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The influence of women on board on the relationship between board-room characteristics and shareholder value: Evidence from Egypt

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Abstract

This study examines the impact of board characteristics on shareholder wealth, with a particular focus on the moderating role of women on corporate boards. Key board attributes analyzed include gender diversity, board size, independence, CEO duality, and board experience. Shareholder value is measured using Tobin's Q, based on data from 42 non-financial companies listed on the EGX 100 over the period 2017 to 2021. Using Ordinary Least Squares (OLS) regression analysis, the findings reveal significant associations between several board characteristics and shareholder wealth. Moreover, the presence of women on boards appears to moderate these relationships, suggesting that gender diversity plays a meaningful role in shaping governance outcomes. The study offers practical implications for policymakers, investors, and corporate leaders aiming to strengthen both financial and non-financial performance through inclusive and well-structured governance practices.

Keywords: BoD Composition, BoD Experience, BoD Size, CEO Duality, Egypt, Gender diversity, Shareholder value.

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1. Introduction

Recent years have witnessed an increased focus on sustainability and responsible practices, leading to greater attention on corporate governance (CG), particularly the role of gender equality in senior management. Regulations have been adopted to mandate greater female representation on corporate boards, and research has been conducted on the impact of gender-diverse boards on sustainability activities and environmental, social, and governance (ESG) disclosure. The board of directors (BoD) is the CG mechanism of a crucial structure responsible for monitoring management, guiding the business, and protecting shareholder interests. Board characteristics (B_CH) include board diversity, board experience

(B_EXP), CEO duality, size, and independence. Board diversity is crucial for enhancing performance by understanding client needs and expectations and introducing creative problem-solving approaches. Moreover, a more diverse board adds value by enhancing decision-making processes, monitoring functions, and problem-solving. Enhanced SHV is a key performance indicator, and gender diversity (GD) in boards can improve efficiency, innovation, resource waste reduction, and problem-solving [1, 2].

Organizational outcomes and SHVs are distinct concepts; business performance, commonly referred to as SHV, includes financial and operational results. Performance primarily focuses on an organization's capacity to mobilize resources effectively to achieve goals consistent with its objectives. B_CH has significant potential for substantial benefits, but some shareholders still struggle to achieve their goals [3].

The definition of performance for an organization over the past years is mainly focused on the capacity and ability of the organization to mobilize relevant resources effectively to achieve goals coherent with the company's established objectives. Performance refers to firm results accomplished in administration, economics, marketing, and finance that provide competitiveness, effectiveness, and efficiency regarding its structure and procedural elements. There are different approaches to estimate SHV from various perspectives: shareholders or accounting, profitability, and market value [4].

Even though B_CH has significant potential for substantial benefits, some shareholders still find it difficult to steer their firms toward goal achievement. Therefore, the present research aims to highlight B_CH in relation to its impact on SHV, addressing the associated complexities and nuances of these relationships. The paper contributes through a critical review of the multifaceted interactions in CG and its role in enhancing organizational performance and shareholder wealth. It thus aspires to provide valuable insights for policymakers, corporate leaders, and investors navigating this increasingly complex landscape of modern business governance.

Although ESG practices have attracted heightened recognition as a crucial aspect of driving long-term sustainable business outcomes, very little is understood about the specific factors that influence shareholder wealth concerning diverse and inclusive corporate leadership. The objective of this study is to explore the relationship between B_CH, GD in corporate leadership, and shareholder wealth within the Egyptian business context.

Despite earlier studies on the effect of board features on SHV, little attention has been given to the moderating role of GD assembled in WoB in CG, particularly in the Egyptian context. This study aims to establish the effects of WoB and the relationship between boardroom characteristics and SHV, which is crucial for evidence-based approaches to enhance financial and non-financial performance in the modern corporate environment. This study examines B_CH and shareholder wealth in Egyptian non-financial firms listed on the Egyptian Stock Market (EGX 100) from 2017-2021. It also investigates the moderating role of CG in WoB in boardroom characteristics and SHV dynamics. The findings offer valuable insights for policymakers, investors, and corporate leaders seeking to enhance financial and non-financial performance through diverse and inclusive leadership practices.

2. Literature Review and Hypotheses Development

2.1. Theories affecting the BOD characteristics:

The Board of Directors plays a crucial role in corporate governance, with theories such as agency theory, stewardship theory, and resource dependency theory explaining its impact on organizational value. Agency theory suggests that the Board of Directors monitors management activities on behalf of shareholders. It is theorized upon the supposition that the primary role of the Board of Directors is to maximize shareholder value by aligning management interests with shareholding interests [3]. Firms with more independent boards tend to have better financial performance. Stewardship theory suggests that experienced boards provide valuable advice to management, leading to improved corporate performance. Due to inherently hardwired incentives and a sense of obligation, managers are motivated to act in a manner that optimizes shareholders' wealth [5, 6]. This is based on the notion that a board comprising experienced and well-informed members can provide valuable advice to management and, hence, contribute towards improved corporate performance. It has been shown that boards with more experienced directors tend to exhibit better CG practices [7, 8].

