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Article

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BANKING & FINANCE | RESEARCH ARTICLE

Integrating agency and resource dependence theories to examine the impact of corporate governance and innovation on firm performance

Farheen Akram^{1*} and Muhammad Abrar Ul Haq²

Abstract: This study aimed to investigate the mediating role of innovation between corporate governance and firm performance. The theoretical foundations of this study were the agency and resource dependence theories. The data were collected from annual reports of non-financial firms listed on the Pakistan Stock Exchange and spanned the period from 2010 to 2019. The direct impact of corporate governance was evaluated using Driscoll Kraay's standard errors, while for the mediating role of innovation, each indirect impact was separately examined using the bootstrapping technique in Stata. Interestingly, the study found significant support for a direct impact of corporate governance variables on firm performance, except for independent directors. The indirect impact of corporate governance on firm performance was also appraised, except for directors' interlocks and family ownership. Based on the findings, the study suggests that firms can achieve higher performance by effectively using embedded resources from the corporate governance structure and innovation.

Subjects: Finance; Corporate Finance; Banking; Corporate Governance

Keywords: corporate governance; innovation; firm performance; mediation; Pakistan stock exchange

1. Introduction

Corporate governance (CG) gained attention following major corporate scandals in the 21st century. However, the focus has strictly been on the disclosure rules of financial statements, audits, and corporate boards. Over time, the business environment changed globally due to advances in technology, while firms began to innovate. Regrettably, however, when CG rules and

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regulations were revolutionised globally at the beginning of the 21st century, the importance of innovation and technological advancements was widely ignored. Nevertheless, the importance of innovation has started emerging in the corporate sector, while researchers have begun to investigate the influence of innovation on firm success in the past decade.

Additionally, competition is currently intense; thus, players in the market appear and disappear annually due to a lack of innovation. Therefore, innovative capability is crucial in this scenario, as it casts long-lasting effects on organisations' survival and performance (Eslami & Nakhaie, 2011). Innovation is a value creation activity to maintain a firm's uniqueness and accelerate its competitiveness, which ultimately affects its performance. It can be viewed as the heart of a company: without it, an organisation will fail as its life-generating force dissipates (Minavand & Lorkojouri, 2013). For instance, in 1985, numerous firms (Blockbuster, Kodak, Borders Books, Motorola, and many others) at the forefront of their industries were ruined as they became outdated, and were subsequently acquired by their strong rivals because they could not respond to the emerging innovations in time.

These companies failed to maintain a competitive edge because they could not deliver new products and services; consequently, their income and returns decreased daily. Thus, such organisations have no recourse but to merge with their competitors. However, innovation does not occur in a tunnel; it is a continuous research and development (R&D) process that requires unique skills and management. Therefore, this study investigates how innovation is crucial for firms' performance and how external and internal governance factors influence the performance of organisations through innovation.

According to Zhang et al. (2014), the structure of CG, which includes strategic internal control and decentralisation, facilitates innovation. The primary reason for developing a corporate structure that facilitates innovation is to restrict managers' myopic behaviour. Managers generally rely on short-term and easily predictable performance measures rather than emphasise long-term and risky activities that accelerate innovation. Meanwhile, the external and internal structures of CG collectively work to influence firms' motivation to invest in innovation, which ultimately affects firms' innovative investment decisions and R&D intensity (Sapra et al., 2014). Although the relationship between CG and innovation has been well established (Manita et al., 2020), how this causal relationship ultimately affects firm performance (FP) remains unclear. Although some studies have attempted to investigate this relationship, their results cannot be generalised due to methodological ambiguity (e.g., Nawaz Khan et al., 2019). The latter study used composite measures of CG and innovation, which made it difficult to distinguish between the individual CG elements' impacts on innovation. Hence, the current study was specifically designed to examine the individual impacts of CG elements on innovation and FP.

Additionally, in CG studies to identify the problems encountered by companies in the current technological era, intervening variables emerge (Manita et al., 2020; Titisari et al., 2019). However, the current study differs from previous investigations in that it includes all critical aspects of CG for FP and innovation. This study covers a wide range of CG measures, including board structure and capital and ownership structure, to examine their direct and indirect (mediating) effects on FP. Meanwhile, this study emphasized an integrated approach of agency and resource-based theories which is a unique concept. The Foundation of most of the studies is based on either firm related theories or resource related theories, how these two concepts collectively support the firm performance is still an open question that has been addressed in this paper.

The remainder of this paper has three main sections: The next section reviews the existing literature and develops the hypotheses. The research methodology is presented in the section that follows, which includes data analysis. The paper concludes with a discussion and recommendations in the last section.

2. Literature review

2.1 FP

For every researcher in any business area, the most relied-upon variable is organisational performance. For managers and researchers, this extensive concept is vital for evaluating firms and comparing them with their competitors. The importance of organisational performance is borne out by its persistent use as a dependent variable (Zhou et al., 2019). According to Kurien and Qureshi (2011), companies' environments and actions are the critical factors behind their performance. Kurien and Qureshi (2011) add that, surprisingly, defining the performance of an organisation remains an open question, as only a few studies are consistent in their measures and definitions. Moreover, scholars have asserted that performance measurement is a technique to evaluate strategies and research activities (Rogers, 2000). Rogers further adds that organisations' performance indicates the output of their R&D activities relative to the R&D input.

2.2. Innovation and FP

Numerous scholars define innovation from different perspectives; according to Teece (2010), innovation is "central to the role of enterprises in modern society" (p. 724). Additionally, innovation is deemed to be a core activity involved in firm behaviours to assist in the creation of value to add cutthroat improvement and enhance FP (Lee et al., 2019). Innovation can also be described as the invention of a completely new product, process, or service, the improvement of an existing process or product, or the diffusion of an already existing innovation into a new system (Dziallas & Blind, 2019; Rogers, 2002).

Furthermore, innovation directly affects firms' profitability by differentiating services and products and paving paths to new markets (Chatterjee & Bhattacharjee, 2020; Porter & Kramer, 2019). Previous studies claimed that innovative activities were strongly linked with firms' future growth opportunities and higher performance (Lee et al., 2019; Tomizawa et al., 2020). These authors further professed that the profitability of innovative firms was higher than that of non-innovative firms. Moreover, a study in the U.S. and Canada found that product innovation strongly impacted FP (Artz et al., 2010). Given the critical importance of innovation for firms, the current study includes it as a predictor and mediator variable for FP.

