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Dr. Dalia Hussein Abdelhay Elsayed

Lecturer of Accounting, Faculty of Management Sciences, October University for Modern Sciences and Arts (MSA), Egypt

The Impact of Board Gender Diversity on Firms Performance During the Covid-19 Crisis

Abstract

This study aims to examine if female representation on board can enhance the firms' performance during the times of crises and uncertainty related to the Covid-19 pandemic outbreak. This study uses a sample of Egyptian firms listed on the Egyptian Stock Exchange index (EGX100), over the period 2017 to 2021. Ordinary Least Squares (OLS) and two-stage least squares (2SLS) regression analysis are used to test the hypotheses. Results show that board gender diversity has a positive and significant impact on firm performance as measured by returns on assets (ROA), but not when measured by Tobin's Q (i.e., firm value). After splitting the sample, results reveal that board gender diversity has a positive impact on firm performance (as measured by ROA) during the period of Covid-19 pandemic (2020-2021), but not before it (2017-2019). This implies the significant role of female representation on corporate board during times of uncertainty and crises.

Keywords: Board Gender Diversity, Firm Performance, Crises, Times of Uncertainty, Covid-19 Pandemic.

E.mail: dabdelhai@msa.edu.eg

أثر التنوع بين الجنسين في مجلس الإدارة على أداء الشركات أثناء أزمه كوفيد-19

ملخص البحث

تهدف هذه الدراسة إلى اختبار ما إذا كان تمثيل المرأة في مجلس الإدارة يمكن أن يعزز أداء الشركات أثناء أوقات الأزمات وعدم التأكد المتعلقه بتفشي جائحة كوفيد-19. وقد استخدمت الدراسة عينة من الشركات المصرية المدرجة بمؤشر البورصة المصرية(EGX100) ، خلال الفترة من 2017 إلى 2021. كما تم استخدام تحليل الانحدار بطريقة المربعات الصغرى العادية (OLS) وطريقة المربعات الصغرى ذات المرحلتين (2SLS) لاختبار فرضيات البحث.

وتشير النتائج الى وجود تأثير إيجابي ومعنوي للتنوع بين الجنسين في مجلس الإدارة على أداء الشركات والذي تم قياسه من خلال العائد على الأصول، ولكن ليس عند قياسه بواسطة Tobin's Q(قيمة المنشأة). وبعد تجزئة العينة، كشفت النتائج أن التنوع بين الجنسين بمجلس الإدارة له أثر إيجابي على أداء الشركة (كما تم قياسه بالعائد على الأصول) خلال فترة جائحة كوفيد -19 (2020-2021)، ولكن ليس قبل الجائحة (2017-2019)، وهو الأمر الذي يشير الى الدور الهام لتمثيل النساء بمجلس إدارة الشركة في أوقات عدم التأكد والأزمات.

الكلمات المفتاحية: التنوع بين الجنسين في مجلس الإدارة، أداء الشركة، الأزمة، أوقات عدم التأكد، جائحة كوفيد -19

1. Introduction

There has been a renewed considerable interest in the issue of women representation on corporate board among researchers, practitioners, and policy makers, especially in the last decade. This interest can be as a result of the relatively slow and low representation of women on boardroom relative to the percentage of women in the population worldwide. For example, female representation on corporate board in countries, such as UK, Australia, and Germany average near 30%; in other countries such as USA and Canada, average close to 25 %, whereas Brazil and India average around 10% (Deloitte, 2022). In Egypt, average female directors on board in firms listed in the Egyptian Stock Exchange (EGX) increased to be 11.6% in 2020 and 15.2% in 2021 (Egypt Women on Board Observatory, 2021). Accordingly, there is an increased response by governments and regulatory authorities all over the countries for improving the percentage of female representation on corporate board. For example, in 2017, the UK government issued the Hampton Alexander report, which requires FTSE companies to include 33% females in leadership teams by 2020. In addition, many European Union countries have required 40% female quotas in their codes (Brahma et al., 2021; Garcia & Herrero, 2021). In Egypt, listed firms are now mandatory required to increase the female representation in boardroom to be not less than 25% or 2 board seats at minimum for females.

Throughout literature, board gender diversity has been shown to be associated with many benefits for firms. Female directors on board can have different insights, innovative ideas (Terjesen et al., 2009) and leadership skills (Huse and Solberg, 2006). In addition, they can bring diverse resources (Hillman & Dalziel, 2003), skills and experiences (Carter et al., 2008; Kim & Starks, 2016), which improve the monitoring and advisory role of the board, and thus enhance firms' corporate governance mechanisms (Adams & Ferreira, 2009). As a result, board gender diversity helps in improving firm performance (Ahmadi et al., 2018; Brahma et al., 2021; Gordini & Rancati, 2017; Hosny & Elgharbawy, 2022; Ramadan & Hassan, 2022; Simionescu et al., 2021; Ullah et al, 2019) and in reducing the firms' opportunistic behaviour. On the contrary, other prior studies found no clear association between board gender diversity and firm performance (Adams & Ferreira, 2009; Carter et al., 2010; Dale-Olsen et al., 2013; Rose, 2007), or revealed that board gender diversity negatively affects firms' performance (Kweh et al., 2019; Matsa & Miller, 2013; Shehata et al., 2017; Westphal & Milton, 2000). This can be reasoned to the interpersonal conflicts and poor communications that resulted from the increased gender diversity on the firm's board (Pelled et al., 1999; Pletzer et al., 2015). In addition, when female directors represent minority groups on corporate boards, they will have weak influence (Westphal & Milton, 2000), which leads to more difficult decision-making.

