

Board Gender Quotas: Does One Size Fit All? A Qualitative Comparative Analysis

Heba Mostafa Al-Gazzar ^{a,*} · Yousri Khlefa ^a

^a Faculty of Commerce, Cairo University, Giza, Egypt

* *Corresponding author:* heba.gazzar@cu.edu.eg

Abstract

This study aims to contribute to the existing literature on the impact of various board characteristics on corporate financial performance, particularly the role of women on corporate boards. Using fuzzy set qualitative comparative analysis (fsQCA), the study examines 200 non-financial firms listed at the EGX from 2014 to 2019. The results support complexity theory tenets, indicating that corporate financial performance depends on complex combinations of board and corporate characteristics, rather than singular linear relationships suggested by traditional regression analysis. By featuring 16 unique board and corporate feature combinations, the findings provide governance guidance for corporate managers to achieve high financial outcomes, including combinations with low board gender diversity. This study offers insightful recommendations for policymakers on corporate governance and board gender quotas. It adds to the discussion on how board features affect financial performance, specifically the impact of women on boards. Importantly, the study provides practical implications for governance and policymakers.

Keywords

Financial performance; Board gender diversity; corporate governance; Qualitative comparative analysis; Complexity theory; fsQCA

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1. Introduction

Despite the extensive research on the impact of board gender diversity on corporate financial performance, results remain empirically inconclusive (Paniagua et al., 2018). One plausible explanation for the controversial empirical evidence is the adoption of previous studies to a single-theory approach; extensively applying the agency and resource dependency theories dichotomously rather than in conjunction (Nguyen et al., 2020). While the resource dependence theory predicts that larger board size, less director independence, and the duality of CEO/Chairperson enhance corporate performance, the agency theory predicts the opposite, resulting in conflicting results among various studies (Reddy & Jadhav, 2019).

Another possible reason for the unsettled debate is the probable non-linear relationships among corporate variables. These asymmetrical relations are attributable to causality, that is, from a configurational standpoint, considered complex (García-Ramos & Díaz, 2021). Although there are non-linear relationships between the variables, multiple regression is still the most used technique for studying the relationship between the board of directors and corporate performance (Amran et al., 2022). However, the use of simple linear regression techniques can be limited due to their assumptions of linearity and symmetry in the data, which may compromise the accuracy and objectivity of the results (Gupta et al., 2020). In response to these limitations, researchers are increasingly calling for the use of more advanced analytical methods such as artificial neural networks and fuzzy set theory to better capture the complex and dynamic relationships between variables (Kundu et al., 2021; Pourebrahimi et al., 2020).

The debate about the effectiveness of soft regulations has not prevented their widespread adoption as a means of encouraging optimal corporate board structures (Hutchinson et al., 2021; Talaulicar & Werder, 2017). While some companies have voluntarily embraced best practices in corporate governance, others have been compelled to comply with externally imposed regulations, which can sometimes lead to unintended consequences such as reduced innovation and flexibility (Brown & Zehnder, 2019; Deakin & Konzelmann, 2019).

Since the calls for the abolition of symmetrical tests rise (Woodside, 2014) and calls for the adoption of more qualitative methods grow stronger (Nguyen et al., 2020), the study builds the empirical analysis on the complexity theory to analyze whether the different combinations of the board and corporate features can lead to high levels of CFP. The study employs the fuzzy sets qualitative comparative analysis technique (fsQCA) on a sample of 200 listed Egyptian non-financial corporations over a six-year period from 2014 to 2019.

The complexity theory: which builds on four main tenets (namely, complexity, equifinality, asymmetry and causal asymmetry); suggests that “outcomes rarely have a single cause but rather result from the interdependence of multiple conditions” (Misangyi et al., p.256). Using FSQCA which can generate predictive conclusions consistent with the main tenets of complexity theory, the results show that CFP is

determined by intricate interactions of board and corporate features. No single board feature (gender diversity, size, activity, independence, leadership structure) nor corporate characteristic (leverage, age, size) can solely explain CFP. The results also reveal that high corporate financial performance can be attained through various complex combinations of the individual board and corporate characteristics (equifinality tenet). Furthermore, the same board/corporate characteristic can lead to both high/low levels of firm financial performance. Causal asymmetry is also confirmed, indicating that the combinations of board and corporate features associated with high CFP levels aren't the mirror contrary of those leading to low corporate financial performance levels.

Building on the complexity theory, this study helps resolve the existing literature's conflicting predictions by empirically validating the mutual ability of both the agency and resource dependence theories to explain CFP. The results have implications for policymakers suggesting that codes of corporate governance should not be generalized in all corporations irrespective of their corporate characteristics. To the best of our knowledge, this study is an early attempt to use a configural analysis framework in such relevant lines of research applied to the Egyptian context.

To achieve the objectives, the study proceeds as follows: the second section reviews the relevant literature. The third section presents the study's theoretical framework and develops four propositions stemming from the adoption of the complexity theory. The fourth section presents the research methodology. The sixth section presents analyses, results, and discussion. The sixth section concludes and provides policy implications.¹

2. Literature Review

The boards of directors (BOD) are key to corporate governance mechanisms, monitoring and approving strategic managerial decisions (Ferreira, 2010). The ability of the BOD to fulfill its role is dependent on the board's structure and features such as its diversity, size, independence, activity, and leadership structure, along with other corporate features (Shahzad et al., 2016).

2.1 Board Gender Diversity

Board gender diversity (BGD) has become a subject of widespread interest in recent years by academics, practitioners, and policymakers (Carter et al., 2017). Several countries including Norway, France, Italy, and Germany have introduced regulations to promote BGD in the past decade (Erkens et al., 2018). In Egypt, the Egyptian Exchange (EGX) updates its listing rules to require a minimum of two women or 25% female representation on boards (Osman, 2016). While arguments for social justice play a role in these regulatory efforts, the economic case for BGD often referred to as the "business case for gender diversity" has also been emphasized (Catalyst, 2013).

¹ Outcomes and conditions are analogous to dependent and independent variable/s in regression analysis, respectively.

