

The Effect of Board Characteristics on Firm Performance: Evidence from Egypt

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Abstract

The study aims to investigate the impact of board Characteristics on firm's performance for Egyptian listed firms. The study used data from companies listed on the Egyptian Stock Exchange, specifically the EGX 100. The researcher used a sample of 59 companies, representing 12 major sectors over a continuous five-year period from 2017 to 2021. The study used a pooled panel linear regression model to test the research hypotheses. The results of the study revealed that both board Size and CEO Duality have a significant impact on Egyptian firm's performance.

Keywords: Board Size, CEO Duality, Firm Performance, Egyptian Listed Companies.

المستخلص:

تهدف الدراسة إلى دراسة تأثير خصائص مجلس الإدارة على أداء الشركة للشركات المصرية المدرجة. استخدمت الدراسة بيانات من الشركات المدرجة في البورصة المصرية، وتحديداً (EGX 100). حيث تتكون عينة البحث من ٥٩ شركة، تمثل ١٢ قطاعاً رئيسياً على مدى خمس سنوات متتالية لفترة تتراوح من ٢٠١٧ إلى ٢٠٢١. استخدمت الدراسة نموذج انحدار خطي مجمع لاختبار فرضيات البحث. كشفت نتائج الدراسة أن كلا من حجم مجلس الإدارة و ازدواجية الرئيس التنفيذي لهما تأثير معنوي على أداء الشركة المصرية. الكلمات الرئيسية: حجم مجلس الإدارة، ازدواجية الرئيس التنفيذي، أداء الشركة، الشركات المدرجة في البورصة المصرية.

1 Introduction

Companies always looking to maximize its profit and increases the performance of the stocks But somehow there are some risks could affect the company's profit and stock prices and poor corporate governance one of those risks. The separation between management and ownership has piqued the interest of researchers which gives rise to the well-known agency problem. The analysis of boards of directors is a crucial aspect of this issue, as they are one of the means by which investors can mitigate this problem and align the interests of managers with those outside of management through monitoring. (García Martín & Herrero, 2018).

Corporate governance refers to the procedures and processes according to which organizations are directed and controlled by

their CEO, board of directors and senior management. Corporate governance deals with mechanisms by which stakeholders of a corporation exercise control over corporate insiders and management such that their interests are protected. The stakeholders of a corporation include equity holders, creditors and other claimants who supply capital, as well as other stakeholders such as employees, consumers, suppliers, and the government. (Adams et al., 2010).

One key element of corporate governance is the role of board of directors in overseeing management. Managerial oversight is needed because managers have their own preferences and may not always act on behalf of the shareholders. Shirking, excessive perks, and non-optimal investments are examples of abusive actions by managers (Jensen and Meckling, 1976). The board of directors can reduce agency conflicts by exercising its power to monitor and control management (Ilaboya & Obaretin, 2015)

Board of directors is an important and highly effective internal mechanism of corporate governance and fulfills two important functions in company's supervision of executive management in representation of the shareholders and providing business resources and assessment. In their supervisory role, the boards use their time and resources to monitor firm performance and the behavior of the executive managers. (Pucheta-Martínez & Gallego-Álvarez, 2019). In this regard, the boards' characteristics are critical due to their essential role within governance (Nekhili & Gatfaoui, 2013). One of

those characteristics is Board size, and CEO Duality (Almomani et al., 2020).

The concept of board size is very closely related to the issues related to corporate governance. (Kalsie & Shrivastav, 2016) Board size refers to the total number of directors on the board of directors of an organization. The relationship between board size and firm performance is supported by different corporate governance theories. Agency and resource dependency theories support board with large number of directors whereas stewardship theory supports smaller board size for effective management. (Badu & Appiah, 2017)

While, the main role of a chief executive officer (CEO) is to originate and implement the strategic objectives, strategies, and policies of the organization. On the contrary, the board of directors assumes the responsibility of conducting the company's operations in a manner that would consistently provide long-term benefits for the shareholders. One of the most important responsibilities entrusted to boards of directors is to conduct audits of the present or prospective administrative attempts undertaken by the individual serving as the Chief Executive Officer (CEO). CEO duality argues that when a CEO also serves as board chair, the board's ability to effectively monitor a CEO's decisions is hampered. (ÖGEL et al., 2013) According to (Aygün & İç, 2010), it is recommended that the roles of the chief executive officer and the president of the board of directors

should be assigned to separate individuals. This is because the person filling the president of the board of directors' post is responsible for crucial auditing and monitoring duties.