Motivated by the debate on board gender diversity, this study examines the impact of female representation in boardroom on firms' performance in an emerging market, Egypt. Investigating such association in different countries with different institutional settings and economic conditions would uncover other factors that could formulate such association. In addition, this study extends to examine such association during the difficult times of Covid-19 Pandemic. During times of crisis and uncertainty, the role of board of directors extends beyond the monitoring and the advisory role to include the responsibility of reducing the uncertainty and instability spread all over the market (Farwis et al., 2021; Foss, 2021; Liu et al., 2020). Thus, corporate board with more diversity in terms of skills, composition and characteristics, and stronger corporate governance can help firm to operate within the uncertain environment (Jumreornvong et al., 2022). Accordingly, examining the women role in boardrooms during Covid-19 pandemic outbreak could lead to uncover unexplored aspects regarding the board gender diversity-firm performance association. In addition, it can help in exploring if the role of board gender diversity in the times of uncertainty and crisis would become more prevalent than in regular circumstances.

Egypt provides an interesting context for this study for several reasons. First, Egypt is one of the emerging economies with a rapid growth and its traditionally strong relationships with the world's richest nations. It has one of the most active markets in the Middle East and North Africa (MENA) region and is considered one of the most attractive areas for investments in this region (Ramadan & Hassan, 2022). Additionally, Egypt has witnessed two revolutions in January 2011 and June 2013 which had an impact on the country's governance systems and firm's disclosure requirements. Second, Egypt differs from other emerging markets due to its commitment towards enhancing the women participation in different firms' aspects and in corporate decision-making process. For instance, the latest version of the Egyptian Corporate Governance Code, issued in 2016, addressed board diversity by requiring firms to avoid bias related to board composition in terms of gender or faith (EIoD, 2016). In addition, in 2019, the financial regulatory authority (FRA) issued acts no. 103 and 104 regarding listing and de-listing rules of firms in the EGX, where listed firms are mandatory required to have at least one female in the board of directors. Moreover, in July 2021, the FRA issued acts no. 123 and 124, where listed firms are now mandatory required to increase the female representation in boardroom to be not less than 25% or 2 seats at minimum. Thus, examining board gender diversity impact on firm performance in the Egyptian market could be interesting after the mandatory requirement for the female quotas on listed firms' boards.

This study provides several contributions to the existing literature. First, the study contributes to the debate regarding the benefits of female representations in boardroom on firm's different aspects. On the contrary to most prior studies examining the relation between board gender diversity and firm performance in regular conditions and periods of stability, this study examines such relation during times of crisis and uncertainty related to the Covid-19 pandemic. Second, results shed light on the benefits of the mandatory requirements of female quota on firms' boards, and thus could be of importance to other countries who are in their way for mandating legislations for female representations.

2. Literature Review and Hypotheses Development

2.1. Board Gender Diversity and Firm Performance

The way in which female representation on board can affect companies' different aspects and outcomes can be interpreted by many theories. The resource dependence theory suggests that board can link firms to other external entities to address environmental dependencies (Hillman & Cannella, 2007). Accordingly, board diversity expands firm's channels of communications, networks and its connections to other companies. In this context, board gender diversity can help in achieving this, where female directors have the ability to access more connections, acquire and monitor diverse resources, including human capital, advice and several channels of communication (Hillman & Dalziel, 2003). In addition, they can bring more skills and experience (Carter et al., 2008; Kim & Starks, 2016), which enhances the advisory role of the board of directors.

The agency theory indicates the existence of information asymmetry and conflict of interest between agents (managers) and principal (shareholders) as managers have interests not aligned with shareholders. Thus, board of directors aims at minimizing this conflict by the supervision and monitoring of management decisions to ensure that shareholders' interests are met (Jensen & Meckling, 1976). Female representation on board can enhance the monitoring role of the board for several reasons (Adams & Ferreira, 2009; Alabede, 2016; Carter et al., 2003). Female directors can think independently, increase managerial accountability, more likely to attend meetings and motivate male directors to improve their presence when there are female directors (Adams & Ferreira, 2009; Dang et al., 2013). Thus, female representation in boardroom can lead the board to devote more time for monitoring managers which enhances the corporate governance mechanisms (Adams & Ferreira, 2009; Singh, 2009), and consequently improves the firms' performance (Adams & Ferreira, 2009; Alabede, 2019; Carter et al., 2003).