Despite the considerable literature on board gender diversity (BGD), empirical evidence on its impact on corporate financial performance (CFP) remains inconclusive (Dutta et al., 2021). It is worth mentioning that many of the contradicting studies have been built on two main theories, namely the resource dependency theory and the agency theory. Both resource dependency theory and agency theory make predictions about the association between board gender diversity and corporate financial performance. Resource dependency theory suggests that board diversity can provide firms with access to a wider range of resources, leading to better performance (Hillman et al., 2010). In contrast, agency theory suggests that board diversity may lead to conflicts among board members, resulting in lower performance (Adams & Ferreira, 2009). The empirical evidence is expectedly inconclusive. Some studies find no significant association between BGD and CFP (Aguilera et al., 2018), while others report a positive association (García-Sánchez & Martínez-Ferrero, 2021; Miller & Triana, 2009) or a negative association (Oehmichen et al., 2020). Furthermore, some researchers suggest that the association between BGD and corporate performance may be non-linear (Kwok & Tadesse, 2020).

The findings are contradictory because of firm heterogeneity (Adams & Ferreira, 2009). The challenge of disentangling the impact of BGD from the impact of other board features remains a strong plague to achieving reliable empirical evidence on BGD and CFP associations (Ferreira, 2015). These contradictory results provide unanswered central traditional question unanswered: How board gender diversity impacts corporate financial performance?

2.2 Board Leadership Structure

The separation of CEO and board chairperson roles has been a topic of significant interest in various governance studies. According to agency theory, splitting these roles can provide a check on the power of the board leadership, which in turn may enhance the board's ability to monitor management for opportunistic behavior (Daily & Dalton, 1993; Jensen, 1993) and limit the power of the CEO (Krause et al., 2017). Consequently, studies suggest that CEO duality may negatively impact corporate financial performance (Fosberg & Ross, 2021; Yu et al., 2018; Wahba, 2015).

In contrast to agency theory, resource dependence theory views the board as a resource provider to the CEO. Accordingly, some studies suggest that CEO duality can enhance the CEO's knowledge of board resources and enable better resource allocation, thereby, minimizing information asymmetries (Krause et al., 2017). Consistent with this view, the resource dependence theory predicts a positive association between CEO duality and corporate financial performance (CFP) (Hillman & Dalziel, 2003). However, the literature on the association between CEO duality and CFP is mixed, studies report both positive and negative impacts (Sun & Cahan, 2018; Shao, 2020). The debate remains vague, yet codes of good governance stress the importance of non-duality.

2.3 Board Activity

The board meetings' impact on CFP has been similarly debatable. The agency theory suggests that an active board can act as a check on the CEO's power, ensuring that decisions are aligned with the interest of the firm, and thus improving corporate financial performance (Jensen, 1993). On the other hand, the resource dependence theory views the board as a provider of resources to the CEO. Thus, an active board provides more resources to the CEO, enabling better decision-making which ultimately positively impacts corporate financial performance (Hillman & Dalziel, 2003). The literature on the association between board activity and corporate financial performance is mixed, some studies find a positive association (Ramadan & Hassan, 2021), while others report a negative or insignificant association (Baysinger & Butler, 1985; Li et al., 2021).

2.4 Board Size

As earlier literature postulates that "board size is an important board characteristic in order to achieve an optimal corporate governance structure" (Paniagua et al., 2018; Tulung & Ramdani, 2018; García-Ramos et al., 2021). The impact of board size on CFP has several confronting views. On one hand, the agency theory suggests that larger board size is essential to effectively monitor the firm's management, hence predicting a positive association between board size and CFP (El-Habashy, 2019; Hillman & Dalziel, 2003).

The resource dependence theory follows a similar vein, suggesting a positive association between board size and CFP. Each board director joins the board as a resource provider, thereby, bringing more human and social capital into the firm (Beiner et al., 2006). A contrary point of view perceives oversized boards as a source of unnecessary additional costs arising from free-riders conflict, control and coordination problems, and inflexibility in decision-making processes (García-Ramos et al., 2017). These challenges in turn hamper boards' effectiveness, and thus resulting in low levels of CFP (García-Ramos et al., 2017).

2.5 Board Independence

The presence of independent directors on corporate boards has been the subject of significant interest in governance studies. According to agency theory, having independent directors on the board can positively impact corporate financial performance by ensuring effective oversight over management and supporting shareholders' interests (Crespi-Cladera et al., 2017; Salem, 2019). On the other hand, the resource dependence theory suggests that the impact of independent directors on CFP can be both positive and negative. The positive impact of independent directors stems from their valuable external linkages. However, lack of internal knowledge and familiarity with the firm's specific knowledge can negatively impact board performance (Hillman & Dalziel, 2003; Daily & Dalton, 1994). Despite the

controversy, appointing independent directors to corporate boards is a crucial component of good governance codes (Arora et al., 2016).

2.6 Firm Age

Firm age has been widely studied in the context of corporate financial performance. Some studies find a positive association between firm age and financial performance (Baum & Haveman, 1997; Demir, 2009). Older firms tend to have more resources, better reputation, and higher levels of expertise, which may ultimately lead to better financial performance. However, other studies report a negative association (Barney & Hansen, 1994; Wang, 2012), suggesting that older firms may be less adaptable to changes in the market and more burdened by legacy costs. Mixed findings indicate that the association between firm age and financial performance is complex and may be influenced by several factors such as industry, firm size, and environmental factors (Coad, 2009; Zahra & Bogner, 2014).

2.7 Firm Leverage

The association between firm leverage and corporate financial performance has been a subject of great interest in finance literature. Several studies find a negative association between firm leverage and financial performance (Titman & Wessels, 1988; Li & Zhao, 2010), indicating that higher levels of debt can increase financial risk leading to lower profitability and stock returns as well. However, other studies reveal a positive association (Bradley et al., 1984; Chung & Pruitt, 1994), suggesting that debts provide tax shields, which can lead to higher profitability levels. Mixed findings indicate that the association between firm leverage and financial performance is complex and may be influenced by firm-specific and macroeconomic factors (Graham & Harvey, 2001; Rajan & Zingales, 1995).

2.8 Firm Size

The association between firm size and corporate financial performance has been widely studied in finance literature. Some studies find a positive association between firm size and financial performance (Petersen & Rajan, 1994; Chen & Hambrick, 1995), indicating that larger firms have more resources, economies of scale, and better access to capital markets, thus, achieving better profitability. However, other studies report a negative association (Berger et al., 2001), suggesting that larger firms may have higher agency costs, bureaucracy, and may be less responsive to market changes. Mixed findings indicate that the association between firm size and financial performance is complex and may be influenced by several firm-specific and industry-specific factors (Levie & Autio, 2008; Zahra et al., 2014).