2.3. CG and FP

Numerous studies have examined the effect of CG on FP. For instance, Ciftci et al. (2019) examined the effects of board size and ownership structure on FP. Akram et al. (2018) and Barroso-Castro et al. (2016) revealed that some aspects of a board have an impact on FP. Akram et al. (2019) and Chen (2012) investigated the influence of board independence on FP.

Martin et al. (2015) asserted that value creation was a critical corporate board responsibility. However, in creating value, the interests of stakeholders such as investors, customers, suppliers, society, and employees must also be considered. Thus, several theoretical perspectives have been considered in examining the impact of corporate boards on organisations' performance. Based on different theories (i.e. agency and stakeholder theories) with a common aim, Kiel and Nicholson (2003) established an association between FP and corporate board characteristics. For instance, independent directors have distinctive ability to enhance the board's effectiveness and firm performance as proved by Bonini et al. (2022). The lined-up studies also asserted that foreign directors serving on board can offer their unique advice and aptitudes to firms for cross-border activities (Masulis et al., 2012). Additionally, the international or global experience of directors empowers them to facilitate the firms with more resources than their domestic colleagues which leads to better firm value (Peck-Ling et al., 2016).

Moreover, one study found that a firm's financial performance and the quality of CG were enhanced if the board composition included at least three female members (Ararat & Yurtoglu,

2020). Similarly, another study found that, after controlling for the direction of causality and firm-level characteristics, the presence of female directors on a board positively impacted FP (Ting et al., 2019). For the decision-making process, individual qualification of board members is important for instance, having experienced and qualified board members make the implementation of monitoring role more effective. Highly qualified board members having exceptional excellence in general research and analysis, particularly PhDs, tend to bring rich innovations for the development of rigged policies in order to provide uniqueness which ultimately shows positive effects on firm performance (Oehmichen et al., 2017).

Additionally, ownership structure significantly influences FP (Minetti et al., 2015; Yangfan, 2015); the ownership structure of an organisation shows how the shareholders', owners', and managers' interests are aligned (Currim et al., 2012). In accordance with Yangfan (2015) stakeholders having larger shares have more power to monitor and control management or insiders. Thus, this argument provides positive support for having large shareholdings to weaken the self-interest of directors. Therefore, agency issues that hinder the performance of any business are fundamentally linked to ownership structure (Yangfan, 2015). According to Shyu (2011), large shareholdings are in possession of a few families or individuals in public listed companies of developing countries. Moreover, it is obvious that firms owned by family members will eventually end up with family members at managerial positions. Resultantly, members of the family being an inappropriate selection for top management will lead towards the inferior performance of the firm directly or indirectly. A constructive relationship in organizational growth and foreign ownership has been reflected in a study by Kim (2006) demonstrating a positive liaison between intensities shares owned by foreigners and sighted dividends.

2.4. CG and innovation

The nature of innovation gives rise to a distinct nexus between various CG factors and innovation. For instance, an independent board can limit managers' myopic R&D behaviour and reduce their misuse of resources, such as when independent directors have extensive technical knowledge and experience to assess innovative projects' worth (Li et al., 2019). Directors with prestigious education have unique human and social capital which enables a firm to connect with the external environment and prepared a firm to ready for the adoption of innovation (Darmadi, 2013). Additionally, effective implementation of innovation activities requires expert knowledge, skills, and resources. Thus, independent and larger boards can deal with complex environments and find alternative, holistic solutions that lead to better-quality innovations (Haynes & Hillman, 2010).

"Busy" directors are likely to be aware of innovative trends in the industry and to bring resources to the board to assist a firm's innovation process (Helmets et al., 2017). The latter authors claim that directors' interlocks bring useful information and ideas for analysing potential innovative opportunities. However, directors' "busyness" is not always beneficial because they may lack the quality time required to examine risky projects.

Østergaard et al. (2011) examined the effect of employee diversity on innovation and claimed that gender diversity positively influenced innovation. Furthermore, due to the natural difference in human capital between female and male directors, female directors positively contribute to the cognitive decision-making necessary for innovation activities (Torchia et al., 2018). As female directors bring diverse human and social capital to the board, their experience, knowledge, and expertise provide new insights into opportunities that ultimately increase innovation (Hernández-Lara & Gonzales-Bustos, 2020; Sarto et al., 2019).

From the perspective of resource dependency, individuals who learn at influential institutions tend to be more skilled and esteemed. Additionally, directors with prestigious educational backgrounds significantly influence firms' investment decisions, due to their unique intellectual capital (Kuo et al., 2018). Such directors possess unique human and social capital that enables a firm to connect with the external environment and prepare to adopt innovation. Additionally, directors'

prior experience strongly influences their ability to make decisions and strategic choices that ultimately affect an organisation's performance. However, the association between directors' educational background (in terms of prestige) and a firm's performance and innovation has rarely been addressed in the finance literature.

2.5. Theoretical framework

It is evident from the literature that agency theory is extensively used in studies on FP and CG. Proponents of agency theory argue that separation of control and ownership causes numerous issues in firms, most notably the conflicts of interest between the parties (Jensen & Meckling, 1976; Pepper & Pepper, 2019). As owners of a business hire managers and directors to operate and manage the business, performance diminishes if the hired managers' and owners' interests are not aligned (Pepper & Pepper, 2019). Therefore, the managers' and owners' interests must be aligned through justifiable share ownership and remuneration. Managers and directors, as part of CG, are both the leading cause of problems and a source of resources for a firm (Hillman & Dalziel, 2003). However, the provision of resources by hired managers and directors is generally ignored or not discussed in agency theory (Pepper & Pepper, 2019). Even the latest literature does not consider this gap in agency theory. Being a crucial element of an organization directors have the power to lead the organization toward success or just let it fail. Agency theory emphasises at the later part of the situation that directors cause significant agency cost which ultimately has diverse effects on firm performance (Alodat et al., 2021). But being a decision-making body of any organization directors contribute unique human capital, social capital collectively known as board capital (Haynes & Hillman, 2010) to the organization.