Several empirical studies have supported that female representation on board can positively affect firm performance as measured by profitability ratios, such as return on assets (ROA), return on equity (ROE), or return on investment (ROI) and firm value measured by Tobin's Q. Those studies were conducted in a variety of developed and emerging markets, such as France (Ahmadi et al., 2018), UK (Brahma et al., 2021), US (Carter et al., 2003; Hosny & Elgharbawy, 2022; Simionescu et al., 2021), Spain (Campbell & Minguez-vera, 2008), Asian countries (Low et al., 2015), Italy (Gordini & Rancati, 2017), Turkey (Kılıç & Kuzey, 2016), Egypt (Ramadan & Hassan, 2022); South Africa (Scholtz & Kieviet, 2018); MENA region countries (Salloum et al., 2019; Sarhan et al., 2019), Pakistan (Ullah et al., 2019) and many different countries (Terjesen et al., 2016). However, Adams & Ferreira (2009) did not find a positive relation between board gender diversity and firm performance in all cases in US firms. They showed that board gender diversity is negatively associated with firm performance (ROA and Tobin's Q) in firms with weak corporate governance and weak shareholders' right. In addition, firms with strong shareholders' right and strong corporate governance mandating gender Quotas in boardroom decrease firm performance and value, which could be reasoned to excess or over monitoring in these firms.

According to social psychology theories, it can be argued that the majority group in boardroom can have a significant role in the decision-making process and even in diverse board, while the minority groups may not influence the board due to the group dynamics (Westphal & Milton, 2000). In addition, it has been argued that female on board might lead to conflicting views on board, which makes the process of decision-making more difficult and increase the time of board meetings (Campbell & Minguez-vera, 2008; Williams & O'Rielly, 1998). Moreover, too diversification on board (i.e., dissimilar board) may result in lack of sufficient cohesion, which can lead to more conflicts and lengthen the time and quality of decision making (Pelled et al., 1999), and thus can negatively affect firm performance.

Some empirical studies have supported that female representation on board can affect negatively firm performance. For example, Kweh et al. (2019) showed that board gender diversity negatively affects firm performance

(ROA) using Malaysian firms. Matsa & Miller (2013) found that board gender diversity has a negative effect on Nordic firm's profits. Shehata et al. (2017) showed a negative association between board gender diversity and performance (ROA) of small and medium enterprises (SMEs). In addition, other studies found that board gender diversity had no impact on firms' ROA (e.g., Carter et al., 2010; Dale-Olsen et al., 2013; Marimuthu & Kolandaisamy, 2009), or Tobin's Q (e.g., Bolyle et al., 2020; Carter et al., 2010; Rose 2007).

Thus, it seems that according to different theories and results of empirical studies, the association between board gender diversity and firm performance remained inconclusive and even contradictory. In this study, the agency theory is adopted, assuming that more women in boardroom leads to a more diversified board, which enhances the monitoring role of the board of directors over management, and hence this affects firms positively. In addition, the resource dependence theory is also adopted, suggesting that more female representation can bring more various skills, experiences, talents, connections and capital resources to the firm which helps in improving firm performance. Thus, the following hypothesis is developed:

H_1: Board gender diversity has a significant positive impact on firms' performance.

2.2. Board Gender Diversity and Firm Performance during Times of Covid-19 Crisis

The relation between diversity and performance is too complex to be interpreted by simple linear relationships as there are many factors that can moderate such relation (Ozbilgin et al., 2016), such as institutional, market and organizational factors (Ararat et al., 2021). However, little is known about if board gender diversity is associated with firm performance during times of crisis and uncertainty. Covid-19 pandemic outbreak is an example of crisis, coupled with uncertainty and difficult times that have affected all firm sectors. The government initiatives in most countries regarding community lockdowns, travel restrictions, social distancing, stay home polices and the closure of many businesses, have affected firms in several aspects.

Beside the monitoring and advisory roles of board of directors, the crisis of Covid-19 pandemic highlighted their role in reducing the uncertainty and instability resulted by the pandemic including shortage of liquidity, business closure and many other problems that lead to higher risk (Farwis et al., 2021). During difficult times, like that of Covid-19 outbreak, it is necessary for firms to adopt different business strategies, different financial policies and restructure their capital, together with the active monitoring (Foss,2021; Shein, 2020). Thus, it can be expected that the extent and effect of board of directors in terms of composition, diversity, characteristics and expertise can be more prevalent during the period of Covid-19 through helping firms to counteract the pandemic negative effects (Farwis et al., 2021; Song et al., 2021). By focusing on the board gender diversity, the role of female directors in the boardroom is expected to be of significant importance during the difficult times of Covid-19 pandemic. This can be reasoned to the diverse skills and experiences they have and to their enhancement of the board's monitoring and advising role over management's operations (Adams & Ferreira, 2009; Alabede, 2016; Carter et al., 2003). In addition, women on board have ability to access more diverse resources, connections and channels of communication (Hillman & Dalziel, 2003) and are able to bring more skills, talents, experience and innovative ideas (Carter et al., 2008; Kim & Starks, 2016; Terjesen et al., 2009).