3. Theoretical Framework

3.1 Complexity Theory

The business environment is a complex and ever-changing system that presents organizations with dynamic scenarios often with conflicting or ambiguous interpretations (Gephart et al., 2008). This complexity may lead to inaccuracy in predictions and inconclusive results when using traditional symmetrical approaches such as multiple regression or structural equation modeling (Smith & Hitt, 2005; Pappas & Woodside, 2021). To address this challenge, researchers advocate the configuration theory approach which investigates complex phenomena as clusters of interrelated conditions (Woodside, 2017; El Sawy et al., 2010). This study applies complexity theory to explore the interrelated combinations of board and corporate features that result in higher levels of CFP.

Complexity theory is grounded on four pillars. The first pillar is equifinality, meaning that there are multiple optimal paths that lead to the same outcome (Gephart et al., 2008; Misangyi et al., 2017). The second pillar is conjunction, suggesting that outcomes rarely have a single cause but rather result from the interdependence of multiple conditions making it difficult to attribute causality to any one variable (Heuer & Bhamomsiri, 2015; Misangyi et al., 2017; Wu et al., 2014). The third pillar is asymmetry, stating the existence of contrarian cases, where variables are asymmetrically associated and antecedent conditions can lead to both high and low scores for a particular outcome condition (Wu et al., 2014). The fourth pillar is causal asymmetry, indicating that the antecedent conditions leading to the presence of an outcome are not the exact contrary of causal models which trigger the absence of the same outcome (Ragin, 2008; Hsiao et al., 2015). This implies that associations among variables are more complex than simple cause-and-effect connections.

3.2 Complexity Theory and Financial Performance

Board gender diversity has been a topical issue attracting substantial research attention over the recent years. The under-representation of females on corporate boards across many countries leads to the rise of calls for board-gender-quotas and related legislations. The empirical results on the impact of BGD on CFP, however, are far from conclusive. Studies show positive, negative, and insignificant impacts. The same inconclusive debates apply to board size, independence, activity, and leadership structure.

One plausible explanation lies in the wide adoption of symmetric tests such as correlation and multiple regression (Cuadrado-Ballesteros et al., 2017) that assume linear relations among variables of interest (Woodside, 2017). However, firms' financial performance is naturally complex and attempts to explain performance unilaterally may lead to inaccurate results (Cuadrado-Ballesteros et al., 2017).

According to the complexity theory, a certain destination can be attained via several paths and therefore may be achieved through different antecedent condition combinations. From this inherent complexity theory logic, this study is based on examining the complex combinations between board characteristics (i.e., board gender diversity, size, independence, leadership structure, and activity) and corporate characteristics (firm size, leverage, and firm age) that can lead to high CFP. More specifically, “cases of firm performance can be conceptualized as combinations of governance and corporate characteristics of interest rather than as a disaggregation of their attributes that are treated in isolation from each other as is done in conventional regression approaches” (Ragin & Rubinson, 2009; García-Ramos et al., 2021).

Therefore, consistent with the complexity theory and its core propositions and according to the preceding arguments, the study proposes the following:

Proposition 1. According to the conjunction/complexity proposition: No single board/corporate characteristic is a sufficient or necessary for achieving high levels of CFP, but rather financial performance is a result of multiple-interdependent board and corporate characteristics conditions.

Proposition 2. According to the equifinality proposition: High CFP can be attained through different combinations of individual board and corporate characteristics.

Proposition 3. According to the asymmetry proposition: The same board/corporate characteristic can lead to both high/low levels of CFP.

Proposition 4. According to the causal asymmetry proposition: Combinations of board/corporate characteristics configurations associated with high levels of CFP are not the mirror opposite of those leading to low firm financial performance levels.

4. Empirical Methods & Data

4.1 Data and Sample

The sample comprises publicly companies listed at the Egyptian Stock Exchange (EGX) for the period 2014 - 2019². Companies included in the final sample operate across a wide range of sectors. Following La Porta et al. (2002), financial firms are eliminated due to their incomparability with non-financial firms across several dimensions. This sample results in an unbalanced panel dataset of 1305 firm-year observations for 200 listed Egyptian companies.

Financial data were obtained from the Decypha database.³ While corporate board data were gathered from the firm’s reports on corporate governance obtained from the Egyptian Exchange Information Center and Egypt for Information Dissemination (EGID)⁴.

² The observations are limited to 2019 to avoid the pandemic era and the risk of sample heterogeneity.

³ Decypha is the world's most comprehensive financial intelligence platform that offers decision-enabling intelligence on the markets of the Middle East, North Africa, Turkey, UK, US and beyond.

⁴ EGID is a joint venture between the Egyptian Exchange (EGX) and NASDAQ that is an authorized information source for EGX-listed companies.

Intending to increase the final sample homogeneity, the sample is country-focused (in the case of Egypt) to empirically simplify the model and set aside discrepancies in legal and institutional frameworks, which also have impact on firm's financial performance. Following García-Ramos et al. (2021), the sample is homogenous with regards to ownership concentration, the study employs the percentage of shares of the main shareholder (Poletti-Hughes & Briano-Turrent, 2019).

4.2 Variables

Variables used in the empirical analysis can be divided into outcome and causal conditions. Causal conditions are further divided into board and corporate characteristics. The main causal condition is board gender diversity. Other board and firm characteristics are board independence, activity, leadership structure, firm age, leverage, and firm size, which are included as well in the causal conditions for corporate financial performance. Control variables are included according to the literature on board gender diversity and corporate financial performance. Tobin's Q is employed as the proxy for corporate financial performance.

4.2.1 Outcome

Tobin's Q is employed as a proxy for CFP. According to Servaes and Tamayo (2013), Tobin's Q gauges a company's capacity to create value over the long run. This proxy is preferred over short-run accounting-based financial performance proxies such as return on assets "ROA" and return on equity "ROE". Thus, Tobin's Q has been widely used in various studies examining the impact of corporate governance on firm performance (Aggarwal et al., 2019).

Tobin's Q is approximated by using each firm's market to book value ratio (Q), which is calculated as the book value of total assets minus the book value of common equity plus the market value of common equity divided by the book value of total assets (García-Ramos et al., 2021). This proxy is log-transformed to enhance the statistical distribution properties (Hirsch & Seaks, 1993).

