and ATO have a positive relationship. If Bsize increases by 100%, then the ATO will increase by 19%. Also, there is a positive influence between Nom and ATO, where it affects the dependent variable by 6%, and between Indep and the dependent variable by 44%, with OwC affected by 38% and BD, Size, and AE affected by 18%, 29%, and 2%, respectively.

The fourth main hypothesis: *H_{O4}: there is no statistically significant influence at the level of significance (a ≤ 0.05) for the characteristics of the Board of Directors on OPM*

Heteroskedasticity testing

Figure (5) Results of study model examination tests

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of OPM
        chi2(1)      =    3.07
        Prob > chi2  =    0.0983


Test for multivariate normality
    Doornik-Hansen                  chi2(2) =    3.079    Prob>chi2 =   0.2144
```

The preceding figure demonstrates that the Residual value of the Doornik-Hansen test was 0.2144, which is greater than 0.05, indicating that the regression model follows the normal distribution. Consequently, we accept the null hypothesis that "the Residual follows the normal distribution if the p-value for Residual is greater than 0.05" and reject the alternative Hypothesis. The test results also indicate that the value of the Breusch Pagan Godfrey test was 0.0983, which is greater than 0.05, indicating that the Residual does not have a Heteroskedasticity problem; consequently, the null Hypotheses should be accepted, and the alternative Hypotheses should be rejected.

OPM	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Bsize	.054	.005	5.75	.004	.014	.006	**
NoM	.069	.003	3.04	.003	.003	.015	**
Indep	.229	.102	2.25	.027	.027	.431	**
OwC	.083	.078	2.07	.006	.238	.071	**
Bd	.36	.2	6.80	.005	.757	.037	**
AE	.021	.004	4.23	.005	.009	.007	**
Size	.043	.032	3.37	.004	.106	.02	**
Constant	.233	.141	5.65	.002	.047	.514	**

Mean dependent var	0.182	SD dependent var	0.163
R-squared	0.554	Number of obs	100
F-test	4.473	Prob > F	0.000
Akaike crit. (AIC)	93.791	Bayesian crit. (BIC)	72.950

*** *p<.01*, ** *p<.05*, * *p<.1*

Table (8) Results of the estimated regression for Model 4

Source: outputs of Stata V15 program

The preceding table displays the results of the Multiple Regression Test to determine the impact of the Board of Directors' independent variable characteristics (Bsize – NoM – Indep – OwC - Bd) and control variables (Size - AE) on OPM. The R-squared coefficient of determination is 0.554, which means that 55.4% of the changes in OPM. because of the change in characteristics of the Board of Directors (Bsize – NoM – Indep – OwC - Bd) and control variables (Size - AE), the residue of the ratio is due to other factors that fall outside the correlation between the study variables.

The earlier table demonstrates that the F test value of the model, which has reached 0.000, is significant at 0.05, indicating that the proposed model has great convenience and interpretive power, thus rejecting the null hypothesis "HO4: there is no statistically significant influence at the level of significance (a 0.05) for Board of Director's characteristics on OPM." and accepted the Alternate Hypotheses

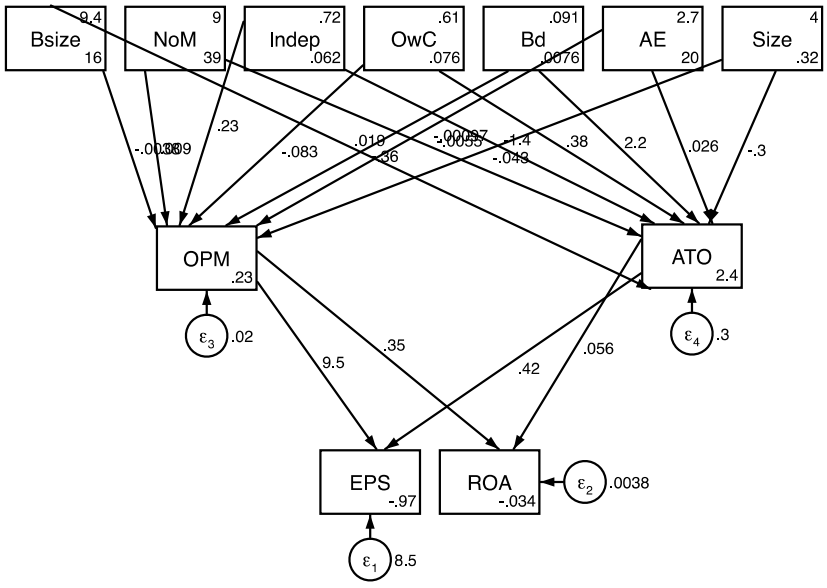
The results of the regression test for the hypothesis of the study show that the coefficient of characteristics of the Board of Directors (Bsize – NoM – Indep – OwC - Bd) and control variables (Size - AE) are significant at 5%, where p-value range from (0.002 to 0.020), confirming the significant influence of characteristics of the Board of Director's variables on OPM, and We can therefore conclude the following regression equation:

$OPM_{it} = 2.33 + 0.054\ Bsize_{it} + 0.069\ NoM_{it} + 0.299\ Indep_{it} + 0.083\ OwC_{it} + 0.36\ Bd_{it} + 0.043\ Size_{it} + 0.021\ AE_{it} + \varepsilon$ (4)

By looking at beta coefficient values for study model variables, we conclude, that there is a positive influence between Bsize and OPM. If Bsize increases by 100%, the OPM increases by 5%. Also, there is a positive influence between Nom and OPM Where it is affected by 6%, and Indep It affects the dependent variable by 29% also OwC is affected by 8%, and the BD, Size, and AE affected by 36%, 4%, 2%.

Path analysis is employed to test the fifth hypothesis. *H_{05}: operational performance has no significant impact on the relationship between the characteristics of the Board of Directors and Financial performance.* to test the Hypotheses of the study that operational performance Impact the relationship between characteristics of the Board of Directors and Financial performance. Path analysis was used to study this relationship.