Hence, Haynes and Hillman (2010) coined the idea of integrating agency theory with resource dependence theory to extend the former's gamut. Moreover, in the current business environment, human resources are critical for organisations as they formulate all the strategies and decisions (Ramón-Llorens et al., 2019). The resource provision function must be considered in discussing the threat of agency problems that is caused by human resources. A large board and independent directors can contribute more knowledge and resources to a firm. Similarly, a diverse board in terms of gender, education and nationality could be more versatile (Ramón-Llorens et al., 2019). Ownership structure is considered as a tool to bind the interest of directors with organizational goals, in fact ownership of directors encourage them to contribute their unique abilities to protect firm's wealth. Which ultimately has positive effect on directors' shareholdings. Thus, an integrated agency-resource dependence view is adopted to evaluate FP in the current study.

3. Hypothesis development

Numerous studies have examined the direct relationship between CG variables and FP. However, the question of the impact of an intermediate variable on this relationship is yet to be resolved. Even the structures of modern organisations have completely changed over time; therefore, there is a need to further investigate the relationship between CG and FP beyond the agency propositions.

Resource dependence theory and agency theory both emphasize how important it is to have independent directors on the board in order to successfully oversee company management. Existing literature comprehensively discusses the relationship between CG, innovation, and FP. For instance, Yousaf et al. (2019) confirm the relationship between board independence and R&D spending. Additionally, Managers may "play it safe" and steer clear of risk-taking tactics out of fear of being penalised (or fired) for bad performance (Manso, 2011), Balsmeier et al. (2015) examined the effect of board independence on innovation; their results revealed that the quality of innovation decreased as board independence increased. This is because managers invest more in ongoing or similar innovation projects than in exploring new avenues. Meanwhile, Fuzi et al. (2016) found mixed evidence for the effect of board independence on FP. A study on Pakistani boards disclosed a negative association between performance of firms and proportion of outside directors. This is the result of having a low number of outside directors on board (Ahmed Sheikh

et al., 2013). Based on these chaotic arguments, there is needed to further examine the board independence, hence, we propose the following hypotheses:

H1: Independent board directors have a direct and significant effect on FP.

H2: Innovation significantly mediates the effect of independent directors on FP.

Globalisation has significantly changed the composition of corporate boards; this transformation highlights the importance of independent foreign directors, as international experience and knowledge are crucial factors for organisational success (Peck-Ling et al., 2016). Şimşek (2017) observed that international experience was a critical asset for firms because foreign directors' extensive knowledge of global management, coupled with their limited social links in a firm's domestic market, placed them in an ideal position for effective monitoring. These factors also alleviate agency problems, resulting in enhanced FP (Sutrisno & Mohamad, 2019). Foreign directors on board bring unique resources that a firm unable to bring internally as well as provide financial opportunities to invest in innovation, growth projects and purchase innovations (Peck-Ling et al., 2016). However, the effect of foreign directors on FP and innovation has hardly been investigated in previous studies; we therefore propose the following hypotheses:

H3: Foreign board directors have a direct and significant effect on FP.

H4: Innovation significantly mediates the effect of foreign directors on FP.

Furthermore, according to the resource dependence perspective, board size is considered to be a bank of resources. However, previous studies have emphasised agency issues and obtained mixed results regarding the effect of board size on FP (Bhatt & Bhattacharya, 2015; Danoshana & Ravivathani, 2019). Having small board size promotes intellectual, critical and genuine prudence among members. Hence, this might lead towards efficient monitoring, enhanced corporate decision-making and better-quality of firm performance (Lawal, 2012). From the perspective of agency theory, having larger boards permits efficient monitoring by plummeting CEO domination inside the board and also protects interests of the shareholders. Chen (2012) found that a larger board reduced environmental uncertainty and increased FP. Additionally, board size provides the necessary resources, knowledge, skills, and expertise to invest in innovative projects (Chen, 2012). Nevertheless, board size remains a controversial issue (Bhatt & Bhattacharya, 2015). Therefore, we propose the following hypotheses:

H5: Board size has a direct and significant effect on FP.

H6: Innovation significantly mediates the effect of board size on FP.

Research carried out in the developed economies, for the most part, suggests evidence of benefits of gender diversity on boards together with positive contributions made towards superior firm performance (Marinova et al., 2016). Gender diversity brings various experiences, judgment, skills, and competencies to a board. Such resources foster decision-making, efficient management of financial resources, and improved shareholders' accountability, which ultimately positively influence FP (Ahmed & Rugami, 2019). Contrarily, Yang et al. (2019) reported a negative impact of female directors on FP. Similarly, Robb and Watson (2012) found that female directors had an inverse effect on firms' profitability. However, female directors have unique abilities to resolve problems that influence board decisions to invest in innovation that impacts FP (Griffin et al., 2019). Thus, we propose the following hypotheses:

H7: Gender diversity has a direct and significant effect on FP.

H8: Innovation significantly mediates the effect of gender diversity on FP.

Interlocks are often thought to boost business performance, although the opposite may also be true, according to prior study. Interlocks may be used by underperforming businesses to raise their performance (Faleye et al., 2014). Fich and Shivdasani (2006) found that directors' interlocks significantly impacted FP (market-to-book ratio). Directors tend to have multiple directorships within the same industry, which can help reduce uncertainties in the external environments (González et al., 2013). In contrast, a recent study (Dutta & Samanta, 2020) found that directors' interlocks reduced FP. From an R&D perspective, these interlocks act as conduits for conveying resources. Gronum et al. (2012) analysed the effect of directors' interlocks on FP from an innovation perspective; they found support for their theoretical hypothesis that innovation mediated the effect of interlocks on FP. However, Hernández-Lara and Gonzales-Bustos (2019) find mixed evidence of the effects of multiple directorships on innovation. Thus, we propose the following hypotheses:

H9: Directors' interlocks have a direct and significant effect on FP.

H10: Innovation significantly mediates the effect of directors' interlocks on FP.