4.2.2 Causal Conditions

Eight causal conditions are used in this study to explain CFP. The main independent variable is board gender diversity, and all other variables are treated as control variables. This, however, does not distinguish them from being labeled causal conditions. The board characteristics selection follows previous literature, the empirical evidence shows that board size, gender diversity, independence, duality, and board meeting frequency have impact on firms' financial performance (Kota et al., 2010). The percentage of women on boards is used as a proxy for BGD (**Female**). Board size is measured by the total number of directors on the board for each company (**B size**). To measure board independence, the ratio of total number of independent directors to total number of directors on the board is employed for each company (**Indep**). A dummy variable is used to represent the presence of role-

duality, taking a value of 1 when the same person is playing dual roles (**CEO & Board Chairperson**) and the value of 0 if the roles are separated (**Duality**). Board-meeting frequency (**board activity**) is represented by the total number of annual board-meetings (**Bmeetings**).

Second, corporate characteristics such as firm leverage, firm age, and firm size are incorporated as control variables in similar studies (Huang, 2010). Firm size is measured by the natural log of total assets (**Fsize**), firm leverage is proxied by the total debt-to-total assets ratio (**Flev**), and firm age is calculated by the number of years since the foundation of the company (**Fage**).

4.3 Methodology

One of the most extensively adopted methodologies in business and management studies is multiple regression (Samara & Berbegal-Mirabent, 2018). Studies adopting multiple regression analysis (MRA) rely on a “net effects” estimation approach that attempts to determine whether each hypothesized independent variable has a statistically significant influence on the dependent variable (. This approach may be misleading in many cases due to the presence of contrarian cases that can support opposite or insignificant conclusions (Woodside, 2013).

The observed inconclusive results on the impact of board structure on corporate performance have triggered calls to move beyond MRA (Woodside, 2014), and the adoption of more “complex adaptive systems” (Tapsell & Woods, 2010) and qualitative analysis as well. Therefore, consistent with the complexity theory, this study applies the FSQCA methodology using the software program FSQCA.com (Ragin & Davey, 2014).

The FSQCA is a mixed technique that combines both qualitative and quantitative approaches (Ordanini et al., 2014). More concretely, this technique can generate predictive conclusions consistent with the main pillars of complexity theory (Mehran & Olya, 2020). In this sense, this study employs FSQCA to determine the various configurations of the board and corporate characteristics that can achieve high corporate financial performance (Bandara et al., 2020). This can be accomplished via consequent stages within a conceptual framework represented by a Venn diagram in **Figure I**.

The configurational paths examined by literature are represented by arrows I, II, and III. Arrow I connects the board characteristics with corporate financial performance. Arrow II links corporate characteristics with corporate financial performance resulting in 31 and 7 possible combinations respectively. Having eight total board and corporate attributes, 255 combinations are possible, which are represented by arrow III. This simultaneous testing of attributes is difficult using a symmetrical test because of multicollinearity issues (Wu et al., 2014).

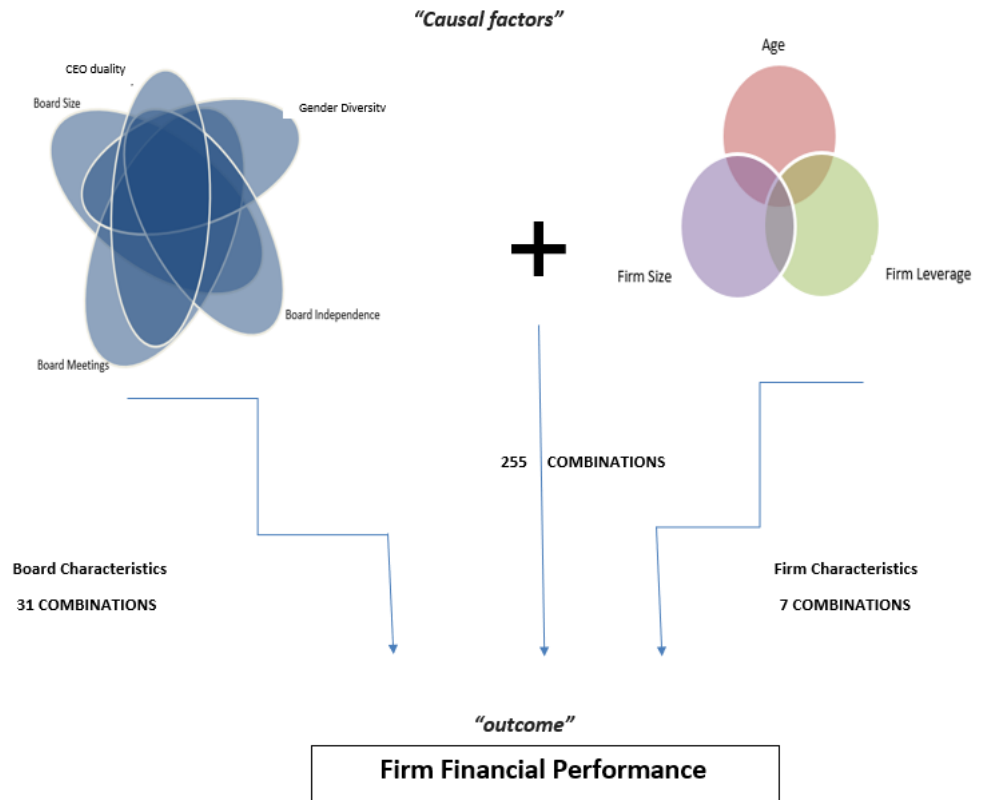


Figure 1: Venn Diagram presenting a complexity view of corporate financial performance (Source: Authors)

After defining all possible configurations deriving high levels of corporate financial performance, the next stage in FSQCA is calibration, the process of continuous-data transformation into membership scores creating fuzzy-set values that range from 0 to 1 (Ragin, 2008). By calibrating the continuous-data variables (board features, corporate characteristics, and corporate financial performance), fuzzy-set values are created by taking the value of 0 to full non-member and the value of 1 to full member., The value of 0.5 is considered as an intermediate set with maximum vagueness. Concerning dummy variables, a value of (1) denotes full membership while (0) denotes full non-membership. The FSQCA.com is employed, version 3.0, to automatically calibrate the variables using the direct calibration method (Pappas et al., 2021).