Resource dependency theory emphasizes the board of directors' role in safeguarding organizational resources through external stakeholders, and social identity theory discusses how directors' social identities shape decision-making processes. The attributes of a company's board of directors can significantly influence its worth, with independent boards having better market values and boards with higher expertise exhibiting superior financial performance.

Boards composed of members with diverse experiences and extensive networks, which are likely to facilitate better access to resources, tend to enhance organizational performance. The decisions made by company directors are influenced by their social identities. Accordingly, boards characterized by greater demographic diversity demonstrate improved decision-making outcomes [9-13].

This study aims to reconcile these perspectives by exploring the potential moderating impacts of women on board (WoB) on the effectiveness of various board structures across different Egyptian environments. By adopting a holistic approach, scholars can contribute to the development of more robust governance frameworks that enhance long-term firm performance (FP) and stakeholder value.

2.2. The Relationship between BoD characteristics and Firm Performance

Numerous studies have investigated the relationship between boardroom features and corporate performance. Naim and Aziz [14] found that board elements, including board independence (B_IND), board meeting frequency, and board size (BoD_S), as well as gray directors, affect the performance of listed companies. They conclude that a larger BoD enhances

firm success. While AlSaif et al. [15] found a positive relationship between BoD_S and business performance in Saudi Capital-Intensive Industries.

Other studies have found a positive relationship between performance and GD, B_IND, ownership, women directors, and the frequency of meetings Kanakriyah [16] and Sobhan [17]. Saleh et al. [18] assessed the impact of multiple directorships and CEO experience on non-financial enterprises listed on the Palestine Securities Exchange. CEO experience improved business performance, but very few directorships did. Boateng [19] found a positive relationship between BoD_S, independence, audit committee size, and GD on business performance. Other studies, Idris and Ousama [20] have found that GD, frequency of board meetings, and non-executive directors increase performance. Nazar [21] found a strong relationship between company size and return on assets, while Isa et al. [22] found a negative correlation between B_IND and performance. Kamenjarska and Ivanovski [23] found that B_EXP increased performance.

Research on B_CH and their impact on company performance has been extensive. Studies have shown that board skills enhance banking and non-financial company performance. Other studies have found that BoD_S, composition, GD, education, nationality, and non-executive members also impact performance. GD has been found to increase corporate value. Dissanayake and Dissanayake [24] study found that CEO responsibilities had a significant impact on firm success. Yassin's [25] study found that BoD_S and CEO duality positively impacted business success, while B_IND showed no correlation. Hemdan et al. [26] study found that CEO duality reduced profit quality, while GD increased it. Salem et al. [27] study found a direct influence of CEO duality, B_IND, BoD_S, and GD on corporate value. Further research is needed to test hypotheses about the relationship between boardroom characteristics, SHV, B_EXP, CEO duality, BoD_S, B_IND, and board gender.

Research has shown that board skills significantly impact the performance of both banking and non-financial companies. Studies have indicated that board composition, governance, education, nationality, and non-executive members can enhance performance. Rodriguez-Fernandez et al. [28] study found that directors' tenure, age, and number of boards served significantly impacted the performance of non-financial Spanish enterprises. Issa et al. [29] study found a positive relationship between GD and corporate value in Kuwait firms. Dissanayake and Dissanayake [24] study found that CEO responsibilities had a significant impact on firm profitability, using ROE as a measure of performance.

Studies on the EGX have shown that CEO duality, BoD_S, and B_IND have a positive impact on business success, while B_IND has no correlation. Hemdan et al. [26] found that CEO duality reduces profit quality, while board GD increases it. Salem et al. [27] found a direct influence of CEO duality, B_IND, and board GD on corporate value, with BoD_S being inversely related. These findings contribute to our understanding of the factors influencing business success and profitability in the EGX.

According to the illustrated literature, the following hypotheses are required to be tested:

$H_{1:}$ There is a significant impact of boardroom characteristics on the SHV.

$H_{1a:}$ There is a significantly positive relationship between B_EXP and SHV.

$H_{1b:}$ There is a significantly positive relationship between CEO duality and SHV.

$H_{1c:}$ There is a significantly positive relationship between BoD_S and SHV

$H_{1d:}$ There is a significantly positive relationship between B_IND and SHV.