Jumreornvong et al. (2022) support this premise, where they revealed that firms increase their board gender diversity in response to the economic policy uncertainty resulted from 11th September terrorist attack. They concluded that board gender diversity can mitigate the adverse effect on the shareholders' wealth resulted by the negative shock from 11th September attack. In addition, some prior studies attempted to examine how the performance-board gender diversity association is affected during a variety of times of crisis. For example, Ararat et al. (2021) showed that board gender diversity leads to improvement in Egyptian firms' financial performance (as measured by ROA, ROE, ROI) during times of uncertainty immediately after the January 2011 revolution (2012-2014), but not before it (2005-2011). However, this is not found when measuring firm performance by the market-based measure Tobin's Q. Agyemang-Mintah & Schadewitz (2019) showed that female representation on board of UK financial institutions have a positive and significant association with firm value prior to the financial crisis (2000-2011), but not after the financial crisis period (2009-2011). They interpreted that as perhaps the UK economy was still suffering from the economic downturn and its consequences. Khatib & Nour (2021), using Malaysian firms, showed that board gender diversity appeared to significantly enhance firm performance during uncertain times of covid-19 and not in the pre-covid 19 period.

Another reason for expecting that the firm performance-gender diversity relation would differ during times of Covid-19 pandemic is that the quality of firm's corporate governance mechanisms including diversity can be perceived by investors as an indicator for corporate resilience to the Covid-19 shock. Thus, stock prices of firms with better corporate governance and more diverse boards are expected to be more immune against the negative impact of the Covid-19 pandemic shock (Francis et al., 2012; Zolotoy et al., 2021). Supporting this, Zolotoy et al. (2021) showed that firms with more board gender diversity have higher abnormal returns in the period when negative market sentiment resulted by Covid-19 pandemic was in its peak. Their result revealed that investors perceive board gender diversity as a positive signal about the firm's ability to face the economic implications of Covid-19 pandemic.

Accordingly, based on the above discussion and the existing literature about the effect of Covid-19 pandemic on corporate governance and firm performance, the following hypothesis is developed:

H_2: Board gender diversity has a significant positive impact on firms' performance during times of Covid-19 pandemic.

3. Research Methodology

3.1. Sample and Data Collection

This study uses a sample of firms listed in the Egyptian stock market in EGX 100 index for the period between 2017 and 2021. The study focuses on non-financial firms and excludes banks, insurance, and financial firms due to their specific rules and regulations. After, excluding firms entered into merger and acquisition and observations with missing data during the sample-period, the final sample is 54 non-financial firms, making up 259 firm-year observations for the period between 2017 and 2021. Data for measuring board gender diversity and other board of directors' characteristics are collected from the firms' board of directors' report and firms' annual reports. Data for measuring firm performance and firm-specific characteristic are collected from firms' financial statements and Thomson Reuters database.

3.2. Variables' Measurements

3.2.1. Board Gender Diversity

In this study, the independent variable is the board gender diversity ***FEM_BOD***, representing the female presentation on the firm's boardroom. Following several prior empirical studies (Ararat et al., 2021; Issa & Zaid, 2021; Guizani & Abdalkrim, 2022; Ramadan & Hassan, 2022; Shehata, 2022; Simionescu et al., 2021; Zhong et al., 2014; Zolotoy et al., 2021), it is measured by the ratio of the number of females members on firm's board divided by the total number of board members.

3.2.2. Firm Performance

The dependent variable is the firm performance ***FIRM_PERF***, which is measured using both return on assets ***ROA*** and Tobin's Q ***TOBINS_Q***. Return on assets has been widely used as an accounting-based measure of firm performance, especially profitability in many literature of gender diversity (Adams & Ferreira, 2009; Ararat et al., 2021; Brahma et al., 2021; Kweh et al., 2019; Ramadan & Hassan et al., 2022; Simionescu et al., 2021; Ullah et al., 2019). In addition, Tobin's Q is used as a market-based measure of firm performance, following several prior studies (Adams & Ferreira, 2009; Agyemang-Mintah & Schadewitz, 2019; Brahma et al., 2021; Gordini & Rancati, 2017; Guizani & Abdalkrim, 2022; Ramadan & Hassan et al., 2022; Ullah, et al., 2019).

3.2.3. Control Variables

Following recent empirical literature (Ararat et al., 2021; Brahma et al., 2021; Gardini & Rancati, 2017; Kweh et al., 2019; Ramadan & Hassan, 2022; Simionescu, et al., 2021; Ullah et al., 2019), several firm-level and board-related factors that are most likely to affect firm performance and value, are used as control variables. Logarithm of firm's total assets ***SIZE*** is used to control for the size effect of firms, ratio of total liabilities to total assets ***LEV*** is used to control for the financial leverage of the firm and logarithm of the firm's age ***AGE*** is used to control for the years since the company is listed. In addition, CEO duality ***CEO_DUAL***, number of members on board ***BOD_SIZE*** and number of board meetings ***BOD_MEET*** are used also as control variables. Also, board internationalization ***BOD_INT*** is added as a control variable as it has shown by many prior studies that it could affect firm performance (Hosny & Elgharbawy, 2022; Masulis et al., 2012). Moreover, industry and year-effects are included to control their effects.

3.3. Empirical Models

To test the hypotheses, firm performance indicators (ROA & Tobin's Q) are regressed on board gender diversity measure, while controlling other variables which could have an effect on firm performance, as follows:

$$FIRM\_PERF_{i,t} = \alpha + b_1 FEM\_BOD_{i,t} + Control\ variables + e_{i,t} \quad \textbf{(1)}$$

Where variables' measures and their formulas are presented in table (1).