Upon calibration and coding completion, the following stage is running the fuzzy-set algorithm and generating the truth table. The truth table displays sample case distributions for all possible combinations of causal conditions. At this stage, it is vital to assess the set of configurations that can be considered sufficient conditions to reach high/low levels of CFP. The consistency and coverage indices are used to assess goodness of fit, which are analogous to the coefficient of determination R^2 and correlation in symmetric tests respectively (Woodside, 2013). First, unlike correlation analysis, consistency is a test for sufficiency and is not a test for necessity (Woodside, 2013). Second, the coverage index in FSQCA assesses the degree to which a simple and complex causal condition (recipe) accounts for instances of an outcome condition, coverage is analogous to an R^2 in statistical analysis (Wu et al.,

2014). The FSQCA model is informative when consistency is more than 0.74 (Ragin, 2008) and the coverage range is between 0.25 and 0.65 (Woodside, 2013; Hsiao et al., 2015). In this study, with consistency and coverage values of 0.78 and 0.42 respectively, the model is considered informative.

5. Analysis, Results & Discussion

5.1 Descriptive statistics & Correlations

Table I presents the descriptive statistics and bivariate correlations of all analyzed variables for the period 2014-2019. Remarkably, the average value of Tobin's Q is 1.91, ranging between 0.28 and 94.74, resulting in a high standard deviation value of 5.68. Furthermore, the presented mean values of board attributes reveal that females (**Fem**) represent 8% of boards with an average board size (**Bsize**) of 8 directors. Boards comprise 70% independent directors on average, while the chairperson duality role (**Dul**) represents almost 60% of the sample period. The results also show that boards meet (**Met**) are around nine times annually. Average values of corporate characteristics are also presented, firm leverage (**Lev**) is around 49%, firm size (**Fsize**) is around 20.5, and firm age (**Age**) is around 35 years old.

Table I displays bivariate correlations as well between variables under analysis. Various board and corporate attributes show significant correlations, which in turn may trigger multicollinearity problems in traditional symmetric tests. All the values, however, are less than 0.4 indicating asymmetric associations (Woodside, 2013) and each variable measures a unique/independent attribute (Wu et al., 2014).

Table I: Descriptive Statistics and Bivariate Correlations

	N		Mean	Minimum	Maximum	Std. Deviation											
	Valid	Missing					1	2	3	4	5	6	7	8	9		
1. Tobin's Q	910	70	1.9046	0.2780	94.7384	5.6897	1										
2. Female	941	39	0.0864	0.0000	0.7143	0.1198	.021	1									
3. Board size	941	39	7.8640	3.0000	17.0000	2.7329	-.028	.135**	1								
4. Duality	958	22	0.5825	0.0000	1.0000	0.4934	.003	.026	-.086**	1							
5. Independent	941	39	0.6965	0.0000	1.0000	0.2130	.021	.036	.357**	-.174**	1						
6. B. Meetings	914	66	9.4212	0.0000	38.0000	5.0653	-.052	-.115**	.013	.235**	-.120**	1					
7. Leverage	915	65	0.4893	0.0005	2.5170	0.3084	-.043	-.100**	-.051	-.070*	-.080*	.186**	1				
8. Firm size	915	65	20.4984	17.2513	25.3665	1.7151	-.144**	-.114**	.381**	-.103**	.074*	.126**	.309**	1			
9. Firm Age	980	0	35.4592	3.0000	131.0000	20.4060	.031	-.142**	.025	.114**	.028	.228**	.203**	-.009	1		

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

Table II: Cross Tabulation between Board/Corporate Features and Firm Performance

Cross Tabulation between Board Gender Diversity and Firm Financial Performance

	5 quintiles Firm Performance					Total
	1	2	3	4	5	
5 quintiles 2	89	108	115	97	92	501
Female	17.76%	21.56%	22.95%	19.36%	18.36%	100.00%
3	7	3	3	6	18	37
Observations	18.92%	8.11%	8.11%	16.22%	48.65%	100.00%
(Percentage) 4	45	27	35	38	41	186
	24.19%	14.52%	18.82%	20.43%	22.04%	100.00%
5	38	39	27	37	31	172
	22.09%	22.67%	15.70%	21.51%	18.02%	100.00%
Total	179	177	180	178	182	896
	19.98%	19.75%	20.09%	19.87%	20.31%	100.00%

Cross Tabulation between Board Size and Firm Financial P

	5 quintiles Firm Performance					Total
	1	2	3	4	5	
5 quintiles 1	53	57	36	37	30	213
Board size	24.88%	26.76%	16.90%	17.37%	14.08%	100.00%
2	12	12	12	15	10	61
Observations	19.67%	19.67%	19.67%	24.59%	16.39%	100.00%
(Percentage) 3	37	52	64	67	52	272
	13.60%	19.12%	23.53%	24.63%	19.12%	100.00%
4	22	19	27	28	40	136
	16.18%	13.97%	19.85%	20.59%	29.41%	100.00%
5	55	37	41	31	50	214
	25.70%	17.29%	19.16%	14.49%	23.36%	100.00%
Total	179	177	180	178	182	896
	19.98%	19.75%	20.09%	19.87%	20.31%	100.00%

Cross Tabulation between Board Leadership Duality and Firm Financial Performance

	5 quintiles Firm Performance					Total
	1	2	3	4	5	
5 quintiles 0	87	67	79	78	71	382
Duality	22.77%	17.54%	20.68%	20.42%	18.59%	100.00%
1	95	115	103	103	111	527
Observations	18.03%	21.82%	19.54%	19.54%	21.06%	100.00%
(Percentage)						
Total	182	182	182	181	182	909
	20.02%	20.02%	20.02%	19.91%	20.02%	100.00%

Cross Tabulation between Board Independence and Firm Financial Performance

		5 quintiles Firm Performance					Total
		1	2	3	4	5	
5 quintiles Independent	1	27	33	32	44	36	172
		15.70%	19.19%	18.60%	25.58%	20.93%	100.00%
	2	41	40	33	26	22	162
	Observations (Percentage)	25.31%	24.69%	20.37%	16.05%	13.58%	100.00%
	3	23	32	43	41	41	180
	12.78%	17.78%	23.89%	22.78%	22.78%	100.00%	
	4	49	43	34	35	37	198
		24.75%	21.72%	17.17%	17.68%	18.69%	100.00%
	5	39	29	38	32	46	184
		21.20%	15.76%	20.65%	17.39%	25.00%	100.00%
Total		179	177	180	178	182	896
		19.98%	19.75%	20.09%	19.87%	20.31%	100.00%