$H_{1e:}$ There is a significantly positive relationship between Board gender and SHV.

2.3. Role of Women on Board (WoB)

Academic research has been focusing on the impact of board diversity, particularly gender, on corporate performance and sustainability. Several studies have attempted to relate board GD with different dimensions of corporate performance and sustainability, such as Alkayed et al. [30], which found that the intensity and quality of sustainability reporting were positively related to GD. It therefore aligns with the broader literature supporting female representation in leadership as a driver of corporate responsibility and reporting quality.

The study of Rahi [31] found a positive relationship between GD and corporate sustainability performance, especially when female board participation reached 30%. Alkhawaja et al. [32] found a positive relationship between GD and ESG disclosure practices. Their findings showed a positive relationship between the two, further supporting the notion that board diversity can provide an improved path toward corporate transparency and sustainability efforts.

Research has shown a positive relationship between GD and firm financial performance. Hindasah and Harsono [33] using meta-analysis, found that female directors significantly impact FP using ROA and Tobin's Q. Elsayed [34] showed that the WOB has a significant positive impact on the performance of Egyptian listed companies when measured by ROA only. Gharbi and Othmani [35] found that WoB positively impact the financial performance of non-financial listed firms on Euronext Paris. Dedunu and Anuradha [36] found that board bio-demographic diversity, including gender, age, race, and job-related tenure, also influences firm performance in listed manufacturing companies. However, this relationship is complex and mediates the role of board meetings.

However, the literature is not unanimous, with some studies finding no significant relationship between GD and firm value. Singh et al. [37] found no significant relationship between GD and corporate boards in the Indian IT sector, while Rahman and Chen [38] found a positive relationship with firm value before and after the 2008 financial crisis. These contrasting findings highlight the complex nature of the relationship between board diversity and corporate performance, with factors like industry context, economic conditions, and cultural differences potentially moderating this impact.

According to the discussed literature, the second hypothesis is to be tested:

H_2 There is a significant moderating role of WoB on the relationship between the boardroom characteristics and the SHV.

3. Research Methodology

The study examines how B_CH enhances SHV in core Egyptian economy sectors, focusing on 42 non-financial companies listed on the EGX100. The focus is on real estate, food and beverage, tobacco, and education service sectors, chosen for their significant economic position and data availability for detailed CG analyses.

Our research study, covering the period from 2017 to 2021, analyzed evolving trends in CG and their impact on SHV. The study aimed to provide a contemporary perspective while allowing for potential changes in governance practices and their consequences.

The data collection process involved a thorough review of various sources, including income statements, financial position statements, and board member biographies available in annual reports, company websites, and reports from Mubasher.

To measure board characteristics, we employed a multi-faceted approach:

1. Board Size: Calculated as the total number of directors serving on the board.
2. Board Independence: Measured as the ratio of independent directors to the total number of board members.
3. CEO Duality: A binary variable, coded as 1 if the CEO also serves as the board chair, and 0 otherwise.
4. Board Gender Diversity: Computed using the Blau index of heterogeneity.
5. Board Experience: Assessed by the average tenure of board members in years.

This analytical approach considers multiple regression analysis, which comes to the forefront and will help in examining the relationships among the various B_CH and SHV by looking at potential confounding variables such as firm size, leverage, and industry-specific effects.

To enhance the reliability and validity of our findings, this study conducted a robustness check. Additionally, we used alternative measures for SHV, such as ROA and Tobin's Q, to confirm the robustness of our findings across different performance metrics.

The following section aims to provide an in-depth and rigorous explanation of how B_CH influences SHV within major sectors of the Egyptian economy, using a comprehensive methodology.

3.1. Regression Model

To test the hypothesis (H1), the following regression model is used:

$$\text{Tobin's Q}_{i,t} = \alpha + \beta 1\ B\_EXP_{i,t} + \beta 2\ CEO\_D_{i,t} + \beta 3\ BOD\_S_{i,t} + \beta 4\ B\_IND_{i,t} + \beta 5\ GDIVi,t\ t + \beta 6\ FS\ i,t + \beta 7\ Lev_{i,t} + e \quad (1)$$

Where:

Tobin's Q i,t = firm performance and market valuation.
α = Model constant.
β1- β5 = regression coefficients.
B_EXP i,t = Board Experience.
CEO_Di,t = CEO duality.
BOD_S i,t = BOD size.
B_IND i,t = Board Independence.
WoB i,t = women on Board (Gender diversity).
FS i,t = LogTotal assets.
Levi,t = Leverage.

Table 1.
Descriptive Analysis.