Table 1: Variables Measurements

Variable		Description	Measurement
Independent Variable			
$FEM\_BOD_{i,t}$		Board Gender Diversity	Ratio of number of female directors on board divided by total number of board members.
Dependent Variables			
$FIRM\_PERF$	*ROA*	Return on Assets	Net income before extraordinary items divided by total assets

	TOBINS_Q	Tobin's Q	(Market value of equity + Market value of liabilities) divided by Total Assets
Control Variables			
BOD_INT		Board Internationalization	Ratio of number of foreign directors on board divided by total number of board of members.
BOD_SIZE		BOD Size	Number of members in the board
BOD_MEET		BOD Meetings	Number of meetings of the board of directors per year
CEO_DUAL		CEO duality	Dummy variable equals 1 if the CEO and chairman of BOD is the same person; otherwise, 0
SIZE		Firm Size	Natural logarithm of the firm's total assets
LEV		Firm Leverage	Ratio of total liabilities to total Assets
AGE		Firm Years	Natural logarithm of number of years since the firm is listed

4. Empirical Analysis and Discussion of Results

4.1. Descriptive Analysis

Table (2) provides results for the descriptive analysis, indicating the minimum, maximum, mean and standard deviation of each variable for the whole sample. In panel (A), over the five-year period, the percentage of female directors on board ***BOD_FEM*** ranges from 0% to 50% with an average of 10.25%. This can be considered low if compared to that of developed countries, such as Italy 16.023% (Gordini & Rancati, 2017), U.S 21.8% (Zolotoy et al., 2021), China 13% (Khidmat et al., 2021).

Table 2: Descriptive Statistics for the Variables

	N	Min	Max	Mean	Std. Deviation
Panel (A)					
TOBINS_Q	259	0.2998	22.6111	1.6258	1.8517
ROA	259	-1.316	0.3486	0.03158	0.0970
FEM_BOD	259	0	0.5	0.1025	0.1135
BOD_INT	259	0	0.875	0.1031	0.1897
BOD_SIZE	259	3	17	8.74	2.945
BOD_MEET	259	3	25	9.42	4.737
SIZE	259	18.3622	25.6557	22.1762	1.5280
LEV	259	0.0479	4.0921	0.6245	0.4124
AGE	259	0.6931	4.5217	3.2777	0.6087

Panel (B) CEO Duality

		Frequency	Percent
CEO_DUAL	Separate Role of CEO and the Chairman	141	54.4%
	Dual role of the CEO and the Chairman	118	45.6%
	Total	259	100%

4.2 Correlation Analysis

Table (3) presents the correlation analysis among the variables of the study. The percentage of female directors on board ***FEM_BOD*** is positively and significantly correlated with firm performance measured by return on assets ***ROA***. The correlation between the percentage of female directors on board ***FEM_BOD*** and firm value, measured by ***TOBIN'S Q*** is very weak and is insignificant. The correlation coefficients between the independent variables and each other or with the control variables are less than 0.7, revealing that no multicollinearity exists between the independent variables and control variables.

Table 3: Pearson's Correlation Analysis

Variables	ROA	TOBIN'S Q	FEM_BOD	BOD_INT	BOD_SIZE	BOD_MEET	CEO_DUAL	SIZE	LEV	AGE
ROA	1.000									
TOBIN'S Q	-0.510**	1.000								
FEM_BOD	0.133*	0.007	1.000							
BOD_INT	-0.082	0.079	-0.080	1.000						
BOD_SIZE	0.172**	-0.126*	0.078	-0.156*	1.000					
BOD_MEET	0.011	0.029	-0.154*	-0.049	0.067	1.000				
CEO_DUAL	0.145*	-0.052	0.109	-0.337**	0.036	0.101	1.000			
SIZE	0.195**	-0.210**	-0.228**	0.077	0.257**	0.106	-0.154*	1.000		
LEV	-0.665**	0.437**	-0.182**	0.024	-0.208**	0.157*	-0.044	0.149*	1.000	
AGE	-0.086	-0.003	0.125*	-0.256**	0.005	0.231**	-0.003	-0.415**	-0.134*	1.000

**Correlation is significant at the 0.01 level(2-tailed).
*Correlation is significant at the 0.05 level(2-tailed).

4.3. Regression Analysis

The analysis is divided into two parts. The first part uses the whole sample for the period (2017-2021) to test the first hypothesis if female representation on board positively affects firm performance. The second part splits the sample into sub-groups in two different time periods; before (2017-2019) and during Covid-19 pandemic (2020 – 2021) to test the second hypothesis if female representation on board enhances firm performance during the Covid-19 pandemic crisis. Ordinary least squares (OLS) regression including the industry and year-effects is used to test the hypotheses. In addition, to address endogeneity issues, two-stage least square (instrumental variable approach) (IV-2SLS) is used.