Cross Tabulation between Board Activity and Firm Financial Performance

		5 quintiles Firm Performance					Total
		1	2	3	4	5	
5 quintiles B. Meetings	1	41	30	24	25	15	135
		30.37%	22.22%	17.78%	18.52%	11.11%	100.00%
	2	53	30	29	35	31	178
	Observations (Percentage)	29.78%	16.85%	16.29%	19.66%	17.42%	100.00%
	3	33	39	52	37	50	211
	15.64%	18.48%	24.64%	17.54%	23.70%	100.00%	
	4	27	30	38	31	24	150
		18.00%	20.00%	25.33%	20.67%	16.00%	100.00%
	5	19	45	33	44	55	196
		9.69%	22.96%	16.84%	22.45%	28.06%	100.00%
Total		173	174	176	172	175	870
		19.89%	20.00%	20.23%	19.77%	20.11%	100.00%

Cross Tabulation between Firm Leverage and Firm Financial Performance

		5 quintiles Firm Performance					Total
		1	2	3	4	5	
5 quintiles Leverage	1	69	22	21	24	46	182
		37.91%	12.09%	11.54%	13.19%	25.27%	100.00%
	2	52	39	23	30	39	183
	Observations (Percentage)	28.42%	21.31%	12.57%	16.39%	21.31%	100.00%
	3	36	48	37	29	31	181
	19.89%	26.52%	20.44%	16.02%	17.13%	100.00%	
	4	25	46	42	45	24	182
		13.74%	25.27%	23.08%	24.73%	13.19%	100.00%
	5	0	27	59	54	42	182
		0.00%	14.84%	32.42%	29.67%	23.08%	100.00%
Total		182	182	182	182	182	910
		20.00%	20.00%	20.00%	20.00%	20.00%	100.00%

Cross Tabulation between Firm Size and Firm Financial Performance

	5 quintiles Firm Performance					Total
	1	2	3	4	5	
5 quintiles Firm size						
1	44	34	35	37	33	183
	24.04%	18.58%	19.13%	20.22%	18.03%	100.00%
2	40	37	33	37	36	183
	21.86%	20.22%	18.03%	20.22%	19.67%	100.00%
Observations (Percentage)						
3	32	36	41	41	33	183
	17.49%	19.67%	22.40%	22.40%	18.03%	100.00%
4	40	40	38	35	30	183
	21.86%	21.86%	20.77%	19.13%	16.39%	100.00%
5	26	35	35	32	50	178
	14.61%	19.66%	19.66%	17.98%	28.09%	100.00%
Total	182	182	182	182	182	910
	20.00%	20.00%	20.00%	20.00%	20.00%	100.00%

Cross Tabulation between Firm Age and Firm Financial Performance

	5 quintiles Firm Performance					Total
	1	2	3	4	5	
5 quintiles Firm Age						
1	34	37	44	41	34	190
	17.89%	19.47%	23.16%	21.58%	17.89%	100.00%
2	50	33	32	24	31	170
	29.41%	19.41%	18.82%	14.12%	18.24%	100.00%
Observations (Percentage)						
3	37	46	27	36	32	178
	20.79%	25.84%	15.17%	20.22%	17.98%	100.00%
4	30	31	43	40	44	188
	15.96%	16.49%	22.87%	21.28%	23.40%	100.00%
5	31	35	36	41	41	184
	16.85%	19.02%	19.57%	22.28%	22.28%	100.00%
Total	182	182	182	182	182	910
	20.00%	20.00%	20.00%	20.00%	20.00%	100.00%

Table III: Analysis of Necessary Conditions

Conditions Tested*	Consistency	Coverage
Female	0.430979	0.561311
~Female	0.689365	0.524046
Board size	0.689776	0.599514
~Board Size	0.529358	0.56755
Duality	0.581718	0.475138
~Duality	0.418274	0.486958
Independent	0.65024	0.564305
~Independent	0.551425	0.592304
B. Meetings	0.642159	0.593895
~B. Meetings	0.541553	0.540472
Leverage	0.654644	0.613084
~Leverage	0.533447	0.525316
F. Age	0.570249	0.560236
~F. Age	0.558416	0.52414
F. size	0.617044	0.58349
~F. Size	0.579394	0.564844

* The symbol (~) indicates the negation of the characteristic.

Table IV: Board and corporate characteristics predicting high levels of firm performance

Source: By authors

Configuration	Female	B. Size	Duality	Independent	B. Meetings	Leverage	F. Size	F. Age	Raw coverage	Unique coverage	Consistency
1		●	●	●	●	●	~		0.143	0.014	0.781
2	●	●	●			●	~	●	0.108	0.009	0.805
3	~	●	~	~		●	●	~	0.088	0.019	0.815
4	~		~	~	●	●	●	~	0.079	0.012	0.818
5	●	~	●	~		~	~	●	0.068	0.008	0.815
6		●	●	●	~	~	~	●	0.099	0.017	0.798
7	●	●		~	~	●	~	●	0.108	0.019	0.838
8	●	●	~		●	●	●	~	0.063	0.017	0.814
9	●	●	●	~	●	~		●	0.071	0.000	0.828
10	~	~	●	●	●	●		●	0.118	0.022	0.807
11	●		●	●	●	●	●	●	0.090	0.001	0.823
12	●	~	~	●	~	●	~	~	0.040	0.008	0.826
13	●	~	●	~	~	●	●	~	0.060	0.011	0.806
14	~	●	●	~	●	●	●	●	0.104	0.016	0.807
15	●	●	●		●	~	●	●	0.087	0.000	0.805
16	●	●	●	●	●		●	●	0.101	0.000	0.825

solution coverage: 0.422

solution consistency: 0.778

Note: ● indicates the presence of causal conditions (i.e., antecedents). ~ indicate the absence or negation of causal conditions.

The blank cells indicate "don't care conditions", that is, that the variable is not necessary for that configuration (Kraus et al.2018)

5.2 Contrarian Cases Analysis

The contrarian case analysis is used to detect cases that predict associations opposite to what has been typically evident in literature (Woodside, 2014) and is common to find in large samples (Hsiao et al., 2015). To examine the associations amongst variables in this study, the sample is divided into quintiles. Then, cross-tabulations are performed across the quintiles, generating 5x5 tables (Table II) for each antecedent condition (board & corporate) with the output variable, allowing to measure the associations between them (Pappas et al., 2021).

The analysis confirms the presence of contrarian cases (presented in Table II). For example, despite the sample evidence of the positive association between board gender diversity and corporate financial performance (Hoobler et al., 2018), the results show contrarian cases where companies with few females on boards can achieve high financial performance levels. More specifically, out of 896 total observations, 189 firms with low board gender diversity (quintile 2) show high levels of CFP (quintiles 4 & 5). The opposite is also evident, boards comprising many female directors showing low levels of CFP. This is consistent with the literature's inconclusive evidence on the impact of BGD on CFP (Nguyen et al., 2020).