Directors with professional qualifications are considered to be experts in their fields as several years of professional knowledge in accounting and complex examinations render them capable of making sound decisions. This ability to perform such a task is the most critical determinant of innovative performance (Saidu, 2019). According to (Dalziel et al., 2011), knowledge on board, set of required skills, their experience and expertise are more likely to impact the effectiveness of monitoring. Additionally, knowledge possessed by professionals seems to be enhanced by on-job learning and education to a great extent. Furthermore, directors' advanced education, such as specialisation in engineering, business, science, computer, or law, endow them with unique skills and capabilities that facilitate their successful evaluation of research projects (Haynes & Hillman, 2010). Similarly, the significant positive impact of board members' higher educational level on innovation has been reported by scholars (Haynes & Hillman, 2010). Literature seems to neglect the examination of correlation among the performance of the firm and prestigious educational accomplishments of directors. Hence, we propose the following hypotheses:

H11: Directors' education level has a direct and significant effect on FP.

H12: Innovation significantly mediates the effect of directors' education level on FP.

H13: Directors' prestigious education directly and significantly affects FP.

H14: Innovation significantly mediates the effect of directors' prestigious education on FP.

Moreover, on-the-job experience is an essential source of knowledge. When similar situations arise, the experience can provide helpful knowledge to predict an outcome, reduce risk, avoid failure, and ensure increased performance (Kempf et al., 2014; Pástor et al., 2015). Additionally, experienced directors can manage business issues more effectively and direct others to achieve organisational goals with integrity (Haynes & Hillman, 2010). Gray and Nowland (2013) claimed that experienced directors were more capable of predicting the risks and benefits associated with innovative projects; they made less risky innovative investments, which positively affected FP. Firms operating in a similar industry tend to face more similar situations than those in different

industries (Pástor et al., 2015). Thus, industry experience can provide useful knowledge on industry-specific operational issues. It can also provide better insights and perspectives on current and future industry landscapes. We thus propose the following hypotheses:

H15: Directors' previous experience directly and significantly affects FP.

H16: Innovation significantly mediates the effect of directors' previous experience on FP.

Previous studies have established a causal association between ownership structure and FP; for instance, Kao et al. (2019) insisted that family, institutional, concentrated, and foreign ownership positively impacted FP. Contrarily, Choi et al. (2015) and Minetti et al. (2015) reported a negative relationship between concentrated ownership and FP. Concentrated ownership used to evaluate the power of shareholders or owners to influence the agents or managers. According to Choi et al. (2015), when the ownership of a firm is concentrated in a few hands, the minority shareholders do not have the power to supervise the management. In such a scenario, the owners and managers may myopically reduce innovation. Family-owned firms achieve extraordinary performance because family members' wealth is strongly linked with performance; thus, family members have incentives to critically monitor managers' activities and guide them towards enhanced FP (Villalonga & Amit, 2020). A contrary view of family ownership is that family members have the incentives and power to exert rent or increase their own wealth while destroying the firm value. Family members tend to have limited knowledge, skills, technical capabilities, and low education, which negatively impacts their innovation performance (Chu, 2011). Foreign ownership is vital in developing markets because foreign owners bring money and assist with advanced technology, managerial skills, and experience, in addition to providing access to other markets (Pasali & Chaudhary, 2020). Foreign investors bring technological advancements to organizations through which the operating cost decreases and profitability of firm increases. However, the results of existing studies are contradictory. Therefore, we propose the following hypotheses (as shown in Figure 1):

H17: Concentrated ownership has a significant direct effect on FP.

H18: Innovation significantly mediates the effect of concentrated ownership on FP.

H19: Family ownership has a significant and direct effect on FP.

H20: Innovation significantly mediates the effect of family ownership on FP.

H21: Foreign ownership has a significant and direct effect on FP.

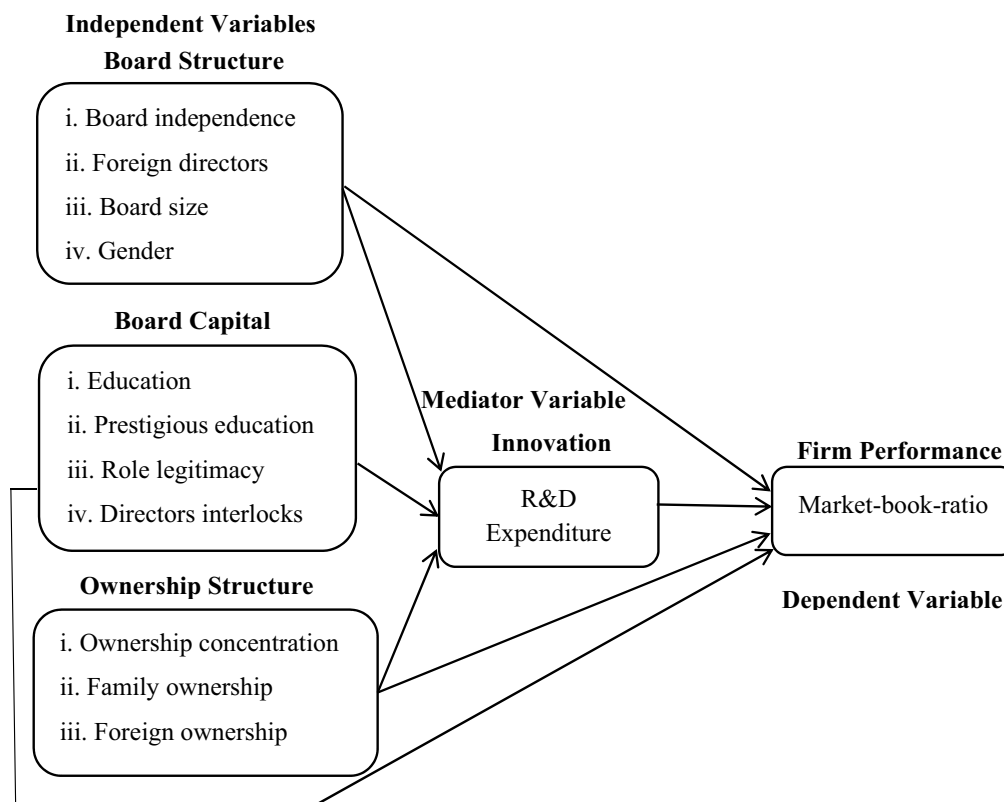
H22: Innovation significantly mediates the effect of foreign ownership on FP.

4. Methodology

4.1. Sample and data source

The study population comprised non-financial firms listed on the Pakistan Stock Exchange (PSX). In April 2020, 542 companies were registered on the PSX, of which 507 were in the non-financial sector. The data were collected from companies' published annual reports spanning a period of ten years (2010–2019). However, some companies were newly registered, while companies with missing data for more than five years were excluded from the sample. Consequently, 210 firms were considered as the final sample for the study.