2. Literature Review and Hypothesis Development

This part discusses the most significant earlier studies that are related to the current study, which investigated the Relationship between Board Characteristics (Board Size & CEO Duality) and firm performance. To achieve this, the researcher will categorize it into two groups, as follows:

2.1. The relationship between CEO Duality and Firm Performance

The study of (Le et al., 2023) aimed to analyze the impacts of CEO duality and board size on the firm performance of top 200 companies listed on the Vietnam Stock Exchange (VSE) from 2014 to 2015. The empirical results indicated that CEO duality limits the monitoring function of the board, and a large board size promotes dominance and power of leaders that create more conflicts, so CEO Duality and board size had a negative significant effect on firm performance. In Contrast the number of executive directors in the top management positively influences firm performance.

While the study of (Mahmood et al., 2023) investigated the impact of Corporate Governance on Firm Performance of Pakistan stock exchange for 100 public listed firms from the non-financial sector. Data around the study variables have been

collected and analyzed for a period of 2013-2022. The findings revealed that board size, leverage, CEO Duality, large firm size, young firms, and sustainable growth positively impact the firm performance. High leverage has been found to have an adverse impact on firms' profitability.

However, the study of (**Pham, 2023**) attempted to evaluate the impact of CEO characteristics on the performance of Vietnamese commercial banks. Variables representing the performance of commercial banks are return on total assets (ROA) and return on equity (ROE). Data was collected from 30 banks from 2012 to 2020. Research results showed that CEO duality and CEO age positively impact the performance of Vietnamese commercial banks. In contrast, the female CEO factor has a negative impact on ROE. In addition, the study did not find evidence of the impact of the CEO's financial background and the CEO tenure on the performance of Vietnamese commercial banks.

In the same context, the study of (**Wicaksono, 2022**) intended to analyze the effect of gender diversity, financial expertise, CEO duality on company performance in Indonesia. From 2018 to 2020. Using ROA & ROE make them correlated into a new set of variables (firm performance). The results of this study concluded that the gender diversity variable has no effect on firm performance; in contrast the variables of financial expertise and CEO duality affect firm performance.

Whereas the study of **(Shen et al., 2021)** aimed to examine the effect of different CEO demographic factors on firm performance in Australia for the period January 2003 to December 2018 using panel regression model. The results highlighted that the CEO characteristics of gender, CEO–chairperson duality, CEO education level and CEO duality have significant managerial effects on firm performance.

Along the same line, the study of **(Mubeen et al., 2021)** attempted to explore the impact of CEO duality on financial performance in the pharmaceutical industry of China. It also tests ownership type as a moderating role in the relationship between CEO duality and firm performance for the period 2011- 2019 in China listed firms. The findings revealed that CEO duality has a positive impact on firm performance in the pharmaceutical industry, which supports the stewardship theory.

On the contrary, the study of **(Jwailes, 2021)** evaluated the association between three antecedents; board independence, the board size, and CEO duality; and the firms' performance among the Jordanian listed firms used regression-based analysis for secondary panel data in the context of the Amman Stock Exchange (ASE) for 180 firms from the non-financial sector from 2008 to 2018 and The results revealed a significant relation with board size having the highest negative impact, in contrast CEO duality the board independence and both have a positive impact.

While the study of (**Kanakriyah, 2021**) aimed to determine and test the effect of the board of directors' (BOD) characteristics on the corporate performance of the Jordanian industrial and service companies listed on the Amman Stock Exchange (ASE) from the period of 2015 to 2019. The characteristics of the BOD the following variables: managerial ownership; CEO duality; board independence; gender diversity; nationality diversity; advanced education; board meetings; board size; corporate size; corporate age. The corporate performance was measured by return on assets (ROA) and return on equity (ROE). The study sample consisted of 85 industrial and service companies. Results showed a positive effect of the study variables on performance, while the corporate age and the education level (BOD members) have a negative effect on performance.