Furthermore, while many cases indicate a positive association between the number of independent board directors and CFP consistent with good corporate governance practices (García-Ramos et al., 2011), contrarian cases remain evident, with 128 observations of low board independence (quintiles 1 & 2) and high CFP (quintiles 4 & 5) (Fuzi et al., 2016). The same reasoning can be applied to the remaining variables (board size, board activity, leverage, firm size, and age), showing evidence of contrarian cases.

5.3 Board and Corporate Characteristics Predicting High Levels of CFP

The study starts by analyzing the antecedent conditions' necessity to generate high levels of corporate financial performance. Table III displays consistency and coverage values for all antecedent conditions (board and corporate features). A condition is necessary when the consistency value is more than or equals 0.9 (Schneider & Wagemann, 2010). According to the consistency scores displayed in Table III, it can be concluded that no variable under analysis is a necessary condition to achieve high CFP.

Next, the study analyzes sufficient conditions to reach high CFP. Following Ragin (2008) who applies a consistency level of 0.74, Table IV displays 16 possible configurations of the board and corporate features leading to high CFP. These complex antecedent conditions "recipes" show sufficiency not a necessity, to achieve high CFP.

Every configuration presented shows variables that positively (*) & negatively (~) impact CFP. For example, the initial configuration (Board size * CEO duality * Board Independence * Board meetings * Firm leverage * Firm size ~) states that some small-sized companies, highly leveraged companies, companies with large boards that meet frequently and companies in which board chairperson duality exists, will have a high level of CFP. In this configuration, women on boards have an insignificant impact on CFP.

Generally, the results show that under several configurations leading to high corporate financial performance, each variable may contribute positively or negatively, and may have an insignificant impact. Table V summarizes the board features' existence in configurations that predict high levels of CFP. For example, among various configurations of board characteristics, board meetings are found to positively contribute to high CFP in 9 configurations, consistent with studies recommending more board activity (Min et al., 2018). Board meetings are also found to negatively contribute to high CFP in 4 configurations, supporting studies linking high board activity to board inefficiency (Boivie et al., 2016).

It is evident from the above-mentioned findings that no individual board or corporate feature can lead to high CFP levels, but rather the configurations displayed show that different configurational paths lead to high outcome levels. Moreover, the impact of a specific board/corporate feature relies on other preliminary board/corporate features. For instance, Beiner et al. (2006) propose that a large board size positively impacts corporate financial performance. Accordingly, conclusions can be drawn that the addition of more board directors can indeed enhance corporate financial performance levels.

According to the results, other board characteristics shall be considered simultaneously before concluding the final impact of increasing the board size like the director type (executives or non-executives) and board gender diversity, amongst other features. These findings validate the main principles of the complexity theory, namely, complexity (proposition 1) and equifinality (proposition 2).

Table V: Summary of the Presence of Board Characteristics Predicting High Levels of Firm Performance

	Positive			Negative			Total	
Female	10/16	62.50%		4/16	25.00%		14/16	87.50%
B. Size	10/16	62.50%		4/16	25.00%		14/16	87.50%
Duality	11/16	68.75%		4/16	25.00%		15/16	93.75%
Independence	6/16	37.50%		7/16	43.75%		13/16	81.25%
B. Meeting	9/16	56.25%		4/16	25.00%		13/16	81.25%

5.4 Board and Corporate Features That Predict a Low CFP Level

While the findings validate the equifinality and complexity propositions of the complexity theory, the study examines the asymmetry and casual asymmetry propositions as well. This is done by applying the same methodology setting low levels of CFP as the outcome variable. According to the causal asymmetry pillar, combinations of board/corporate features configurations associated with a high CFP level aren't the exact opposite of the ones that lead to a low CFP level. The asymmetry pillar further states that a certain board/corporate feature can lead to both a high/low level of CFP. As **Table VI** demonstrates, results are consistent with both complexity and equifinality propositions, with 17 unique configurational paths leading to low levels of CFP.

Furthermore, by contrasting board/corporate combinations that lead to high/low CFP in **Tables V** and **VI**, it can also be concluded that a certain board/corporate feature can lead to both a high/low CFP level, consistent with the asymmetry pillar. Furthermore, the antecedent conditions associated with high CFP levels aren't the exact opposite of the ones that lead to a low CFP level as proposed by the causal asymmetry pillar. In other words, every table comprises a distinctive set of complex configurational paths, predicting that the causal conditions of high levels of CFP are possibly distinct than those of low CFP levels.

For example, the literature provides mixed results regarding the association between BGD & CFP. Hoobler et al. (2018) suggest a positive association, Chapple and Humphrey (2014) reveal a negative association, and Carter et al. (2010) find an insignificant association. The main results, however, show that **Female** is evident in several configurational paths leading to both a high and a low level of CFP. Furthermore, one board/corporate characteristic may not always lead to the desired outcome. In the case of female directors, gender is not the only attribute, but rather a complex set of characteristics such as director type and independence among others have impact on CFP. Accordingly, the findings strongly support the asymmetry and causal asymmetry pillars of the complexity theory (propositions 3 and 4).

Table VII summarizes the board features existing in configurations that predict a low level of CFP. Additionally, the results provide evidence supporting all complexity theory pillars. For example, CEO duality suggested by many studies to negatively impact CFP (Krause et al., 2017), is showing positive and negative impacts (7 & 8 configurations, respectively) to low levels of CFP. Thus, achieving high levels of corporate financial performance is more complex and challenging than

simply suggesting univariate recommendations. Furthermore, a more holistic approach shall be considered before concluding the final impact on CFP.

Table VI: Board and corporate characteristics predicting low levels of firm performance

Source: By authors

Configuration	Female	B. Size	Duality	Independent	B. Meetings	Leverage	F. Size	F. Age	Raw coverage	Unique coverage	Consistency
1	~	~	●	~	~			~	0.107	0.031	0.810
2	~		~		~	~	~	●	0.081	0.003	0.815
3	~		~	~		~	~	●	0.067	0.005	0.801
4	~	~	●		●		~	~	0.105	0.011	0.808
5	~	~	●	~	●		~		0.152	0.015	0.790
6	●	●	~	●	~	~			0.079	0.003	0.773
7		●	~	●	~	~		●	0.104	0.008	0.828
8		●	~	●	●	~	●		0.093	0.023	0.811
9	●	~	~	~	~		~	~	0.047	0.007	0.811
10	●	~		~	●	~	~	~	0.095	0.011	0.825
11	~	~	~		~	●	●	~	0.071	0.025	0.783
12	●	●		●	~	~	~	~	0.119	0.021	0.807
13	●	~	●	●		●	~	~	0.065	0.010	0.840
14	~	~	●	~	●	●		●	0.123	0.007	0.781
15	●	●	~		~	~	●	●	0.062	0.006	0.878
16	~	●	●	~	●	●	●		0.119	0.016	0.814
17	●	~	●	●	●	●	●	●	0.062	0.010	0.819

solution coverage: 0.521

solution consistency: 0.776

Note: ● indicate the presence of causal conditions (i.e. antecedents). ~ indicate the absence or negation of causal conditions.