	N	Minimum	Maximum	Mean	Std. Deviation
B_EXP	210	0.0	1.0	0.733	0.4433
CEO duality	210	0.0	1.0	0.886	0.3189
BoD_S	210	3.0	15.0	7.843	2.5732
B_IND	210	0.25	.95	0.7241	0.16555
GD	210	0.00%	65.00%	21.9460%	15.62123%
Tobin's Q	210	0.445	12.704	1.66017	1.304311
Valid N (Listwise)	210				

The descriptive statistics presented in Table 1 provide insights into the characteristics of the sample under study. With a sample size of 210 observations, we can observe the range, central tendency, and dispersion of various variables.

B_EXP, a binary variable, has a mean of 0.733, suggesting that approximately 73.3% of the observations have B_EXP. This finding aligns with the growing emphasis on board members' expertise and knowledge, as highlighted in recent studies [39, 40].

CEO duality, also a binary variable, has a mean of 0.886, indicating that in approximately 88.6% of the observations, the CEO also serves as the board chair. This practice has been the subject of ongoing debate, with some researchers arguing for the separation of these roles to enhance B_IND and CG [41, 42].

The BoD_S variable ranges from 3 to 15 members, with a mean of 7.843. This falls within the recommended range for BoD_S, as overly large or small boards can potentially compromise their effectiveness [43, 44].

B_IND, measured as the proportion of independent directors on the board, has a mean of 0.7241, indicating that, on average, approximately 72.41% of board members are independent. This aligns with CG best practices and regulatory guidelines emphasizing the importance of B_IND [45, 46].

GD, measured as the percentage of female directors on the board, has a mean of 21.946%. While this figure reflects progress in promoting GD on corporate boards, it also highlights the need for further efforts to achieve greater representation and inclusivity [47].

Tobin's Q, a widely used measure of firm performance and market valuation, has a mean of 1.66017, indicating that, on average, the market value of the firms in the sample exceeds their replacement cost. This suggests that investors perceive these firms as having valuable intangible assets and growth opportunities [48, 49].

Table 2.
Correlation Analysis.

		B_EXP	CEO duality	BoD_S	Board Independence	GD	Tobin's Q
B_EXP	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	210					
CEO duality	Pearson Correlation	-0.217**	1				
	Sig. (2-tailed)	0.002					
	N	210	210				
BoD_S	Pearson Correlation	0.206**	-0.442**	1			
	Sig. (2-tailed)	0.003	0.000				
	N	210	210	210			
B_IND	Pearson Correlation	0.555**	-0.327**	0.318**	1		
	Sig. (2-tailed)	0.000	0.000	0.000			
	N	210	210	210	210		
GD	Pearson Correlation	0.058	-0.452**	0.215**	0.390**	1	
	Sig. (2-tailed)	0.400	0.000	0.002	0.000		
	N	210	210	210	210	210	
Tobin's Q	Pearson Correlation	0.318**	-0.489**	0.268**	0.473**	0.448**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	
	N	210	210	210	210	210	210

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

The correlation matrix in Table 2 presents the strength and direction of the linear relationships between the variables under study. The statistical significance of these correlations is indicated by the asterisks, with two asterisks (**) denoting a correlation significant at the 0.01 level.

B_EXP exhibits a positive and significant correlation with BoD_S ($r = 0.206$, $p < 0.01$), B_IND ($r = 0.555$, $p < 0.01$), and Tobin's Q ($r = 0.318$, $p < 0.01$). These findings suggest that boards with more experienced members tend to be larger, have a higher proportion of independent directors, and are associated with higher FP and market valuation. This aligns with previous research highlighting the importance of B_EXP in enhancing board effectiveness and contributing to better decision-making [50, 51].

CEO duality exhibits a negative and significant correlation with B_EXP ($r = -0.217$, $p < 0.01$), BoD_S ($r = -0.442$, $p < 0.01$), B_IND ($r = -0.327$, $p < 0.01$), GD ($r = -0.452$, $p < 0.01$), and Tobin's Q ($r = -0.489$, $p < 0.01$). These findings suggest that firms with CEO duality, where the CEO also serves as the board chair, tend to have less experienced boards, smaller BoD_S, lower B_IND, less G&D, and lower FP and market valuation. These results align with concerns raised in the literature about the potential conflicts of interest and reduced board oversight associated with CEO duality [52, 53].

BoD_S exhibits a positive and significant correlation with B_IND ($r = 0.318$, $p < 0.01$), GD ($r = 0.215$, $p < 0.01$), and Tobin's Q ($r = 0.268$, $p < 0.01$). These findings suggest that larger boards tend to have a higher proportion of independent directors, greater GD, and are associated with higher FP and market valuation. However, it is important to note that the relationship between BoD_S and FP has been subject to debate, with some studies suggesting an optimal range for BoD_S [43, 44].

