Name of Publisher: GO GREEN RESEARCH AND EDUCATION
Review Type: Double Blind Peer Review
Area of Publication: Business, Management and Accounting (miscellaneous)

Journal of Business and Management Research
Online ISSN 2958-5074
Print ISSN 2958-5066

Vol. 4, issue.1,2025

Mediating Role of Financial Innovation on Board Gender Diversity and Bank's Financial Performance: Evidence from Commercial Banks of Developing Economies

Sheikh Khurram Abid
Lahore Business School, The University of Lahore, Lahore, Pakistan
Muhammad Akram Naseem*
Associate Professor, Lahore Business School, The University of Lahore, Lahore. Correspondingauthor's email: muhammad.akram@lbs.uol.edu.pk
Muhammad Zain ul Abidin
Lahore Business School, The University of Lahore, Lahore, Pakistan

Abstract

Current literature has revealed the inconsistent results regarding the role of female participants on bank boards and financial performance: some studies find that more female on board has positive effect on the financial performance but on the other hand several studies reflects negative or no effect. The direct impact of gender diversity on bank's financial performance is widely studied but mediating effect of financial innovation on this relationship is rarely examined. In this context, this study aims to bridge this gap as Gender diversity is gaining recognition as an important part of corporate governance team. The study engaged a sample of 456 bank-year observation of 38 banks selected from developing economies over the period from 2011 to 2023. To test the research hypothesis and mediation analysis, and to control for endogeneity issues, the Generalized Method of Moments (GMM) estimation was applied. The studied report a significant impact of gender diversity on ROA and ROE separately considering three controlling factors namely, asset quality, leverage and capitalization. Further, financial innovation partially mediates the link between gender diversity and financial performance. The results contribute to the existing knowledge regarding effectiveness of inclusion of female board members and their impact on financial performance of banks in the context of developing economies namely Pakistan, Bangladesh, Indonesia and Malaysia. Moreover, this study tries to connect the empirical findings with governance theories for highlighting the role of board gender diversity in determining the performance of banking sector of developing countries that will facilitate decision makers and bank authorities to analyse the contribution of women board members in enhancing bank's performance.

Keywords: Board Gender Diversity, Financial Innovation, Financial Performance, Developing Economies, GMM

Introduction

In the rapidly evolving financial landscape, the composition of corporate boards has emerged as a critical factor in shaping the strategic direction and performance of banks. Board characteristics have consistently attracted significant research attention as a crucial component of corporate governance. Recently, the gender diversity of corporate boards has become a prominent area of academic inquiry (Wang et al. 2024). Incorporating greater gender diversity and the presence of more women among board members can potentially enhance organizational value (Mohammad, 2018) enhance a firm's effectiveness by providing a deeper understanding of stakeholders' needs,

which improves risk management and overall business practices. Additionally, decision-making could benefit from the introduction of new ideas and diverse perspectives during board and executive management meetings. On one hand where bank performance is highly impacted by corporate governance (Ma'aji, 2021; Bhatia and Gulati 2021; Habtoor, 2021) but on the other hand, bank performance could be improved by earning income in shape of bank fees by offering value added banking products and services through innovation to their customers (Wang and Cao, 2022). Literature revealed that organization's willingness to involve in financial innovation depends upon its corporate governance and effective corporate governance mechanisms enhances innovation performance (Chi 2017; Balsmeier et al. 2017; Xiao and Zhao 2012). The theoretical link between gender diversification on corporate boards and financial innovation highlights the significant role that diverse perspectives and governance practices play in fostering an innovative culture within banks. As commercial banks in developing economies strive to adapt to competitive and dynamic markets, understanding the interplay between board gender diversity, financial innovation, and bank performance becomes crucial.