The blank cells indicate "don't care conditions", that is, that the variable is not necessary for that configuration (Kraus et al.2018)

Table II: Summary of the Presence of Board Characteristics Predicting High Levels of Firm Performance

	Positive		Negative		Total	
Female	7/17	41.18%	8/17	47.06%	15/17	88.24%
B. Size	6/17	35.29%	9/17	52.94%	15/17	87.50%
Duality	7/17	41.18%	8/17	47.06%	15/17	88.24%
Independence	6/17	35.29%	7/17	41.18%	13/17	76.47%
B. Meeting	7/17	41.18%	8/17	47.06%	15/17	88.24%

6. Conclusion

Despite the considerable attention from academics, governments, and policymakers given to the impact of board gender diversity on corporate financial performance, the findings remain inconclusive. Hence, this study examines whether more female directors on corporate boards enhance financial performance.

The investigation focusses on the complexity theory arguing that no single corporate governance arrangement can fit the multifaceted needs of companies embedded in different cultural, historical, and institutional settings (Corbetta and Salvato, 2004). This is done by adopting the FSQCA technique which employs alternative algorithms to test 200 non-financial companies listed at the Egyptian Stock Exchange (EGX) over six years from 2014 to 2019. To this extent, this study

investigates the different combinations of causal conditions to determine whether more female directors on boards of Egyptian firms are considered an opportunity to enhance corporate financial performance.

6.1 Academic Implications

The findings support the complexity theory's core pillars which are testable propositions. Proposition (1): no specific board/corporate feature is a sufficient or necessary condition to achieve a high level of CFP, but rather financial performance is a result of multiple-interdependent board and corporate characteristics conditions (Complexity pillar). Proposition (2): high CFP can be attained via distinct combinations of the specific board and corporate features (Equifinality pillar). Proposition (3): a certain board/corporate feature can lead to both a high/low level of CFP (Asymmetry pillar). Proposition (4): combinations of board/corporate characteristics configurations associated with high CFP level aren't the exact opposite of the ones that lead to a low CFP level (Causal asymmetry pillar).

Theoretically, the study follows recent calls for the adoption of a multi-theoretical framework to enhance women representation on corporate boards (Nguyen et al., 2020). The results empirically validate the contentions of both the agency and the resource dependence theories, implying the possibility of considering both theories in conjunction rather than as dichotomous. Hence, both theories comply with results generated from various combinations. On this basis, high corporate financial performance can be achieved via small boards, more board independence, and the absence of CEO role-duality, as suggested by the agency theory. Furthermore, the same outcome can be achieved with the opposite board features as predicted by the resource dependence theory.

The findings additionally contribute methodologically to the corporate governance literature via using the FSQCA technique. The FSQCA technique is backed by Boolean algebra and configurational relationship that can depict the combinations of antecedent conditions deriving a certain outcome, and thus reflecting the reality's complex interconnections of variables. By adopting this methodology, this study responds to many calls for the adoption of multiple regression analysis and more qualitative methodologies in corporate governance studies (Nguyen et al., 2020).

Nonetheless, this study does not come without limitations. Firstly, the sample is limited to publicly listed Egyptian companies which confine the generalization of the findings. Hence, extending this study to other similar corporate governance settings and/or at different sample periods such as pre- and post-pandemic will be insightful. Secondly, according to Ordanini et al. (2014), QCA solutions are relevant to several factors including sample, measures, and factor-range selections. More specifically, QCA requires diverse cases included in the sample to avoid constrained analysis. Furthermore, QCA is subject to the researcher's subjective choices in calibrating variables, thus, inference validity can decrease with an increased number of factors included due to the exponential increase in the number of combinations.

Nevertheless, QCA provides significant findings than the findings attained using traditional methods particularly regression analysis (Woodside, 2014).

6.2 Policy-Maker Implications

The results have relevant practical implications for Egypt's policymakers and regulators. Based on the findings, board gender diversity, directors' independence, board size, and board activity are significant antecedents that contribute to the corporate financial outcomes of a firm. However, they can represent a hurdle as well based on the present set of corporate and board configurations. Therefore, board characteristics considered individually are neither necessary nor sufficient conditions while achieving a high CFP level. Considering these findings, general corporate governance regulations/recommendations shall be revisited. The results suggest that out of 16 different significant configurations, only 10 configurations validate the positive impact of female directors on CFP. This implies that despite the corporations' moral commitment toward gender equality, a high CFP level can likewise be achieved with lower levels of board gender diversity besides other board and corporate features. Accordingly, before generalizing and enforcing corporate gender quotas and setting a minimum of two women members on Egyptian boards, regulators and practitioners are advised to carefully consider other corporate and governance contingencies and promote more specific codes of good practices that contemplate prominent board and corporate characteristics.

6.3 Management Implications

The results show significant antecedent conditions achieving high CFP levels. Accordingly, top management can rely on the findings of the 16 unique recipes of board and corporate feature combinations as guidance to achieve high corporate financial performance in the Egyptian setting. These 16 recipes are essential guidelines for firm's management strategic planning to select best board and corporate governance combinations, and thus achieving high corporate financial performance. In addition, the selection and combinations can be checked and reviewed by regulators to ensure the best corporate governance practices in Egypt.

6.4 Future Research

The results highlight the usefulness of making a "business case" for female board representation as well as other corporate governance recommendations. Kemp (2020) indicates that several early and mid-career stage challenges may hinder the advancement of women to boardrooms. Having a wider pool of qualified professionals in business can bring up additional benefits on the macro level than enforced board quotas. This point of view and the implications trigger policymakers to revisit corporate governance recommendations and encourage practitioners to follow a more holistic approach before applying corporate governance practices and to consider the corporate and board attributes.

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