B_IND exhibits a positive and significant correlation with GD ($r = 0.390$, $p < 0.01$) and Tobin's Q ($r = 0.473$, $p < 0.01$). These findings suggest that boards with a higher proportion of independent directors tend to have greater GD and are associated with higher FP and market valuation. These results align with the principles of good corporate governance, which emphasize the importance of B_IND and diversity in enhancing board monitoring and decision-making [46, 54].

GD exhibits a positive and significant correlation with Tobin's Q ($r = 0.448$, $p < 0.01$), suggesting that firms with greater GD on their boards tend to have higher FP and market valuation. This finding is consistent with the growing body of literature highlighting the potential benefits of GD on corporate boards, such as improved decision-making, enhanced stakeholder representation, and positive signaling to investors [47, 54].

3.2. The Results from Regression Model

Table 3.
Regression Model (1) Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	0.635[a]	0.404	0.383	1.024654	19.522	0.000

Note: a. Predictors: (Constant), Leverage, CEO duality, LogTotal assets, BoD_S, GD, B_EXP, B_IND.

The model summary in Table 3 shows an R-squared value of 0.404, indicating that approximately 40.4% of the variation in the dependent variable, Tobin's Q (a proxy for FP and market valuation), can be explained by the independent variables included in the model. The adjusted R-squared value of 0.383 suggests a relatively good fit for the model, considering the number of predictors.

Table 4.
Results of Regression Model (1).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.381	0.585		2.360	0.019
	B_EXP	0.507	0.222	0.172	2.286	0.023
	CEO duality	-1.147	0.276	-0.281	-4.164	0.000
	BoD_S	0.000	0.032	-0.001	-0.009	0.992
	B_IND	1.962	0.650	0.249	3.017	0.003
	GD	0.020	0.006	0.241	3.638	0.000
	LogTotal assets	-0.036	0.022	-0.127	-1.629	0.105
	Leverage	-0.556	0.328	-0.096	-1.692	0.092

Note: a. Dependent Variable: Tobin's Q.

Examining the coefficients in Table 4, we can observe the following:

B_EXP has a positive and statistically significant relationship with Tobin's Q ($\beta = 0.507$, $p < 0.05$). This finding suggests that firms with more experienced board members tend to have higher FP and market valuation. This aligns with recent studies that have highlighted the benefits of B_EXP in enhancing board effectiveness and strategic decision-making [51, 55].

CEO duality exhibits a negative and statistically significant relationship with Tobin's Q ($\beta = -1.147$, $p < 0.001$). This finding indicates that firms where the CEO also serves as the board chair tend to have lower FP and market valuation. This result aligns with the ongoing debate regarding the potential conflicts of interest and reduced board oversight associated with CEO duality [53, 56].

BoD_S does not exhibit a statistically significant relationship with Tobin's Q ($\beta = 0.000$, $p > 0.05$). This finding suggests that BoD_S alone may not significantly impact FP and market valuation. However, it is essential to consider potential non-linear relationships and optimal BoD_S ranges, as highlighted in recent studies [44, 57].

B_IND has a positive and statistically significant relationship with Tobin's Q ($\beta = 1.962$, $p < 0.01$). This finding suggests that firms with a higher proportion of independent directors on their boards tend to have higher FP and market valuation. This result aligns with the principles of good corporate governance and the potential benefits of B_IND in enhancing monitoring and decision-making [46, 54].

GD exhibits a positive and statistically significant relationship with Tobin's Q ($\beta = 0.020$, $p < 0.001$). This finding indicates that firms with greater GD on their boards tend to have higher FP and market valuation. This result is consistent with the growing body of literature highlighting the potential benefits of board diversity, such as improved decision-making, enhanced stakeholder representation, and positive signaling to investors [1, 57, 58].

The control variables, the logarithm of total assets and leverage, do not exhibit statistically significant relationships with Tobin's Q in this model ($p > 0.05$).

Table 5.
The Link between Result, Hypotheses, and Literature Review.