By examining the mediating role of financial innovation in the relationship between board gender diversity and bank performance, this research aims to shed light on the mechanisms through which gender diversity can contribute to improved financial outcomes in commercial banks of developing economies. Using Return on Assets (ROA) and Return on Equity (ROE) as indicators of bank performance, and measuring financial innovation through the value of ATM (VATM) transactions, this research attempts to provide empirical evidence on how gender diversity on boards can drive financial innovation and, consequently, enhance bank performance. The analysis also considers three critical control variables: asset quality, leverage, and capitalization. The findings reveal a significant impact of gender diversity on both ROA and ROE, with financial innovation playing a partial mediating role. These results underscore the importance of including women on boards, not only for enhancing governance practices but also for driving innovative financial solutions that improve performance.

The study contributes to the growing body of knowledge on corporate governance by linking empirical findings with governance theories, thereby offering valuable insights for decision-makers and bank authorities in developing economies such as Pakistan, Bangladesh, Indonesia, and Malaysia. This research underscores the

strategic value of gender diversity in boardrooms and its potential to shape the future of banking in developing regions.

The reminder of the paper is structured as follows. Section 2 presents the theoretical foundation, reviews relevant literature and discusses the hypothesis development. Section 3 elucidates description of the research design. Section 4 provides the empirical results, discuss their implications. Section 5 gives conclusion with final remarks and recommendations for future research.

Theoretical Foundation, Literature Review and Hypotheses Development

The theoretical foundation linking gender diversification on corporate boards to financial innovation can be explained through several key perspectives:

Agency Theory

Agency theory is most prevalent theoretical perspective in corporate governance and connected with the ownership and control (Warrad and Khaddam, 2020). Agency theory states that a corporation with superior governance should perform better and be valued higher due to lower agency costs.

The division between control and ownership in firms gives rise to agency issues. gender-diverse boards may better align the interests of management and shareholders by promoting transparency, accountability, and robust governance practices. Gender diversity on boards brings fresh perspectives and valuable guidance to top executives, leading to improved decision-making, problem-solving, and enhanced firm performance (Amin et al. 2022). Women directors often advocate for more thorough scrutiny and better governance standards, which can facilitate the adoption of innovative financial technologies that improve operational efficiency and customer satisfaction. This alignment of interests can motivate banks to invest in financial innovations that ultimately enhance performance.

Resource-Based View (RBV): The Resource-Based View posits that diverse boards, including gender diversity, bring unique resources, skills, and perspectives to the organization. Women on boards often contribute different viewpoints, risk appetites, and innovative thinking, which can lead to enhanced problem-solving and creativity. This diversity in thought and experience can foster an environment conducive to financial innovation, as diverse teams are more likely to explore and implement novel ideas, such as the adoption and expansion of ATM banking services.

Board Gender Diversification and Bank Performance

Several country specific analysis and multi-country investigations indicate the beneficial impact of gender diversity on corporate performance. Zelechowski & Bilimoria (2004) and Bart & McQueen (2013) explored that female directors perform their duties with more dedication and commitment. Author further revealed that improvement in financial performance is anticipated when more gender diverse BOD exists as his study conducted on Islamic banks of Malaysia and Indonesia. Unlike European countries, representation of females in corporate boards of Asian countries appears limited due to local traditions and cultural differences (Jabari and Muhamad, 2020). However, it is still to be explored weather board diversity increases firm performance. In several empirical and theoretical studies, mixed findings regarding association between gender diversity and financial performance are revealed (Bhatia and Gulati, 2021). Mohammad (2018) examined the effect of gender diversity on the financial performance of banks and found an insignificant result. Fan et al. (2029) and Owen & Temesvary (2018) found non-liner relationship of gender diversity on bank board and performance. However, several authors found positive impact of board gender diversity on firm's performance (Wang et al. 2024; Alshirah et al. 2022; Baselga-Pascual & Vähämaa, 2021). A systematic review by Hazaea et al. (2023) found that gender diversity on boards enhances financial performance by bringing diverse perspectives and problem-solving approaches.