Whereas the study of (**Pham & Pham, 2020**) examined the impact of CEO duality on firm performance. The data covered the period of 2012–2018 for 442 publicly listed firms in Vietnam. The findings indicated that CEO duality had a positive effect on firm performance in growth stage and had a negative effect on the mature stage of the firm's life-cycle. These results are supported by stewardship theory which argues that CEO duality may be good for firm performance in the growth stage. In contrast, agency theory shows CEO duality is bad for firm performance in the maturing stage since it compromises the

monitoring and controls the behavior of the CEO.

The researcher intends to investigate the study by formulating the following hypothesis:

H1: There is a significant relationship between CEO Duality and Firm Performance.

2.2.The effect of board Size on Firm performance

There has been a lot of prior research that examined the association between Board Size and Firm performance; the researcher can approve the presence of the association between the two variables as well as the existence of controversial findings regarding the nature of the association between Board Size and firm performance

The study of (**Le et al., 2023**) aimed to analyze the impact of CEO duality and board size on the firm performance. Study assessed the association between CEO duality, board size and firm performance of top 200 companies listed on the Vietnam Stock Exchange (VSE) from 2014 to 2015. The empirical results indicated that CEO duality has a significant positive effect with firm performance. The number of executive directors in the top management (Board size) positively influences firm performance.

However, the study of (**Bulusson et al., 2023**) attempted to provide evidence on the moderating role of board expertise in examining board characteristics and firm performance for 40 listed firms in Nigeria from 2012 to 2021. The interaction of board expertise as a moderator with board size, independence,

young female directors, and female financial experts improves firm performance. The findings of the study revealed a significant positive relationship between board size, meeting, young female directors, female financial experts, board expertise and financial performance.

Along the same line, the study of **(Fajarwati & Witiastuti, 2022)** explored the relationship of board size, independent director, board meeting frequency and women director on firm performance of listed companies on the Indonesia Stock Exchange and Bursa Malaysia from 2015 to 2019. The study analysis was carried out on a sample involved of 120 companies in Indonesia Stock Exchange and 209 companies in Bursa Malaysia. The results showed that board size and board meeting frequency have a significant positive effect on the performance of manufacturing companies in Indonesia Stock Exchange and Bursa Malaysia. However, Independent directors have a significant positive effect on firm performance in Bursa Malaysia, while have a significant negative effect on firm performance in Indonesia Stock Exchange.

On the contrary, the study of **(Nepal & Deb, 2021)** examined the association between board size, board independence and financial performance of the Indian textile firms of 40 firms representing the top 100 BSE-listed textile firms from 2015 to 2019. The results indicated that board size and firm performance are positively associated. Results also indicated a significant

inverse relationship between the board independence and financial performance. It has concurred policy implications as the inclusion of more number of board members would likely to increase the firm performance.

Whereas the study of **(David et al., 2021)** assessed the impact of board size on the financial performance of listed companies within the East African Community from the period 2008 to 2014. The study results indicated that the relationship between board size and company performance has a significant positive impact. The result suggested that the optimal board size in EAC lies between nine and ten members.

Unlike the study of **(Al-Saidi, 2021)** evaluated the effect of board size on firm performance using a sample of 110 non-financial firms listed on the Kuwait Stock Exchange (KSE) from 2009 to 2017. According to the statistical results board size negatively affected firm performance. Thus, a small board size is better for non-financial Kuwaiti listed firms, which is consistent with agency theory and the majority of previous studies conducted in developed and developing countries.

On the other hand, the study of **(Pucheta-Martínez & Gallego-Álvarez, 2019)** aimed to examine how board size, board independence, CEO duality, female directors and board compensation affect firm performance in a sample of international firms. Data sample was composed of 10,314 firms for 34 countries. The results showed that some board

characteristics, such as board size, board independence and having a female director, are positively associated with firm performance, whereas CEO duality, contrary to our expectations, also impacts positively on firm performance. Moreover, board compensation is not associated with firm performance.

While the study of **(Pervin & Rashid, 2019)** tested the impact of board characteristics on banking institutions of Bangladesh from 2013 to 2017 of 30 banks listed in the Dhaka Stock Exchange. The results of the study demonstrated a significant positive effect of board independence and female directorship on banks performance. However, the effect of board size on banking performance is not statistically significant. Moreover, the study finds insignificant effect of board characteristics on accounting-based performance of the banks.

the first research hypothesis can be written as follows:

H2: There is a significant relationship between board Size and Firm Performance.