Hypotheses	Accept/ Reject	References support the hypotheses	References oppose the hypotheses	References that found no relation
H_{1a}	Accept	Kamenjarska and Ivanovski [23], Andoh et al. [59], Gharbi and Othmani [35], Tejerina-Gaite and Fernández-Temprano [39] and Salem et al. [27]	N/A	Dissanayake and Dissanayake [24]
H_{1b}	Accept	Kamenjarska and Ivanovski [23], Kanakriyah [16], Salem et al. [27], Yassin [25] and Dissanayake and Dissanayake [24]	Wijethilake and Ekanayake [60], Hemdan et al. [26] and Nazar [21]	N/A
H_{1c}	N/A	Naim and Aziz [14], Saleh et al. [18], Kanakriyah [16], Kamenjarska and Ivanovski [23], Andoh et al. [59], AlSaif et al. [15], Sobhan [17], Boateng [19], Idris and Ousama [20], Yassin [25] and Nazar [21].	Isa et al. [22], Naim and Aziz [14] and Nazar [21]	Dissanayake and Dissanayake [24]
H_{1d}	Accept	Isa et al. [22], Kamenjarska and Ivanovski [23], Kanakriyah [16], Andoh, et al. [59], Goel et al. [61], Sobhan [17], AlSaif et al. [15], Boateng [19], Salem et al. [27] and Nazar [21]	Braendle et al. [62]	Yassin [25], Hemdan et al. [26] and Dissanayake and Dissanayake [24]
H_{1e}	Reject	Elsayed [34], Kanakriyah [16], Kamenjarska and Ivanovski [23], Wijethilake and Ekanayake [60], Rahman and Chen [38], Agyemang-Mintah and Schadewitz [63], Boateng [19], Idris and Ousama [20], Hindasah and Harsono [33], Hemdan et al. [26], Salem et al. [27] and Issa et al. [29]	N/A	Singh et al. [37], John et al. [64] and Dissanayake and Dissanayake [24]

According to the previous table, the results support the hypotheses H_{1a}, H_{1b}, and H_{1d} and reject H_{1e}.

3.3. The Moderating Role of WoB on the Relationship Between the Boardroom Characteristics and The Shareholder Value.

To test the hypothesis (H_2), the second regression model is used:

$$\text{Tobin's Q}_{i,t} = \alpha + \beta 1\ B\_EXP_{i,t}{}^{*}\ WoB_{i,t} + \beta 2\ CEO\_D_{i,t} * WoB_{i,t} + \beta 3\ BOD\_S_{i,t}{}^{*}\ WoB_{i,t} + \beta 4\ B\_IND_{i,t}{}^{*}\ WoB_{i,t} + \beta 5\ FS_{i,t} + \beta 6\ Levi_{i,t} + e \quad (2)$$

Where:

$B\_EXP_{i,t}{}^{*}\ WoB_{i,t}$ = The moderating effect between B_EXP and GD (WoB) of the firm (i) within the time period (t)

$CEO\_D_{i,t} * WoB_{i,t}$ = The moderating effect between CEO duality and GD (WoB) of the firm (i) within the time period (t)

$BOD\_S_{i,t}{}^{*}\ WoB_{i,t}$ = The moderating effect between BoD_S and GD (WoB) of the firm (i) within the time period (t)

$B\_IND_{i,t}{}^{*}\ WoB_{i,t}$ = The moderating effect between B_IND and GD (WoB) of the firm (i) within the time period (t)

Table 6.
Examining the Moderating Role for WoB - Model (2).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	0.651[a]	0.424	0.407	1.004325	24.917	0.000

Note: a. Predictors: (Constant), Leverage, BODSize_Gen, LogTotal assets, CEO_Gen, BodExp_Gen, BODInd_Gen.

The model summary in Table 6 shows an R-squared value of 0.424, indicating that approximately 42.4% of the variation in the dependent variable, Tobin's Q (a proxy for FP and market valuation), can be explained by the independent variables and their interactions with GD included in the model. The adjusted R-squared value of 0.407 suggests a relatively good fit for the model, considering the number of predictors.

Table 7.
Results of Regression Model (2)

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.488	0.363		4.105	0.000
	BodExp_Gen	0.009	0.008	0.122	1.129	0.260
	CEO_Gen	-0.037	0.006	-0.418	-5.721	0.000
	BODSize_Gen	-0.001	0.001	-0.103	-0.758	0.449
	BODInd_Gen	0.069	0.017	0.738	3.965	0.000
	LogTotal assets	-0.004	0.017	-0.015	-0.252	0.801
	Leverage	-0.648	0.310	-0.112	-2.090	0.038

Note: a. Dependent Variable: Tobin's Q.

Examining the coefficients Table 7, we can observe the following:

The interaction term BodExp_Gen (B_EXP × GD) does not exhibit a statistically significant relationship with Tobin's q ($\beta = 0.009$, $p > 0.05$). This finding suggests that the relationship between B_EXP and FP and market valuation is not significantly moderated by GD.

The interaction term CEO_Gen (CEO duality × GD) has a negative and statistically significant relationship with Tobin's q ($\beta = -0.037$, $p < 0.001$). This finding indicates that the negative relationship between CEO duality and FP and market valuation is strengthened in firms with greater GD on their boards. This result aligns with recent studies that have highlighted the potential for GD to enhance board monitoring and oversight, which may amplify the negative effects of CEO duality [57, 65].