Figure 1. Research Framework.



4.2. Variables definition

Variables used in this study has been defined below Table 1.

4.3. Econometric strategy and empirical model

Stata (v13) was used to test direct and mediation models, and statistical treatment was performed on the unbalanced panel data. Direct effect model was estimated using Driscoll-Kraay's standards errors with fixed effects. This technique accounts for heteroscedasticity, cross-sectional dependencies, and autocorrelation (Hoechle, 2007). Moreover, to test the projected mediation model for this study, we used the bootstrap technique proposed by Preacher et al. (2007). We developed the following direct-effect model based on the existing literature and theoretical framework. The mediator model is not expressed as an econometric equation because the bootstrapping technique in Stata performs a separate regression for each indirect effect (i.e. $X_1 \rightarrow M \rightarrow Y$, $X_2 \rightarrow M \rightarrow Y$, where X = Independent variable; M = Mediator variable; and Y = Dependent variable).

4.4. Direct effect model

$$MtB_{it} = \beta_0 + \beta_1 InD_{it} + \beta_2 FoD_{it} + \beta_3 BS_{it} + \beta_4 GD_{it} + \beta_5 DI_{it} + \beta_6 DE_{it} + \beta_7 DPE_{it} + \beta_8 DEX_{it} + \beta_9 ConOw_{it} + \beta_{10} FaOw_{it} + \beta_{11} ForOw_{it} + \text{Control variables} + \alpha_i + \delta_t + \mu_{it}$$

Where,

MtB = market-to-book ratio; **InD** = independent directors; **FoD** = foreign directors; **BS** = board size; **GD** = gender diversity; **DI** = directors' interlocks; **DE** = directors' education level; **DPE** = directors' prestigious education; **DEX** = directors' experience; **ConOw** = concentrated ownership; **FaOw** = family ownership; **ForOw** = foreign ownership.

Table 1. Measurement of Variables

Variables	Name	Measurement
Dependent Variable	Market-to-book ratio	Ratio of average of the high and low market price per share for the year to book value per share
Independent Variable	Independent Directors	Number of independent directors on board divided by board size
	Foreign Directors	Number of foreign directors on board divided by Board size
	Board Size	Log of total number of directors on board
	Gender diversity	Blau's heterogeneity index 1 $-\sum x_i^2 / (\sum x_i)^2$
	Directors' Interlocks	Total interlocks of directors/Board size
	Directors' Education	Blau's heterogeneity index 1 $-\sum x_i^2 / (\sum x_i)^2$
	Directors' Prestigious Education	Proportion of domestic directors with international degree to total domestic directors sitting on the board
	Directors' Experience	Total experience of directors divided by Board size
	Concentrated Ownership	Percentage of shares owned by large block holders (owned at least 5 % or more shares)
	Family Ownership	Number of shares owned by the family members divided by total number of shares outstanding
	Foreign Ownership	Number of shares owned by the foreign investors divided by total number of shares outstanding
Mediating Variable	Innovation	R&D expense divided by Sales
Control Variables	Firm Size	Log of total assets
	Firm Age	Log of firms' total age
	Debt to equity ratio	Ratio of total debt (short and long-term debt) to total assets
	Directors' short-term compensation	Fixed cash salary plus short-term incentives divided by total remuneration
	Directors' long-term compensation	Sum of restricted stock grants, option grants, and long-term incentive plans divided by total remuneration

5. Results and discussion

5.1. Hausman test

We used the Hausman test on the panel data to choose between the fixed- and random-effects models (Wooldridge, 2010). The Hausman test presumes the random-effects model to be appropriate under the null hypothesis (H0) in econometrics, the alternative hypothesis (H1) being that the fixed-effects model is appropriate. If the p-value of the Hausman test is significant, then the null hypothesis is rejected (Hausman, 1978). In this study, the results of the Hausman test showed a significant p-value (0.000), which meant that the random-effects model was inappropriate; thus, we accepted

Figure 2. Histogram test of normality.

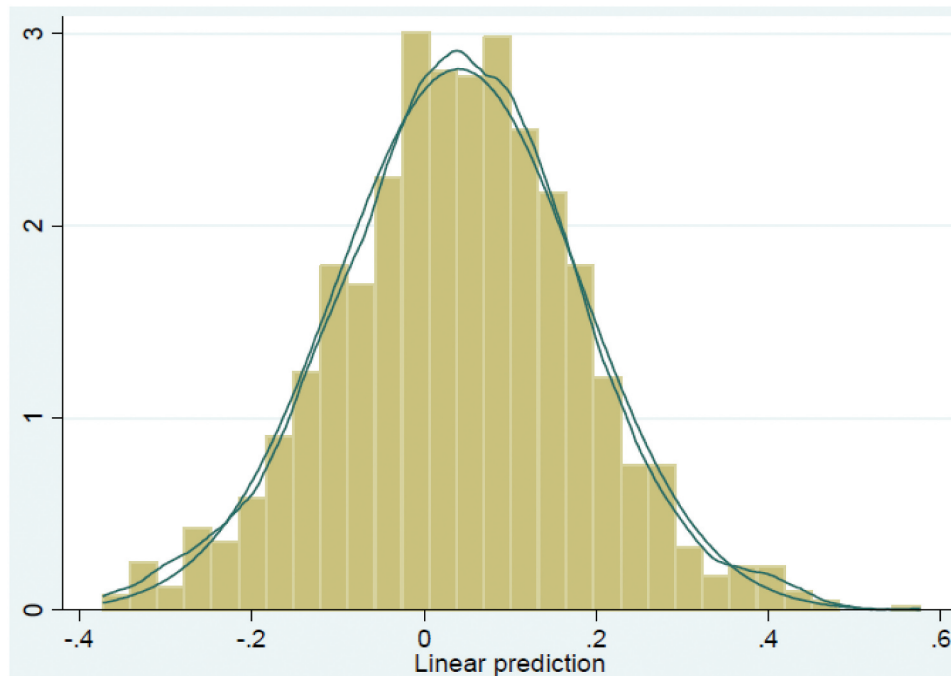


Table 2. Model Fit

Market-to-Book ratio	Beta (β)	Std. Err.	t-statistics	P-value
_hat	0.9952	0.0694	14.35	0.000
_hatsq	0.1117	0.3967	0.28	0.778
Constant	-0.0022	0.0126	-0.18	0.860

the alternative hypothesis that the fixed-effects model was preferred. Fixed effect regression accounts for unobserved time-invariant among individual characteristics (Lin et al., 2021).