3. Research Design and Methodology

2.1. Research Conceptual Framework

The following figure shows the conceptual framework of the research which clarifies the relationship between the independent variables and the dependent variable:

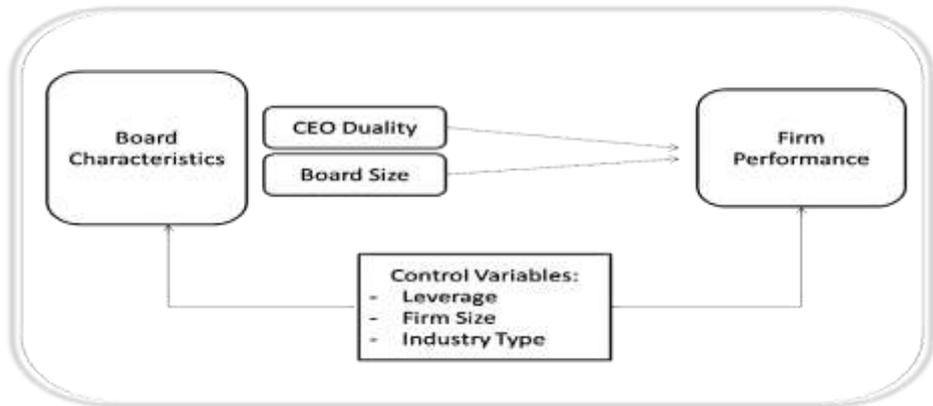


Figure 1: The relationship between Board Size, CEO Duality, and Firm Performance.

Data Collection and Study Sample

The research data was collected from Mubasher Egypt website (<https://www.mubasher.info/countries/eg/stock-prices>) and the Egyptian Stock Exchange website (<https://www.egx.com.eg/en/ListedStocks.aspx>), and the company websites. The data was gathered using the company's annual reports including corporate governance reports, BOD reports, and financial statements. The research population consists of EGX100 from 2017 to 2021. The study sample includes 59 Egyptian companies that are listed on the Egyptian Stock Exchange and the total number of observations is 295 observations. However, the other companies have been excluded due Banks, insurance companies, and businesses in the financial services industry are not included in the study sample due to the

unique nature that regulates their institutions; they must adhere to certain criteria and regulatory regulations. The study will use pooled panel model to analyze the data.

2.1. Research Model

The following equations will represent the relationship between the independent and dependent variables:

Model (1) to test the effect of CEO Duality on Firm performance (H1):

$$ROA_{it} = \alpha + \beta_1 CD_{it} + \beta_2 size_{it} + \beta_3 LEV_{it} + \beta_4 IT_{it} + \varepsilon_{it}$$

Model (2) to test the effect of board size on Firm Performance (H2):

$$ROA_{it} = \alpha + \beta_1 BS_{it} + \beta_2 size_{it} + \beta_3 LEV_{it} + \beta_4 IT_{it} + \varepsilon_{it}$$

As;

β_0 : refers to the estimated constant term.

$\beta_1, \beta_2, \beta_3$: Parameters to be estimated, namely Beta

ROA: Return on Assets.

BS: board Size

CD: CEO Duality

t : refers to the year.

i : refers to the company.

2.2. Variables Measurement

Table 1: clarifies the measurement of the variables as follows:

Variables	Abbreviation	Measurement	Ref.
<i>Independent variables</i>			
CEO Duality	CD	Dummy variable showing 1 if chairman is also the CEO, 0 if chairman and CEO position differs.	(Shrivastav and Kalsie, 2016).
Board Size	BS	Total Number of directors on the board for firm	(Shrivastav and Kalsie, 2016).
<i>Dependent variables</i>			
Return on Assets	ROA	Net income divided by total assets of the firm	(Kusuma, 2021)
<i>Control Variables</i>			
Firm Size	SIZE	The natural logarithm of total assets	(Asiriwa et al., 2019) (Saleem Salem Alzoubi, 2016)
Leverage	LEV	Total liabilities / total assets.	(Soliman, 2019) (Mohd et al., 2015)
Industry Type	IT	Dummy Variable 1: Manufacturing companies 0: Other (Service Companies)	(Asiriwa et al., 2019)

Source: by the researcher

3. Results and Discussion

The main study variables will be analyzed in order to determine measures of central tendency like mean, maximum and minimum values, and their measures of dispersion, standard deviation and coefficient of variation for each variable.

Table (2): Variables descriptive analysis.