Figure (6) Results of Path analysis



Where:

Endogenous variables

Observed: OPM ATO EPS ROA

Exogenous variables

Observed: Bsize NoM Indep OwC Bd AE Size

Fitting target model:

Iteration 0: log likelihood = -923.15043

Iteration 1: log likelihood = -923.15043
Structural equation model Number of obs = 100
Estimation method = ml
Log likelihood = -923.15043

Table (9) Results of path analysis

	OIM					
	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
Structural						
EPS <-						
OPM	9.533	1.997	4.770	0.000	5.619	13.447
ATO	0.416	0.497	0.840	0.003	-0.559	1.390
_cons	-0.966	0.703	-1.370	0.009	-2.344	0.412
ROA <-						
OPM	0.348	0.042	8.250	0.000	0.266	0.431
ATO	0.056	0.011	5.320	0.000	0.035	0.077
_cons	-0.034	0.015	-2.270	0.023	-0.063	-0.005

LR test of model vs. saturated: chi2(16) = 50.46, Prob > chi2 = 0.0000

Source: outputs of Stata V15 program

Path analysis display that there is a positive impact relationship between the characteristics of the Board of Directors (Bsize – NoM – Indep – OwC - Bd) and control variables (Size - AE) and independent variables financial performance (EPS – ROA) through the Mediator variable operational performance (ATO – OPM). The Mediator variable operational performance (ATO – OPM) has a positive impact on EPS, by looking at beta coefficient values (0.41 – 9.53), Also, operational performance (ATO – OPM) has a positive impact on ROA (0.05 – 0.34). This means rejecting the null Hypotheses "*H_{05}: operational performance has no significant impact on the relationship between the characteristics of the Board of Directors and Financial performance*". and accepted the Alternative Hypotheses.

Conclusion

This paper attempts to explore the mediator role of operating performance on the relationship between BOD characteristics and firm financial performance, and finds a positive impact for operating performance measured by assets turnover and operating profit margin, indicating the importance of operating performance in recognizing highly efficient financial performance in addition to the substantial role of BOD characteristics in influencing operating dec. Path analysis demonstrates that the characteristics of the BOD reveal the significant role of diversity (women's participation) in influencing financial decisions directly on EPS and indirectly on ROA via operational decisions (asset turnover). While ownership concentration has a significant direct effect on earnings per share (EPS) but a small effect on return on assets (ROA), which may be due to the fact that ownership concentration influences the board of directors' (BOD) financial decisions related to owners' interests and not those of all stakeholders, the number of board meetings has no significant direct or indirect effect on financial performance, indicating that the quality of the board's decisions is not significantly affected by the number of board meetings. The majority of the paper's findings align with those of previous studies (Alodat et al., (2021), Guluma, (2021), Al Alimat (2019), Martín and Herrero (2018), Mahmoud (2017), Al-Omari (2016), Al-Daas, and Masoud (2015)).

Recommendations

Shareholders should emphasize BOD characteristics such as increasing women's participation in Egyptian BOD firms and applying corporate governance principles in the selection of board members; however, there is no need to increase the number of board members to ensure decision quality. The characteristics of the board and its financial performance should be maintained and fostered. This is based on the discovery that board characteristics have a substantial positive impact on financial performance. The positive association between Board gender diversity and financial performance suggests that companies with a greater gender balance are more likely to have superior operating and financial

performance. Similarly, there is a strong correlation between board meeting frequency and financial performance.

Additional studies should be conducted over a longer time frame and include various board characteristics, such as education level or professional certifications. Accordingly, using more operational measures, especially in service-providing businesses.

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