5.2. Regression diagnostic tests

Several regression diagnostics indicated that all the regression assumptions were satisfied in this study. For instance, the normality of the data was confirmed using a histogram plot and the Jarque-Bera (JB) normality test. The JB test assumes normality of data under H0; in the current study, the Chi-square test statistic value for the JB test was greater than the p-value (0.05), and therefore H0 was accepted that the data came from a normal distribution. Figure 2 illustrates the results of the histogram test of normality.

The linearity of the model was confirmed using the user-written command “nlcheck” applicable after performing the panel (xt) regression (Jann, 2008). This command enables researchers to perform a joint Wald test. According to Jann (2008), if the probability value is greater than 0.05, then the null hypothesis (model is linear) is accepted; in the current study, the probability value was 0.0674, which meant that there was no evidence of a violation of the linearity assumption.

We performed the Breusch-Pagan heteroscedasticity test, which assumes no heteroscedasticity under the null, H0, and the existence of heteroscedasticity under the alternative, H1. In this study, the probability value for the Breusch-Pagan test was 0.2376, significantly higher than 0.05, which

Table 3. Correlation Matrix

	MtB	InD	FoD	BS	GD	DI	DE	DPE	DEX	ConOw	FaOw	FoOw	Inn	VIF
MtB	1													1.12
InD	-0.034	1												1.10
FoD	0.018	-0.030	1											1.09
BS	-0.212**	-0.095**	0.009	1										1.06
GD	-0.0184	-0.044**	-0.186**	0.015	1									1.03
DI	0.054	0.025**	-0.062**	-0.018	0.078**	1								1.12
DE	-0.100**	0.074**	0.0004	0.056**	0.028**	0.060**	1							1.02
DPE	0.037	0.255**	-0.056**	-0.035	-0.029	0.002	0.044*	1						1.02
DEX	0.022	-0.061**	-0.002	0.057**	-0.048	-0.032	0.029	0.049	1					1.08
ConOw	0.165**	-0.085**	0.116**	-0.125**	0.0004	-0.031**	0.047	-0.015	-0.012	1				1.06
FaOw	-0.260**	-0.004	0.114**	0.089**	-0.058**	0.112**	0.021	-0.045	0.006	0.075**	1			1.09
FoOw	-0.061**	0.044**	-0.139**	0.161**	0.065**	0.027	0.096**	-0.003	0.019	0.049**	0.027	1		1.03
Inn	0.082**	-0.095**	0.120**	0.098**	0.114**	0.014	-0.0018	0.109**	0.065**	0.137**	0.170**	0.110**	1	1.07

Significance levels (α) are as follows: * = 10%, ** = 5%, and *** = 1%.

MtB = market-to-book ratio; InD = independent directors; FoD = foreign directors; BS = board size; GD = gender diversity; DI = directors' interlocks; DE = directors' education level; DPE = directors' prestigious education; DEX = directors' experience; ConOw = concentrated ownership; FaOw = family ownership; FoOw = family ownership; Inn = innovation; VIF = variance inflation factor

meant that the null hypothesis of homoscedasticity could not be rejected in favour of the alternative assumption of the existence of heteroscedasticity.

We also performed a model specification test to ensure that there were no omitted variables. A user-written command, “linktest”, in Stata was used, which generated two more variables, “_hat” and “_hatsq”. A nonsignificant value of “_hatsq” indicates that there are no omitted values, while “_hat” should be significant. In the present case, “_hatsq” was nonsignificant ($\beta = 0.1117$, t -value = 0.28, p -value = 0.778), indicating that there were no omitted variables and the model was appropriately fitted. Table 2 presents the results of the model fit test.

5.3. Correlation analysis

According to Pallant (2007), correlation analysis is the easiest way to predict and describe a linear association between two variables. Hence, in the current study, Pearson’s correlations were used to describe the directions and strengths of the relationships among the variables. Additionally, a high value of correlation is a sign of multicollinearity. The results of Pearson’s correlation analysis are reported in Table 3, and indicate that there is no multicollinearity issue in the data, as the correlation coefficient values were small (i.e. much less than 1). Additionally, the absence of multicollinearity was also confirmed using the variance inflation factor (VIF): the VIF rule of thumb is that its value should be greater than 1 and less than 5 (Hair et al., 2019) a VIF value greater than 5 indicates a serious collinearity issue. The following statistics were obtained from Stata:

5.4. Regression analysis

We performed regression analysis using Driscoll-Kraay’s standard errors with fixed effects (command “xtsc”). This technique accounts for heteroscedasticity, cross-sectional dependencies, and autocorrelation (Hoechle, 2007). Table 4 presents the results of the fixed-effects regression analysis.

The results of the multiple regression analysis revealed that independent directors had a negative but nonsignificant impact on FP; thus, we rejected H_1 . These findings are consistent with those in the literature (Fauzi & Locke, 2012). Foreign directors have a positive and significant impact on FP; thus, H_3 is accepted at ($\beta = 0.363$, t -value = 1.91) the 10% significance level. These findings are consistent with recent results obtained by Şimşek (2017) and Peck-Ling et al. (2016). Moreover, the findings are consistent with both agency and the resource dependence theories. According to agency theory, external board directors are effective monitors and persuade management to take actions that increase firms’ revenues (Jensen & Meckling, 1976). Board size positively and significantly impacts FP; hence, H_5 is accepted, with path coefficient value $\beta = 8.565$. A study from Pakistan yields similar results (Ahmed Sheikh et al., 2013). According to agency theory, having too many members on a board has costs. The resource dependency argument, on the other hand, contends that larger boards benefit firms by giving them access to more outside resources.

Moreover, gender diversity has a significant and negative impact on FP, based on which H_7 is accepted ($\beta = -1.275$, t -value = -1.89). Previous studies have also reported a significant and negative impact of gender diversity on FP (Dobbin & Jung, 2011). The negative effect of gender diversity on FP is due to cultural practices among Pakistani firms. The presence of females on boards is merely symbolic; hence, their contribution towards good governance is negligible in Pakistan. Moreover, this study demonstrates that directors’ interlocks have a large negative and significant impact on FP, with a coefficient value of -1.475 ; H_9 is thus accepted. Similar results were reported by Nam and An (2017); these authors argued that boards’ ability to monitor effectively decreased when directors sat on more than one board.