Variable	N	Minimum	Maximum	Mean	Standard Deviation	Coefficient of Variation
CEO Duality	295	0.00	1.00	0.36	0.48	1.35
Board Size	295	0.00	16.00	8.46	2.59	0.31
Firm size	295	0.00	24.86	21.21	2.21	0.10
Leverage	295	0.00	30.12	0.59	1.95	3.30
Industry Type	295	0.00	1.00	0.51	0.50	0.98
Return on Assets	295	-64.89	52.22	6.40	10.20	1.59

Source: prepared by the researcher from E-views software output.

From table (2) it is concluded that:

- All study variables have 295 observations which mean that there is no missing data.
- The independent variable CEO Duality variable has a minimum value of 0.00 and maximum value of 1.00 with an arithmetic mean of 0.36, and its standard deviation is 0.48 and coefficient of variation of 135% which indicates a high level of dispersion of values around the arithmetic mean.
- The independent variable Board Size variable has a minimum value of 0.00 and maximum value of 16.00 with an arithmetic mean of 8.46, and its standard deviation is 2.59 and coefficient of variation of 31% which indicates a low level of dispersion of values around the arithmetic mean.

- The Control variable Firm Size variable has a minimum value of 0.00 and maximum value of 24.86 with an arithmetic mean of 21.21, and its standard deviation is 2.21 and coefficient of variation of 10% which indicates a low level of dispersion of values around the arithmetic mean.
- The Control variable Leverage variable has a minimum value of 0.00 and maximum value of 30.12 with an arithmetic mean of 0.59, and its standard deviation is 1.59 and coefficient of variation of 130% which indicates a high level of dispersion of values around the arithmetic mean.
- The Control variable Industry Type variable has a minimum value of 0.00 and maximum value of 1.00 with an arithmetic mean of 0.51, and its standard deviation is 50 and coefficient of variation of 98% which indicates a moderate level of dispersion of values around the arithmetic mean.
- The Dependent variable Return on Assets variable has a minimum value of -64.89 and maximum value of 52.22 with an arithmetic mean of 6.40, and its standard deviation is 10.20 and coefficient of variation of 159% which indicates a high level of dispersion of values around the arithmetic mean.

4.1 Correlation Matrix

After applying test of normality for the main dimensions of the independent, control and the dependent variables of study and founding the study variables don't follow the normal distribution, So Spearman correlation coefficient will be the most appropriate

coefficient for determining the relation strength and direction between each two variables, then the correlation coefficient is tested by a t-test which its null hypothesis states that correlation does not exist if the test *p-value* is greater than 0.05.

Table (3): Spearman correlation coefficient matrix

Variable	CD	BS	SIZE	LEV	IT	ROA
CD	1					
<i>P-value</i>	-					
BS	0.206**	1				
<i>P-value</i>	0.000	-				
SIZE	0.086	0.379**	1			
<i>P-value</i>	0.138	0.000	-			
LEV	-0.016	-0.074	-0.083	1		
<i>P-value</i>	0.790	0.204	0.156	-		
IT	0.023	0.127*	0.134*	-0.078	1	
<i>P-value</i>	0.697	0.030	0.021	0.179	-	
ROA	0.198**	0.233**	0.182**	-0.151**	0.131*	1
<i>P-value</i>	0.001	0.000	0.002	0.010	0.025	-

Source: prepared by the researcher from E-views software output.

From Matrix (3) it is concluded that:

- There is significant, direct and weak relation between ROA and CEO Duality of correlation coefficient value 0.198 and *P-value* 0.001.
- There is significant, direct and weak relation between ROA and Board Size of correlation coefficient value 0.233 and *P-value* 0.000.

- There is significant, direct and weak relation between ROA and Firm's Size of correlation coefficient value 0.182 and *P-value* 0.002.
- There is significant, inverse, and weak relation between ROA and Leverage of correlation coefficient value -0.151 and *P-value* 0.010.
- There is significant, inverse, and weak relation between ROA and Industry Type of correlation coefficient value 0.131 and *P-value* 0.025.

4.2 Testing the First Hypothesis:

The researcher will use the panel regression techniques to test the first hypothesis which states that: There is a significant relationship between board independence and earnings quality.

4.3 Model Diagnostics:

The following table presents the diagnostics of the three-panel models to determine the most appropriate model for forecasting ROA.