4.3.1. Regression Analysis Results for Board Gender Diversity Impact on Firm Performance for the Whole Sample (H_1)

Table (4) presents regression results for the whole sample that examine the impact of female representation in boardroom on firm performance as measured by ROA (column 1) and Tobin's Q (column 2). In column (1), the association between ***FEM_BOD*** and ***ROA*** is positive (+ 0.129) and significant (at 5%). This result implies that the higher the presence of female directors on firm's board, the higher the firm's profitability. These findings align with the agency theory in providing evidence that more women representation leads to a more diversified board, which enhances the monitoring role of the board of directors, and hence affects the firm' performance positively. In addition, the result supports the resource dependence theory which suggests that the presence of women on board will bring more diversified skills, experiences, valuable resources and knowledge to decision-making process in the board-room, and hence improves firm's performance. The result is consistent with that of prior studies, such as Ahmadi et al. (2018); Ararat et al. (2021); Brahma et al. (2021); Hosny & Elgharbawy (2022); Kılıç & Kuzey (2017); Ramadan & Hassan et al. (2022); Sarhan et al. (2019); Scholtz & Kieviet (2018);Terjesen et al. (2016); Ullah et al. (2019). However, the results are inconsistent with Adams & Ferreira (2009) who found that board gender diversity has a negative effect on firm performance in weak governance and weak shareholders' right environment.

Table 4: OLS Regression Results for Board Gender Diversity and Firm Performance

	(1)ROA	(2)TOBIN'S Q
(Constant)	-0.312***(-2.756)	10.032***(4.663)
FEM_BOD	0.129**(2.578)	0.871(0.913)
BOD_INT	-0.056*(-1.809)	0.631(1.067)
BOD_SIZE	-0.004*(-1.830)	0.051(1.339)
BOD_MEET	0.003***(2.787)	0.005(0.228)
CEO_DUAL	0.028**(2.360)	-0.280(-1.247)
SIZE	0.027***(6.296)	-0.412***(-5.069)
LEV	-0.235***(-17.140)	2.216***(8.493)
AGE	-0.028**(-2.547)	-0.250(-1.202)
Year	YES	YES
Industry	YES	YES
Adj R^2	58.5%	25.7%
F-stat(Prob)	29.009***(0.000)	7.859***(0.000)
Observations	259	259

Notes: t-statistics are in parentheses.***,**,*Statistical significance at 1%, 5% and 10% respectively.

Column (2) in table (4) shows that the association between ***FEM_BOD*** and ***TOBIN'S Q*** is positive, but insignificant indicating that board gender diversity has no impact on the firm's value. This result suggests that the positive impact that female directors on board add to the firm's decision-making and profitability is not perceived by the market. It is worth noting that perhaps there are other factors that could have affected the market's expectations about the firm's future performance, and thus affecting the firm value. This result is consistent with Rose (2007). In addition, this result is consistent with Ararat (2021) and Ramadan & Hassan (2022) who found also that female representation on board of directors has no impact on Egyptian firms' value. However, the result is inconsistent with Agyemang-Mintah & Schadewitz (2019); Brahma et al. (2021); Carter, et al. (2003); Gordini & Rancati (2017); Hosny & Elgharbawy (2022); Sarhan et al. (2019); Salloum et al. (2019); Scholtz & Kieviet; Simionescu et al. (2021); Terjesen et al. (2016); Ullah (2019); who found that female representation on board has a significant positive impact and enhance firm value. Based on the results related to both the firm's ROA and Tobin's Q, hypothesis (1) is partially accepted.

Concerning the control variables, in column (1) of table (4), board internationalization ***BOD_INT***, Board size ***BOD_SIZE***, firm age ***AGE*** and leverage ***LEV*** have a significant and negative association with firm performance, as measured by ***ROA***. However, board meetings ***BOD_MEET***, CEO duality ***CEO_DUAL***, and firm size ***SIZE*** are found to have positive and significant impact on firm's ROA. In column (2) of table (4), board size ***BOD_SIZE***, board meetings ***BOD_MEET***, board internationalization ***BOD_INT***, CEO duality ***CEO_DUAL*** and firm age ***AGE*** have an insignificant impact on firm performance as measured by Tobin's Q ***TOBINS_Q***. Firm size ***SIZE*** is negatively and significantly associated with the firm value as measured by Tobin's Q ***TOBINS_Q***. Firm leverage ***LEV*** has a significant and positive impact on ***TOBINS_Q***.

4.3.2. Regression Analysis Results for Board Gender Diversity Impact on Firm Performance Pre- and during Covid-19 Pandemic (H_2)

Table (5) presents regression results that examine the impact of female representation in boardroom on firm performance during times of crisis and uncertainty related to the Covid-19 pandemic outbreak. Columns (1) and (2) in table (5) provide the results in the period pre-Covid -9 pandemic (2017-2019), while columns (3) and (4) provide the results during the Covid-19 pandemic (2020-2021). In column (1), the association between female representation in board ***FEM_BOD*** and firm performance as measured by ***ROA*** in the pre-Covid 19 period is positive, but insignificant. However, interestingly in column (3), the association between ***FEM_BOD*** and ***ROA*** is positive (+ 0.211) and significant (at 10%) during the times of Covid-19 pandemic (2020-2021). This supports the notion that the role of female directors is more apparent during times of covid-19 pandemic. A reasonable explanation for the insignificant results in the period before Covid-19 pandemic (2017-2019), could be that during this period there was no mandatory requirement for the female representation in the Egyptian firms' board, leading to fewer female directors on firms' boards during this period. However, the sample-period during the Covid-19 pandemic (2020-2021) came after the mandatory requirement in 2019 for the female representation by at least one seat in the listed Egyptian firms' board of directors.