The results of the multiple regression analysis also indicate that education has a significant and positive impact on FP. Hence, hypothesis H_{11} is accepted at the 1% significance level ($\beta = 0.119$,

t-value = 3.39). These findings are consistent with those obtained by Darmadi (2013) in Indonesia. Next, H_{13} is accepted at $\beta = 0.449$, which shows that prestigious education positively and significantly impacts FP. People who graduate from elite colleges frequently create and maintain elite social networks, which may be a valuable organizational resource because such networks may give the hiring firm access to priceless external resources.

Furthermore, the results of this study show that the average experience of directors has a positive and significant impact on FP; thus, hypothesis H_{15} is accepted ($\beta = 0.159$, t-value = 4.00). Kempf et al. (2014) reported similar results. Directors with more experience gain more expertise in businesses, markets, and competition. Therefore, more experienced directors are valuable assets for a firm, creating unique human capital for it.

Furthermore, concentrated ownership shows a positive and significant impact on FP; the volume of the path coefficient is 28.3%. Hence, hypothesis H_{17} is accepted at the 1% level of significance. Yasser and Mamun (2017) reported similar findings. Because control cannot be contested when significant shareholdings are obtained, agency expenses may be reduced or even eliminated as a result of the concentration of ownership. A negative and statistically significant impact of family ownership on FP is indicated in the present study. Hence, hypothesis H_{19} is also accepted at the 1%

Table 4. Fixed-Effects Regression Analysis using Driscoll-Kraay's standard errors

Variables	Coefficient	Driscoll/Kraay Std. error	t-value
Constant	-82.127***	3.342	-24.57
InD	-0.125	0.234	-0.53
FoD	0.363*	0.190	1.91
BS	8.565***	2.189	3.91
GD	-1.275**	0.674	-1.89
DI	-1.475*	0.616	-2.39
DE	0.119***	0.035	3.39
DPE	0.449*	0.260	1.72
DEx	0.159***	0.040	4.00
ConOw	0.283***	0.026	10.81
FaOw	-0.085***	0.022	-3.87
FoOw	125.924***	8.268	15.23
DtE	0.308***	0.031	9.83
FS	-0.011	0.107	-0.11
FA	0.151***	0.033	4.55
DSC	-0.137*	0.028	-1.76
DLC	0.178***	0.050	3.56
Within R2			0.358
Probability > F			0.000
F (14, 6)			4.15e+09
Number of observations			2068
Number of groups			210

Significance levels (α) are as follows: * = 10%, ** = 5%, and *** = 1%.

InD = independent directors; **FoD** = foreign directors; **BS** = board size; **GD** = gender diversity; **DI** = directors' interlocks; **DE** = directors' education level; **DPE** = directors' prestigious education; **DEx** = directors' experience; **ConOw** = concentrated ownership; **FaOw** = family ownership; **FoOw** = foreign ownership; **DtE** = debt-to-equity ratio; **FS** = firm size; **FA** = firm age; **DSC** = directors' short- term compensation; **DLC** = directors' long-term compensation

level of significance ($\beta = -0.085$, t -value = -3.87). Family-owned firms typically appoint directors from among family members with low experience, knowledge, and professional experience. Such favouritism gives rise to poor decisions, low efficiency of the board, and limited resources. Last, foreign ownership has a positive and significant impact on FP, supporting H_{21} , with a beta value of 125.924. Similar findings on this relationship have been reported in the literature (Pervan et al., 2012). Foreign owners persuade the managers to be more diligent and to avoid behaviours and activities that undermine the firm owners' wealth creation motivations. The resource dependence theory claims that foreign owners bring numerous resources to firms, including managerial skills, technological knowledge, and access to financial resources.

5.5. Mediation analysis

We conducted mediation analysis using the (Preacher et al., 2007) bootstrap method. The method provides the significance of indirect effects and assumes that no zero is included between the upper and lower limits of the confidence intervals. The command for executing the bootstrap procedure in Stata is "bootstrap r(ind_eff), reps (5000): sgmediation depvar, iv(X) mv(M)", where "depvar" denotes the dependent variable, X the independent variable, and M is the mediator variable. As mentioned earlier, this command was used separately for each mediation effect, with 5000 bootstrap replications. Table 5 presents the results of the mediation analysis.

In mediation analysis, the upper and lower bounds of confidence intervals play a critical role, as mediation will exist if zero is not included between the upper and lower bounds, and will not otherwise. Based hereon, innovation positively mediates the impact of independent directors on FP; hence H_2 is accepted, as the values of the upper (0.0276) and lower (0.0005) bounds do not include zero. Positive indirect effects indicate that external directors' restrictive monitoring and advisory competencies encourage the corporate board to innovate. The indirect impact of foreign directors on FP is also positive and significant; therefore, H_4 is accepted ($\beta = 0.110$, t -value = 2.14). These findings support the claim in the resource dependence theory that foreign directors bring diverse experience and knowledge for effective strategic decision making regarding innovation and enhance FP (Haynes & Hillman, 2010). The indirect effect of board size on FP is positive and significant ($\beta = 0.398$, t -value = 2.12), which supports the acceptance of H_6 . These findings reinforce the proposition in the resource dependence theory that a board is a bank of resources and brings more ideas and skills pursuant to firms' strategic decisions, which ultimately positively impacts firm value.

Moreover, innovation positively mediates the effect of gender diversity on FP; hence, we accept H_8 ($\beta = 0.398$, t -value = 2.12). The hypothesised mediating role of innovation between directors' interlocks and FP could not be demonstrated in this study. Therefore, H_{10} is rejected, while the indirect effect of director's interlocks on FP is positive, in contrast to the direct effect, which is negative and significant. We find that innovation significantly and positively mediates both the effect of directors' education on FP and that of directors' prestigious education on FP. Therefore, hypotheses H_{12} and H_{14} are accepted at the 1% and 5% significance levels, respectively. These results suggest that more significant educational heterogeneity of a board increases the probability of innovation and underpins the importance of knowledge in the innovation process. Consequently, performance rises. Additionally, H_{16} is accepted at the 5% level of significance ($\beta = 0.0044$, t -value = 2.19). These findings indicate that experienced directors possess more knowledge and professional expertise; thus, they have a deeper insight into innovation, enabling them to select highly effective innovative projects with greater positive impacts on firm value (Haynes & Hillman, 2010).