In the light of the literature review, we proposed our first hypothesis;

Hypothesis H1: Board gender diversity has positive impact on bank's financial performance

Board Gender Diversification and Financial Innovation

According to Tufano (2003) "financial innovation is the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets". Chishti and Sinha, (2022) refers financial innovation as innovations in the financial products and services for improved administration of financial risk, transferring risk and proficient management of credit and liquidity. Studies consistently show that gender-diverse boards and management teams are linked to higher levels of innovation and financial performance in organizations (Hazaea et al. 2023; Teruel & Segarra, 2017).

Vafaei et al, (2021) studied the effect of board female contribution in Australian firm's innovation and found a significant and positive association between female

director contribution and firm innovation activity. Del Mar Fuentes et al. (2023) reported the similar results and concluded that gender diversity on the level of board of directors impacts inclusive innovation. Griffin & Xu (2021) in their study of board gender diversity and corporate innovation revealed that gender diverse boards leads to more innovative cultures and having traits that are conducive to improved innovative performance. Similarly, research by Teruel and Segarra (2017) highlights that gender diversity positively influences various innovation outputs, including product, process, marketing, and organizational innovations. Based on the studies, we propose that;

Hypothesis H2: Board gender diversity has positive impact on financial innovation.

The Mediating Role of Financial Innovation on the Relationship between Board Gender Diversity and Bank's Financial Performance

Innovation has also considered as intervening in relationships that effect financial performance. Oláh et al. (2021) proposed innovation as a mediating variable, improving a positive correlation between inter-organizational trust and financial performance. R.Sari et al. (2020) measured the indirect effect of process innovation on the association between environmental management accounting and organizational performance.

Agency theory supports the interrelation between corporate governance and financial innovation as shareholders from different perspectives have different preferences and interests with respect to financial activities of the bank (Wang & Cao, 2022). On the other side, researchers proposed that the financial innovation has positive impact on bank's performance. (Wang and Cao 2022; Liu, 2019; Chang, 2017). Financial innovation gives banks a strategic advantage to remain competitive in market (Zouari-Hadiji, 2021) and brings cost reduction which increase profits and shareholder's wealth. Protecting and maximizing shareholder's wealth is a vital function of corporate governance under agency theory which indirectly works behind on the mediating impact of financial innovation and its relationship with bank's performance. Further, financial innovation enhances firm's resources and capacity to deliver banking products and services through innovative, cost reduction and efficient channels which ultimate contribute in profits and this phenomenon is supported by resource based theory.

Arthur, (2017) explored that automated teller machines (ATMs) is considered as major and specific financial innovation (Barman et al. 2022; Arthur, 2017) widely used by financial institutions for its two main functionalities such as to dispense cash

from account of depositors and transfer of funds from one account to another account within and between financial institutions. The ATM, which is one of the process innovations in payment system technologies with focus on reducing transaction expenses (Ejinkonye and Okonkwo, 2021; Chipeta and Muthinja, 2018; Arthur, 2017; Tufano, 2003), is selected as proxy to measure financial innovation as significant innovation in financial service industry. Further, Effiom and Edet, (2022); Nazaritehrani and Mashali, (2020) has studied automated teller machines (ATM's) as innovative channel and its impact on development of E-Banking in developing countries.

Hasan et al, (2013) finds evidence that ATM has a positive effect on bank performance. Therefore, adoption of financial innovation can mediate the relationship between board gender diversity and bank's performance, so the proposed hypothesis is:

Hypothesis 3: Financial Innovation mediates the relationship between board gender diversity and bank's financial performance

Research Design

Research is conducted in research centre at Lahore Business School, The University of Lahore. The research centre is equipped with all facilities required for academic research. The quantitative research approach and positivist paradigm is applied which is most likely used in finance studies to verify the theories by developing and testing hypothesis. The study has adopted a descriptive and analytical research design which involves gathering of secondary data. The study implemented deductive approach rather than inductive. Further, correlational research design is adopted to tests the relationships between variables (Cresswell, 2008).