The interaction term BODSize_Gen (BoD_S × GD) does not exhibit a statistically significant relationship with Tobin's q ($\beta = -0.001$, $p > 0.05$). This finding suggests that the relationship between BoD_S and FP and market valuation is not significantly moderated by GD.

The interaction term BODInd_Gen (B_IND × GD) has a positive and statistically significant relationship with Tobin's q ($\beta = 0.069$, $p < 0.001$). This finding indicates that the positive relationship between B_IND and FP, and market valuation is strengthened in firms with greater GD on their boards. This result aligns with the argument that GD can enhance B_IND and monitoring effectiveness, leading to improved FP [54, 58].

The control variable, the logarithm of total assets, does not exhibit a statistically significant relationship with Tobin's q in this model ($p > 0.05$), while leverage has a negative and statistically significant relationship with Tobin's q ($\beta = -0.648$, $p < 0.05$).

These findings suggest that GD may moderate the relationship between CG characteristics, FP, and market valuation, but further robustness checks and endogeneity considerations are necessary to strengthen the causal interpretations of these findings.

3.4. Robustness Test

Table 8.
Robustness Test Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.528[a]	0.279	0.276	1.110057
2	0.570[b]	0.324	0.318	1.077257
3	0.640[c]	0.409	0.401	1.009704
4	0.636[d]	0.405	0.399	1.011208
5	0.647[e]	0.418	0.410	1.001875

Note: a. Predictors: (Constant), BodExp_Gen.
b. Predictors: (Constant), BodExp_Gen, CEO_Gen.
c. Predictors: (Constant), BodExp_Gen, CEO_Gen, BODInd_Gen.
d. Predictors: (Constant), CEO_Gen, BODInd_Gen.
e. Predictors: (Constant), CEO_Gen, BODInd_Gen, Leverage.

The model summary Table 8 presents the results of a stepwise regression analysis, where predictor variables are added or removed from the model based on their statistical significance and contribution to the model's explanatory power [66]. The dependent variable is Tobin's Q, which serves as a proxy for FP and market valuation.

Table 9.
Robustness Test Model Results.

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.012	0.105		9.620	0.000
	BodExp_Gen	0.039	0.004	0.528	8.975	0.000
2	(Constant)	1.261	0.122		10.333	0.000
	BodExp_Gen	0.045	0.004	0.603	9.959	0.000
	CEO_Gen	-0.020	0.005	-0.225	-3.723	0.000
3	(Constant)	1.119	0.117		9.540	0.000
	BodExp_Gen	0.010	0.008	0.132	1.272	0.205
	CEO_Gen	-0.035	0.006	-0.402	-6.148	0.000
	BODInd_Gen	0.058	0.011	0.627	5.443	0.000
4	(Constant)	1.120	0.118		9.534	0.000
	CEO_Gen	-0.037	0.006	-0.423	-6.691	0.000
	BODInd_Gen	0.070	0.006	0.750	11.853	0.000
5	(Constant)	1.406	0.174		8.079	0.000
	CEO_Gen	-0.036	0.006	-0.412	-6.557	0.000
	BODInd_Gen	0.069	0.006	0.741	11.808	0.000
	Leverage	-0.679	0.308	-0.118	-2.208	0.028

Note: a. Dependent Variable: Tobin's Q.

In the initial model (Model 1), only the interaction term BodExp_Gen (B_EXP × GD) is included as a predictor, with an R-squared value of 0.279 and an adjusted R-squared of 0.276. This model explains approximately 27.9% of the variation in Tobin's Q.

Model 2 introduces the interaction term CEO_Gen (CEO duality × GD) as an additional predictor, resulting in an increase in R-squared to 0.324 and an adjusted R-squared of 0.318. This model explains approximately 32.4% of the variation in Tobin's q, suggesting that the addition of CEO_Gen improves the model's explanatory power.

In Model 3, the stepwise regression procedure identifies the interaction term BODInd_Gen (B_IND × GD) as a significant predictor and includes it in the model. The R-squared for this model is 0.409, and the adjusted R-squared is 0.401, indicating a substantial improvement in the model's explanatory power compared to previous models. This model explains approximately 40.9% of the variation in Tobin's Q.

Interestingly, Model 4 excludes the interaction term BodExp_Gen and retains CEO_Gen and BODInd_Gen as predictors, suggesting that the stepwise regression procedure deemed BodExp_Gen as less significant in the presence of the other two interaction terms. The R-squared for this model is 0.405, and the adjusted R-squared is 0.399, indicating a similar explanatory power to Model 3.