These results provide support to the premise that women representation on board can make a distinguished contribution to firm performance during difficult times and times of crisis and uncertainty. Altogether, results suggest that the extent and effect of board of directors in terms of composition and characteristics, especially gender diversity, can be more prevalent during periods of crisis such as Covid-19, helping firms to counteract the pandemic negative effects. These results are consistent with Ararat et al. (2021) that showed that female representation on board can make contribution to Egyptian firms' performance during difficult times post-2011 revolution. In addition, results are consistent with Khatib & Nour (2021) which showed that after splitting the sample, Malaysian firms' board diversity appeared to significantly enhance firms' performance during, but not pre-Covid 19 period. Moreover, results agree with Jumreornvong et al., (2022) which concluded that board gender diversity can mitigate the adverse effects resulted by the negative shock from 9/11 attack.

Column (2) and (4) in table (5) show that the association between ***FEM_BOD*** and ***TOBIN'S Q*** is positive, but insignificant. These results indicate that board gender diversity has no impact on the firm's performance as measured by the Tobin's Q (i.e., firm value) in both pre and during Covid-19 period. This result is similar to that found for the whole sample in table (4), which suggests that the impact that female directors on board add to the firm's decision-making and profitability is not perceived by the market. This result is inconsistent with Zolotoy et al. (2021) who showed that firms with more board gender diversity have higher abnormal returns in the period when negative market sentiment resulted by Covid-19 pandemic in its peak. Thus, in this context results show that Egyptian Investors do not perceive board gender diversity as a positive signal or value-enhancing during the times of Covid-19 pandemic. Based on the results related to both the firm's ROA and Tobin's Q, hypothesis (2) is partially accepted.

Table 5: OLS Regression Results for Board Gender Diversity and Firm Performance Pre-/During Covid-19 Pandemic

	Pre-Covid-19 Pandemic		During Covid-19 Pandemic	
Dep Variable	(1)ROA	(2)TOBIN'S Q	(3)ROA	(4)TOBIN'S Q
(Constant)	-0.101(-0.862)	6.607***(3.067)	-0.596**(-2.566)	11.879***(3.001)
FEM_BOD	0.072(1.408)	1.176(1.248)	0.211*(1.969)	1.023(0.560)
BOD_INT	-0.069**(-2.120)	1.332**(2.232)	-0.023(-0.381)	-0.075(-0.071)
BOD_SIZE	-0.004*(-1.771)	-0.060(-1.549)	-0.003(-0.760)	0.191***(2.637)
BOD_MEET	0.002*(1.950)	0.062***(2.826)	0.006**(2.191)	-0.090*(-1.969)
CEO_DUAL	0.018(1.50)	-0.094(-0.422)	0.043*(1.795)	-0.657(-1.610)
SIZE	0.018***(3.765)	-0.164*(-1.922)	0.037***(4.459)	-0.603***(-4.276)
LEV	-0.249***(-11.906)	0.527(1.374)	-0.225***(-10.974)	2.890***(8.274)
AGE	-0.025**(-2.288)	-0.569***(-2.874)	-0.035(-1.432)	0.243(0.592)
Industry	YES	YES	YES	YES
Adj R^2	50.8%	14.3%	61.8%	47.3%
F-stat (Prob)	18.912***(0.000)	3.885***(0.000)	19.153***(0.000)	11.087***(0.000)
Observations	157	157	102	102

Notes: t-statistics are in parentheses.***,**,*Statistical significance at 1%, 5% and 10% respectively.

4.4. Additional Analysis

To address endogeneity issue, two-stage least squares regression (Instrumental variable approach) (IV-2SLS) is conducted. Lagged values of the explanatory variables are used. Results of the 2SLS regression are presented in tables (6) and (7) and are consistent with that of OLS regression in tables (4) and (5). Table (6) presents the results for the whole sample and shows that the association between ***FEM_BOD*** and ***ROA*** is positive and significant; however, the association between ***FEM_BOD*** and ***TOBIN'S Q*** is positive, but insignificant. This result is robust to the regression results of the main analysis in section (4.3.1).

Table (7) presents the results in the period pre-Covid-19 pandemic (2017-2019), and during Covid-19 pandemic (2020-2021) using IV-2SLS. In column (1), the association between female representation on board ***FEM_BOD*** and firm performance as measured by ***ROA*** in the pre-Covid 19 period (2017-2019) is positive, but insignificant. However, in column (3), the association between ***FEM_BOD*** and ***ROA*** is positive and significant during the times of Covid-19 pandemic (2020-2021). Columns (2) and (4) in table (7) show that the association between ***FEM_BOD*** and ***TOBIN'S Q*** is positive, but insignificant in both pre- and during Covid-19 period. This result is robust to the regression results of the main analysis in section (4.3.2).