Sample Selection and Data Collection

Non-probability sampling method is applied which involves non-random selection based on the availability of data for the time frame of the banks belongs to selected developing countries such as Pakistan, Bangladesh, Indonesia and Malaysia. The panel data technique is applied due to the nature of the data that involves combination of cross section and time series which included 38 commercial public and private banks from four developing countries having similar corporate governance data, similar banking procedures, products and service in practice and shared the similar banking laws. The time frame of data is 13 years from 2011 to 2023. Total 456 observations were collected after omitting the record of banks with missing data and

outliers to develop data set for analysis. The Bloomberg data stream was used to collect financial data of banks. The bank's annual reports were obtained from their respective official websites for corporate governance data.

Variable Measurement and Model Specification

Explanatory Variable

Board gender diversity is the independent variable which is measured through ratio of female director on the board, calculated by dividing the number of women directors by the total number of directors (Wang et al. 2024). Amin et al (2022) has adopted the similar measure that is proportion of female director on board.

Mediating Variable

In this study we consider ATM a proxy measure which is widely used in the empirical literature. ATM is measured through value of ATM transactions by each bank in each year.

Dependent Variable

Financial performance of banks is measured through ROA and ROE. Return of Assets (ROA) is one the financial ratio commonly used proxy of bank performance (Chen et al. 2018; Chalabi, 2020; Bhatia and Gulati, 2021; Adam, 2014) and is measured as "ratio of Net Income to Total Assets" and describes how efficient is a bank to utilize its assets for generation of income. Return on equity (ROE) is another most standard measure to assess the financial health of banks (Adam, 2014; You, 2020). Return on Equity measures the rate of return on resources provided by shareholders. It gives the rate of return on resources provided by shareholders. A higher ration is beneficial for shareholders.

Control Variables

To fulfil the purpose of this study, control / extraneous variable is introduced. Extraneous variables are also called nuisance variables or confounding variables that can obscure the link between the independent variable and dependent variable or highlight that there is a causal link between them when none exists (Flannelly et al. 2014). In order to keep the study variables as constant as possible, researchers try to control the extraneous variables by controlling the conditions of the experiment environment. Liquidity, Asset quality and Capitalization are used as bank specific control variables that have already been used in researches (Chalabi (2020), Amidu and Wolfe, (2013); Chalabi, (2020). Asset quality is measure by the ratio of non-

performing loans / total assets, high ratio shows lower asset quality (Islam and Rana, 2017; Chalabi, 2020).

Table 1: Variable Measurement and Definition

Nature	Variable	Symbol	Measure	Source
Dependent Variable	Return on Assets	ROA	Calculated as a ratio of Net Income to Total Assets	Sakawa and Watanabel (2018);Butt,(2021);El Khoury, (2023); Khamees, (2023)
	Return on Equity	ROE	ROE is calculated by profit after tax divided by total equity shares at the end of the year	Adam, (2014); Akhisar,(2015); Gupta and Mahakud, (2020); Thaker et al. (2022); Bhatia and Gulati, (2021).
Independent Variable	Board Gender Diversity	BGD	Calculated by dividing the number of women directors by the total number of directors	Wang et al. 2024, Amin et al. 2022, Jabari and Muhamad, (2020); Gulati, (2021);
Moderator	VATM	lnVATM	The natural logarithm of value of ATM transactions	Barman et al. 2022; Arthur, 2017
Control Variables	Leverage	LEV	Total loans / total deposits	Ali et al. (2022), Alam, Ramachandran and Nahomy, (2020)
	Asset Quality	AQ	Ratio of non-performing loans / total assets	Islam and Rana, (2017); Chalabi (2020).
	Capitalization	lnCAP	The natural	Amidu and Wolfe,

	logarithm of Ratio (CAR) of total equity / total assets	(2013); Chalabi, (2020).