Table (4): The pooled panel model diagnostics for the first hypothesis.

Test	Purpose	Test-statistic result	<i>P-value</i>	Fitted panel model
F-test	Comparing between Pooled panel and Fixed Effect Panel	F = 5.842	0.80923022	Pooled panel
Breusch-Pagan test	Comparing between Pooled panel and Random Effect Panel	LM = 2.559	0.74189028	Pooled panel
Hausman test				

Source: Prepared by the researcher depending on E-views software output.

From the previous table shows that the pooled panel model is the most fitted model to explain the impact of the independent on the dependent variables.

4.4 Pooled Panel:

The following table presents the pooled panel linear regression model for Return on Assets ROA as a dependent variable and CEO Duality as an independent variable in the presence of the Firm's size, Leverage and Industry type as a control variables to obtain the most fitted linear relation that can forecast the leverage on the long run.

Table (5): The pooled panel model of ROA for the first hypothesis.

Model	<i>Pooled Panel</i>	Dependent variable		ROA
Independent variables	<i>Coefficient</i>	<i>t-ratio</i>	<i>p-value</i>	Significance
Constant	-9.54604	-1.721	0.0863	Insignificant
CEO Duality	3.85896	3.235	0.0014	Significant
Firm's Size	0.658116	2.509	0.0127	Significant
Leverage	-0.670587	-2.282	0.0232	Significant

Industry Type	1.98582	1.725	0.0856	Insignificant
F-test	7.516444	<i>p-value</i>		<0.0001
Adjusted R-squared			8.1439%	

Source: Prepared by the researcher depending on E-views software output.

From table (5) it is concluded that:

- The overall pooled panel model is significant as the overall F-test for significance has a value of 7.516444 and *P-value* <0.0001 which is less than 0.05, with adjusted R-squared value of 8.1439% which means that CEO duality, Leverage, and firm's size explain the change in the ROA by 8.1439%.
- CEO Duality has a direct and significant impact on ROA
- Leverage has an inverse and significant impact on ROA.
- Firm's size has a direct and significant impact on ROA.
- Industry Type has a direct and insignificant impact on ROA.
- The overall equation for forecasting the ROA is:

$$\widehat{ROA}_{it} = 3.85896 \text{ CEO Duality}_{it} + 0.658116 \text{ Firm'sSize}_{it} - 0.670587 \text{ Leverage}_{it}$$

4.5 Heteroscedasticity Test for Residuals Stability:

The regression models and the OLS method are based on several assumptions, including the constancy of homoscedasticity by which the mean should be equal to zero, and if the Heteroscedasticity variation is used, some methods are used to overcome this problem, such as the White test. The null

hypothesis is that the model has a problem of random error instability if *p-value* is less than 0.05.

Table (6): Heteroscedasticity test for the first hypothesis.

Overall test of Heteroscedasticity	Chi-square	<i>P - value</i>
	2.677	0.20353032

Source: Prepared by the researcher depending on E-views software output.

The above table shows that the chi-squared test of value 2.677 has a p-value of 0.20353032 which means accepting the null hypothesis which means that the study model does not suffer from the problem of random error instability.

4.6 Ramsey Reset Test:

This test is used to determine whether the model contains all the appropriate variables and excludes all irrelevant variables to ensure that the model estimated coefficients are not biased. This is done through the Ramsey RESET Test, and the decision criterion is to accept the null hypothesis that the study model includes all the appropriate variables P-value was greater than (0.05).

Table (7): Ramsey Reset test for the second hypothesis.

Ramsey RESET overall Test	F-test	<i>P - value</i>
	2.677	0.20353032

Source: Prepared by the researcher depending on E-views software output.

The above table shows that P-value for the F test is greater than (0.05), which means that the study model does not contain any inappropriate variables included in the model

4.7. Variance Inflation Factor (VIF) Test:

Minimum possible value equals to 1.0 and the values greater than 10.0 indicate a collinearity problem.

Table (8): VIF of the independent and control variables for the first hypothesis.

Variable	VIF
CEO Duality	1.088
Firm's Size	1.031
Leverage	1.012
Industry Type	1.023

Source: Prepared by the researcher depending on E-views software output.

From the previous table it is concluded that there is no variable suffers from multi-collinearity as the VIF values don't exceed 10.