Furthermore, innovation significantly and positively mediates the effects of concentrated ownership and foreign ownership on FP. Hence, H_{18} and H_{22} are accepted at the 5% significance level. These findings are consistent with the agency theory perspective that block holders have incentives to reduce managers' myopic behaviour regarding innovation through strict monitoring, which eventually raises firm value (Choi et al., 2015). Since foreign owners typically come from countries with better developed CG systems, they bring superior technology and marketing knowledge;

Table 5. Mediation Analysis

Variables	Beta	Bootstrap Stand. Error	t-value	Normal-based (95% Conf. Interval)
InD→Inn→MtB	0.014**	0.0069	2.03	0.0276
FoD→Inn→MtB	0.110**	0.0511	2.14	0.0094
BS→Inn→MtB	0.398**	0.1874	2.12	0.0309
GD→Inn→MtB	0.147**	0.0696	2.11	0.0103
DI→Inn→MtB	0.214	0.1414	1.51	-0.0630
DE→Inn→MtB	0.028*	0.0101	2.83	0.0087
DPE→Inn→MtB	0.011**	0.0046	2.37	0.0019
DEX→Inn→MtB	0.0044**	0.0020	2.19	0.0005
ConOw→Inn→MtB	0.0008**	0.0004	2.27	0.0001
FaOw→Inn→MtB	0.0009	0.0004	2.04	-0.0017
FoOw→Inn→MtB	0.0512**	0.0223	2.29	0.0074

Note: Significance levels (α) are as follows: * = 10%, ** = 5%, and *** = 1%.

InD = independent directors; **Inn** = innovation; **MtB** = market-to-book ratio; **FoD** = foreign directors; **BS** = board size; **GD** = gender diversity; **DI** = directors' interlocks; **DE** = directors' education level; **DPE** = directors' prestigious education; **DEX** = directors' experience; **ConOw** = concentrated ownership; **FaOw** = family ownership; **FoOw** = foreign ownership

Table 6. Summary of results

Variables	Direct Effect	Indirect/Mediated Effect
InD	-0.125	0.0141**
FoD	0.361*	0.1097**
BS	8.565***	0.3983**
GD	-1.275**	0.1468**
DI	-1.475*	0.2141
DE	0.119***	0.0284*
DPE	0.449*	0.0110**
DEx	0.159***	0.0044**
ConOw	0.283***	0.0008**
FaOw	-0.085***	0.0009
FoOw	125.924***	0.0512**

Significance levels (α) are as follows: * = 10%, ** = 5%, and *** = 1%.

InD = independent directors; **FoD** = foreign directors; **BS** = board size; **GD** = gender diversity; **DI** = directors' interlocks; **DE** = directors' education level; **DPE** = directors' prestigious education; **DEx** = directors' experience; **ConOw** = concentrated ownership; **FaOw** = family ownership; **FoOw** = foreign ownership

consequently, foreign-owned firms should perform better than their locally owned counterparts (Pervan et al., 2012). Last, the indirect effect of family ownership on FP is not statistically significant in this study. Hence, H_{20} is rejected. A summary of the results is presented in Table 6.

6. Conclusion and recommendation

In the current innovative business era, rather than solely emphasise traditional agency issues, it is necessary to account for other relevant factors in organisations' performance. Therefore, the main aim of this study was to examine the mediating role of innovation between CG and FP, along with the direct effect of CG. The study emphasised an integrated view of resources and agency issues (i.e. an integrated agency-resource-based view), which has been ignored in previous research. For this purpose, secondary data were collected from non-financial firms listed on the Pakistan Stock Exchange, with a final sample of 210 firms. The empirical results of the current study revealed a significant direct effect of CG on FP.

Additionally, there was also an indirect effect through mediation, which meant that some variables of CG hampered FP. However, the same variables were less harmful or contributed positively when innovation was included as a mediator. For instance, the direct effects of independent directors and gender diversity on FP were negative; however, through mediation, they became positive. In the same vein, family ownership has a negative direct effect but a nonsignificant and positive mediation effect. Moreover, directors' interlocks negatively affect FP, although the variable has no indirect effect. Our findings strengthen the idea of an integrated agency-resource-based view of FP. Such an integrated approach is more comprehensive in examining both aspects (agency issues and resource provision) of CG.

This study has a few important implications: First, it provides an extensive theoretical base for FP studies. This study covers broader aspects of organisational performance by integrating two important theories (agency and resource-based). The use of an integrated theory approach means that firms' utilisation of the resources provided by their agents can alleviate their agency issues. Furthermore, ours is among the few studies to have used a bootstrapping technique to test the indirect or mediation effect; most previous studies used a series of regression mediation methods. Hence, this study provides significant methodological guidance for future researchers.

Some managerial implications for stakeholders follow from the study. First, we found that few independent directors on a board worsen the board's ability to effectively supervise the firm. Moreover, independent directors must be offered some equity as part of their compensation, as an incentive for them to focus more on long-term innovative projects. Hence, firms should ensure a sufficient number of independent directors on their boards to increase their efficiency. A diverse corporate board in terms of educational background and gender is constructive for firms. Moreover, there was an excessive number of board interlocks in the sample firms. There is a need for firms to restrict the number of each board member's directorships to enhance their service quality. Additionally, some companies engage females on their boards as a façade against social pressure; such practices hinder females' participation in board decisions, and should be discontinued.

Despite its unique and valuable contribution to the literature and theory, this study collected data on Pakistan's non-financial firms; therefore, the research findings may differ for the financial sector. Rules and regulations vary by country: the implications of the same model may change in another context. For these reasons, the present study can be extended in light of these limitations in the future. Moreover, panel data were used to confirm the proposed model; future studies may consider using cross-sectional data and those from other firms and sectors.

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Data availability statement

The data used in the current study were extracted from published annual reports of selected companies listed on the Pakistan stock exchange. The data are available from the corresponding author upon reasonable request.

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