Finally, Model 5 adds the control variable Leverage to the predictors in Model 4, resulting in an R-squared of 0.418 and an adjusted R-squared of 0.410. This model explains approximately 41.8% of the variation in Tobin's Q.

The stepwise regression approach allows for the identification of the most significant predictor variables and their contributions to the model's explanatory power. The inclusion of interaction terms enables the examination of potential moderating effects of GD on the relationships between CG characteristics and FP and market valuation.

The hierarchical regression analysis examines the relationships between various CG characteristics, their interactions with GD, and FP and market valuation, as proxied by Tobin's Q.

B_EXP and GD: The interaction term BodExp_Gen (B_EXP × GD) exhibits a positive and statistically significant relationship with Tobin's Q in Model 1 ($\beta = 0.039$, $p < 0.001$). This finding suggests that the combination of B_EXP and GD is positively associated with FP and market valuation. However, in Model 3, when the interaction term BODInd_Gen (B_IND × GD) is introduced, the coefficient for BodExp_Gen becomes statistically insignificant ($\beta = 0.010$, $p > 0.05$). This might indicate that the positive effect of the interaction between B_EXP and GD on FP and market valuation is subsumed or mediated by the interaction between B_IND and GD. Recent studies have highlighted the potential benefits of B_EXP and diversity in fostering effective decision-making and strategic oversight [58] but the interplay between these factors and other B_CH may be complex.

CEO duality and GD: The interaction term CEO_Gen (CEO duality × GD) exhibits a negative and statistically significant relationship with Tobin's Q across Models 2, 3, 4, and 5 (β ranging from -0.035 to -0.037, $p < 0.001$). This finding suggests that the combination of CEO duality (where the CEO also serves as the board chair) and GD is negatively associated with FP and market valuation. This result aligns with the literature suggesting that CEO duality can potentially undermine B_IND and oversight, and that this negative effect may be amplified in the presence of greater GD on boards [56]. The consistent significance of this interaction term across the models highlights its robustness and potential importance in understanding the interplay between CEO duality, board diversity, and FP.

B_IND and GD: The interaction term BODInd_Gen (B_IND × GD) exhibits a positive and statistically significant relationship with Tobin's q across Models 3, 4, and 5 (β ranging from 0.058 to 0.070, $p < 0.001$). This finding suggests that the combination of B_IND and GD is positively associated with FP and market valuation. This result aligns with the principles of good corporate governance and the potential benefits of B_IND and diversity in enhancing monitoring and

decision-making [46]. The consistent significance and relatively large coefficient magnitudes of this interaction term across the models highlight its robustness and potential importance in understanding the interplay between B_IND, board diversity, and FP.

4. Conclusion

The aim of this research is to examine how B_CH influences SHV in Egypt and which aspects, if any, are positive, negative, or insignificant. Most literature focuses on Egyptian firms listed on the Egyptian Stock Exchange to investigate whether the relationship is positive, negative, or insignificant. The sample for this research includes 42 companies from different sectors (2017-2021).

After investigation, the results showed that there is a significant positive relationship between the B_EXP and SHV. Moreover, there is a significant positive relationship between BoD_S and SHV. The findings showed a significant negative relationship between board compositions and SHV. Finally, the findings showed an insignificant negative relationship between GD and SHV. The results indicate that there is a significant relationship between B_EXP, BoD_S, board composition, and SHV in non-financial Egyptian firms. Higher shareholder returns and better corporate performance are correlated with improved board qualities, even though having a board with members of different sizes and levels of expertise can promote more creative and adaptable corporate cultures as well as better decision-making. Having a board with the necessary knowledge can help provide valuable direction and oversight in crucial company areas, thereby improving strategic decision-making and SHV.

5. Limitations and Recommendations for Future Research

This research, spanning five years from 2017 to 2021, examines the impact of B_CH on SHV in 42 non-financial companies, using Tobin's Q only, and 210 observations.

Future research should focus on small and medium-sized enterprises (SMEs) and non-listed firms, in addition to financial firms and banks, to understand the relationship between B_CH and SHV. It is recommended to consider factors like meetings, educational qualifications, board tenure, and director ownership, as well as the impact of diversity in race, age, and professional background on corporate boards, and to consider other factors before making investment decisions, such as industry trends and macroeconomic conditions.

Abbreviations:

The following abbreviations are used in this manuscript:

WOB	Women on Board
EGX	Egyptian Stock Market
GD	Gender Diversity
CG	Corporate Governance
BOD	Board of Directors
FP	Firm Performance
SHV	Shareholder Value
BoD_S	Board Size
B_IND	Board Independence
B_EXP	Board Experience
B_CH	Board Characteristics

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