4.8 Normality of Residuals:

The following table presents the normal distribution of residuals as the model residuals must follow the normal distribution in the long run with mean equals zero and variance equals one.

Table (9): Normality of residuals for the second hypothesis.

Chi-square test of Normality	Test	<i>P</i> – value
	8.571	0.67451039

Source: Prepared by the researcher depending on E-views software output.

From the previous table shows that the chi-square test of normality its *p-value* is 0.67451039 which is greater than 0.05 which means that residuals are normally distributed.

4.9 Testing the second Hypothesis:

The researcher will use the panel regression techniques to test the second hypothesis which states that: There is a significant relationship between Board Size and Firm Performance.

4.10 Model Diagnostics:

The following table presents the diagnostics of the three-panel models to determine the most appropriate model for forecasting ROA.

Table (10): The pooled panel model diagnostics for the second hypothesis.

Test	Purpose	Test-statistic result	<i>P-value</i>	Fitted panel model
F-test	Comparing between Pooled panel and Fixed Effect Panel	F = 5.90418	0.83182023	Pooled panel
Breusch-Pagan test	Comparing between Pooled panel and Random Effect Panel	LM = 9.85	0.41845030	Pooled panel
Hausman test				

Source: Prepared by the researcher depending on E-views software output.

From the previous table shows that the pooled panel model is the most fitted model to explain the impact of the independent on the dependent variables.

4.11. Pooled Panel:

The following table presents the pooled panel linear

regression model for Return on Assets ROA as a dependent variable and Board size as an independent variable in the presence of the Firm's size, Leverage and Industry type as a control variables to obtain the most fitted linear relation that can forecast the leverage on the long run.

Table (11): The pooled panel model of ROA for the second hypothesis.

Model	<i>Pooled Panel</i>	Dependent variable		ROA
Independent variables	<i>Coefficient</i>	<i>t-ratio</i>	<i>p-value</i>	Significance
Constant	-8.77489	-1.486	0.1384	Insignificant
Board Size	0.668507	2.897	0.0041	Significant
Firm's Size	0.520805	1.710	0.0884	Insignificant
Leverage	-3.77455	-2.510	0.0126	Significant
Industry Type	0.683661	0.6673	0.5051	Insignificant
F-test	6.053217		<i>p-value</i>	0.000109
Adjusted R-squared				6.4329%

Source: Prepared by the researcher depending on E-views software output.

From table (11) it is concluded that:

- The overall pooled panel model is significant as the overall F-test for significance has a value of 6.053217 and *P-value* 0.000109 which is less than 0.05, with adjusted R-squared value of 6.4329% which means that Board size, Leverage, and firm's size explain the change in the ROA by 6.4329%.
- Board size has a direct and significant impact on ROA
- Leverage has an inverse and significant impact on ROA.
- Firm's size has a direct and insignificant impact on ROA.
- Industry Type has a direct and insignificant impact on ROA.

- The overall equation for forecasting the ROA is:

$$\widehat{ROA}_{it} = 0.668507 \text{ Board Size}_{it} - 3.77455 \text{ Leverage}_{it}$$

4.12 Heteroscedasticity Test for Residuals Stability:

The regression models and the OLS method are based on several assumptions, including the constancy of homoscedasticity by which the mean should be equal to zero, and if the Heteroscedasticity variation is used, some methods are used to overcome this problem, such as the White test. The null hypothesis is that the model has a problem of random error instability if *p-value* is less than 0.05.

Table (12): Heteroscedasticity test for the second hypothesis.

Overall test of Heteroscedasticity	Chi-square	<i>P - value</i>
	4.29	0.47464030

Source: Prepared by the researcher depending on E-views software output.

The above table shows that the chi-squared test of value 4.29 has a *p-value* of 0.20353032 which means accepting the null hypothesis which means that the study model does not suffer from the problem of random error instability.

4.13 Ramsey Reset Test:

This test is used to determine whether the model contains all the appropriate variables and excludes all irrelevant variables to ensure that the model estimated coefficients are not biased. This is done through the Ramsey RESET Test, and the decision criterion is to

accept the null hypothesis that the study model includes all the appropriate variables P-value was greater than (0.05).

Table (13): Ramsey Reset test for the second hypothesis.

Ramsey RESET overall Test	F-test	P – value
	2.677	0.20353032

Source: Prepared by the researcher depending on E-views software output.