Table 6: IV-2SLS Results for Board Gender Diversity and Firm Performance

	(1)ROA	(2)TOBIN'S Q
(Constant)	-0.147***(-2.86)	10.061***(4.17)
FEM_BOD	0.049*(1.90)	1.146(0.94)
BOD_INT	-0.018(-1.33)	0.445(0.69)
BOD_SIZE	-0.0007(-0.81)	0.071*(1.71)
BOD_MEET	0.0007(1.43)	-0.011(-0.44)
CEO_DUAL	0.009*(1.85)	-0.324(-1.32)
SIZE	0.010***(5.58)	-0.443***(-5.04)
LEV	-0.084***(-13.25)	2.359***(8.89)
AGE	-0.009*(-1.79)	-0.152(-0.63)
Year	YES	YES
Industry	YES	YES
Adj R^2	52.6%	34.08%

Notes:***,**,*Statistical significance at 1%, 5% and 10% respectively.

Table 7: IV-2SLS Results for Board Gender Diversity and Firm Performance Pre-/During Covid-19 Pandemic

	Pre-Covid-19 Pandemic		During Covid-19 Pandemic	
Dep Variable	(1)ROA	(2)TOBIN'S Q	(3)ROA	(4)TOBIN'S Q
(Constant)	-0.096(-1.58)	0.963***(3.09)	-0.208***(-2.69)	11.370***(2.97)
FEM_BOD	0.0167(0.62)	0.142(1.05)	0.100*(1.95)	2.449(0.95)
BOD_INT	-0.022(-1.38)	0.097(1.15)	-0.006(-0.31)	0.0038(0.003)
BOD_SIZE	-0.002**(-2.18)	-0.007(-1.37)	0.0008(0.58)	0.195***(2.82)
BOD_MEET	0.0007(1.25)	0.005*(1.85)	0.001(1.22)	-0.083*(-1.88)
CEO_DUAL	0.006(1.04)	-0.016(-0.52)	0.0107(1.37)	-0.652*(-1.68)
SIZE	0.010***(4.47)	-0.019(-1.63)	0.011***(4.18)	-0.594***(-4.41)
LEV	-0.126***(-12.4)	0.104**(2.03)	-0.067***(-8.39)	2.923***(8.71)
AGE	-0.010*(-1.70)	-0.061**(-2.01)	-0.0086(-1.09)	0.250(0.64)
Industry	YES	YES	YES	YES
Adj R^2	62.6%	19.32%	53.8%	51.7%
Notes:***,**,*Statistical significance at 1%, 5% and 10% respectively.				

5. Conclusion, Limitations and Recommendations for Future Research

This study examines the impact of board gender diversity on Egyptian firms' performance. In addition, it extends to examine such association during times of uncertainty and crisis, especially during the period of Covid-19 pandemic outbreak.

Using a sample of 259 firm-year observations for years 2017-2021, results show that female representation on board has a significant and positive impact on firm's performance, as measured by ROA. The results support the agency theory and the resource dependence theory, indicating that the presence of women on board will lead to more diversified skills, knowledge and experience, coupled with improvement in the monitoring role of the Egyptian firms' board of directors and firms' performance. However, after splitting the data into two sample-periods; before and during Covid-19 pandemic, results show that female representation on board has a positive significant impact on firms' ROA during times of Covid-19 period (2020-2021), but not in the period before the pandemic (2017-2019). This implies that the role of female representation on board can be more significant and prevalent during periods of crisis and uncertainty, helping firms to counteract the negative effects. On the other hand, results show that female representation on board has no significant impact on firm's performance as measured by Tobin's Q, whether in the results related to the whole sample-period or in the sub-samples before and during Covid-19 pandemic period. These results indicate that the impact of women on board on firm's performance is not perceived by the Egyptian investors, even during difficult times of uncertainty and crisis.

The results have several implications and can be of importance to managers, government, regulatory authorities, and investors. First, for government and regulatory authorities, results support the recent changes and reforms towards mandating female representation on firm's board of directors in Egypt. In addition, the results could be of importance to other countries, similar to Egypt in their regulatory environment, especially those who are considering corporate governance reforms including board gender diversity. Second, results offer implications for shareholders and other stakeholders by increasing their awareness regarding the positive role of women in corporate decision-making that can help in protecting their interests through enhancing the monitoring role over management and reducing the management's opportunistic behavior. Third, the findings support the valuable role of female directors during times of uncertainty and crisis. Thus, it could be of importance to managers in highlighting the corporate governance reforms that are necessary to regain back the firms' performance and profitability, after the negative consequences of Covid-19 pandemic outbreak.

This study has some limitations, which provide several streams for future research. First, this study has been conducted in Egypt, thus the results should be interpreted in the light of the context in which Egyptian listed firms operate. Therefore, future research is recommended to examine to what extent the impact of board gender diversity on firm performance would vary among different countries that might have different regulations, laws and cultural environment. Second, the study showed how the presence of exogenous factors, such as in the times of uncertainty and crisis of Covid-19 pandemic could affect the association between board gender diversity and firm performance. Thus, future research can extend to examine such association during other events with uncertainty, other than the Covid-19 pandemic, or can extend to explore how such association can be moderated by other factors like board culture or background. Third, this study did not address how the levels of qualifications, education, or age of female directors are related to the firm performance, which could be addressed in future research. Future research could also adopt different methodologies, including surveys and interviews for more comprehensive understanding of the role of gender diversity in the Egyptian firms boardroom.

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