The above table shows that P-value for the F test is greater than (0.05), which means that the study model does not contain any inappropriate variables included in the model.

4.14 Variance Inflation Factor (VIF) Test:

Minimum possible value equals to 1.0 and the values greater than 10.0 indicate a collinearity problem.

Table (14): VIF of the independent and control variables for the third hypothesis.

Variable	VIF
CEO Duality	1.177
Firm's Size	1.181
Leverage	1.013
Industry Type	1.030

Source: Prepared by the researcher depending on E-views software output.

From the previous table it is concluded that there is no variable suffers from multi-collinearity as the VIF values don't exceed 10.

4.15 Normality of Residuals:

The following table presents the normal distribution of

residuals as the model residuals must follow the normal distribution in the long run with mean equals zero and variance equals one.

Table (14): Normality of residuals for the second hypothesis.

Chi-square test of Normality	Test	<i>P – value</i>
	8.571	0.67451039

Source: Prepared by the researcher depending on E-views software output.

From the previous table shows that the chi-square test of normality its *p-value* is 0.67451039 which is greater than 0.05 which means that residuals are normally distributed.

The researcher concluded the results by the following points:

- As the study variables are not normally distributed, the Spearman correlation coefficient is the most suitable coefficient for determining the linear relationship between the independent, dependent, and control variables.
- There is a significant relationship between CEO Duality and firm performance.
- There is a significant relationship between Board Size and firm performance.

5. Conclusion

This research investigated the effect of Board characteristics on firm performance. The study used a sample that consists of 58 Egyptian companies that are listed on the Egyptian stock exchange from the year of 2017 and 2021 with 295 observations.

The sample compromise of many sectors includes real estate, food and beverage, construction material, chemicals, tourism, basic resources, personal and household, health care, media, oil and gas, travel, and capital goods.

The study findings of the H1 show a significant relationship between Board sizes on firm performance. This result is consistent with the results Results of **(Le et al., 2023)** & **(Fajarwati & Witiastuti, 2022)**, **(Nepal & Deb, 2021)**, **(David et al., 2021)**, as they concluded that board Size and firm performance have a significant positive relationship. Whereas, the studies of **((Al-Saidi, 2021)** and **(Hussain & Abdul Hadi, 2018)** show a significant negative relationship between Board Size and firm performance. While, the findings of **(Pervin & Rashid, 2019)**, **(Sarpong-Danquah et al., 2018)**, and **(Mohammed, 2018)** disagreed with our findings as they agreed that there is an insignificant relationship between Board size and firm performance.

Additionally, the empirical findings of H2 indicated that CEO Duality has a significant negative relationship with firm performance. This result is consistent with the results of **(Le et al., 2023)** & **(Kanakriyah, 2021)**. Whereas, the studies of **(Mahmood et al., 2023)**, **(Mubeen et al., 2021)**, **(Jwailles, 2021)** show a significant positive relationship between CEO Duality and firm performance. While, the studies of **(Puni & Anlesinya, 2020)**, **(Puni & Anlesinya, 2020)** contradicted our findings as they showed that there is an insignificant relationship between CEO

Duality and Firm performance.

4. The study limitation

- The research discusses only two corporate governance mechanism which is board composition (board size) and board committees (chief executive officer (CEO) duality) and doesn't include other corporate governance mechanisms such as: board composition (inside directors, and outside directors), board committees (audit, stakeholder's relationship committee, and risk management committee), /separation, board meetings.
- The research is limited to a sample of listed companies on the Egyptian Stock Exchange during the period from 2017 to 2021 to serve the research objectives.
- The study sample includes listed companies on the Egyptian Stock Exchange other than banks, insurance companies and companies in the financial service sector as they have special nature that governs their institutions as well as they are subject to some standards and legal requirements.

5. Recommendation

The results of the study on board characteristics and firm performance may be useful to the Egyptian regulatory bodies to place more enhancement of corporate governance effectiveness. Additionally, it might draw attention to the importance of the board of directors' role in the quality of financial reports among professionals (investors, bankers, etc.) in industrial businesses.

6. Future researches

After reviewing the findings of the current investigation, the researcher suggests a number of additional studies that might be undertaken in order to further the current study.

- The effect of board duality and managerial ownership on firm performance.
- The impact of governmental ownership on firm performance.
- The relationship between board diversity and board impence on firm performance.

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