The models: To test for the mediating effect, the model proposed by Baron and Kenny was adopted. This approach, with the objective to test the mediation effect, is implemented through several hierarchical regressions (Zouari & Abdelmalek, 2020: Dzombo et al. 2018). It is three step process and significance of coefficient is examined at each step. However, in order to apply mediation analysis certain conditions must be fulfilled; in step 1, there should be a significant effect on the regression between the independent variables and dependent variables. In step 2, there should be a statistically significant relationship between the independent variable and mediating variable (the parameter regression analysis). In step 3, independent variables in combined with mediating variables is assessed collectively with dependent variables and regression analysis and mediating variables should be proved statistically significant for dependent variables (Jin & Lee, 2020)

Model 1: Effect of Board Gender Diversification on Financial Performance

The first step is to test the predictor effect (independent variable) on the criterion (dependent variable). This step covers the following hypothesis of the study;

H1: Board gender diversity has positive impact on bank's financial performance"

H1a: $ROA_{it}=\beta_0+\beta_1 BGD_{it}+ \beta_2 LIQ_{it}+\beta_3 LEV_{it}+\beta_4 AQ_{it}+\epsilon_{it}$ (1)

H1b $ROE_{it}=\beta_0+\beta_1 BGD_{it}+ \beta_2 LIQ_{it}+\beta_3 LEV_{it}+\beta_4 AQ_{it}+\epsilon_{it}$ (2)

Model 2: Effect of Board Gender Diversification on Financial Innovation (Mediator)

The second step is to test the independent variable on the mediating variable

H2: Board gender diversity has positive impact on financial innovation.

$$\ln VATM_{it}=\beta_0+\beta_1 BGD_{it}+ \beta_2 LIQ_{it}+\beta_3 LEV_{it}+\beta_4 AQ_{it}+\epsilon_{it} \quad (3)$$

Model 3: Combined effect of Board Gender Diversification and Financial Innovation (Mediator) on Financial Performance

The third step is to test the predictor effect (independent variable) and mediating effect on criterion variable (dependent variable). This step covers following hypotheses of the studies;

H3: "Financial Innovation mediates the relationship between board gender diversity and bank's financial performance

$$ROA_{it}=\beta_0+ BGD_{it}+\beta_2 lnVATM_{it}+\beta_3 LIQ_{it}+\beta_4 LEV_{it}+\beta_5 AQ_{it}+ \epsilon_{it} \quad (4)$$

$$ROE_{it}=\beta_0+\beta_1 BGD_{it}+\beta_2 lnVATM_{it}+\beta_3 LIQ_{it}+\beta_4 LEV_{it}+\beta_5 AQ_{it}+\epsilon_{it} \quad (5)$$

Return on Asset (ROA) and Return on Equity (ROE) is proxy of our dependent variable. Board Gender Diversity (BGD) is independent variable. β_1 is the coefficient of BGD, β_2 is the coefficient of lnVATM a proxy of mediator. Control Variables are also included in the study which are Liquidity (LIQ), Leverage (LIV) and Asset Quality (AQ). B_{3-5} are the regression coefficient of control variables. Whereas $_i$ represents the industry and $_t$ represents as time and ϵ is the error term.

Results and Discussion

Descriptive Statistics

The data was analysed by using stata as analysis tool. The descriptive statistics are shown in Table 2 which gives the descriptive view of the variables by showing the number of observations (N), mean (M) standard deviation (SD), minimum (Min) and maximum (Max) for all variables. The table reveals that mean of BGD is 0.097. it is pertinent to mention that BGD varies greatly between the banks having minimum BGD 0 to maximum 0.571. The high variation exhibits that some banks keep their BGD large give more opportunities to female directors monitor the management to protect shareholder's interest. The more number of female directors shows that banks engage more female directors to get benefit from their knowledge, expertise and experience to safeguard interest of shareholders. The mean of ROA, ROE Liquidity, Asset Quality and log of Capitalization is 0.011, 0.121, 0.037, 0.575 and -2.332 respectively.

Descriptive Statistics

Table 2 Variable	**Obs (N)**	**Mean (M)**	**Std. Dev. (SD)**	**Minimum (Min)**	**Maximum (Max)**
BGD	494	.097	.104	0	.571
lnVATM	494	5.77	3.938	-2.305	14.16
ROA	494	.011	.007	-.022	.04
ROE	494	.121	.065	-.261	.457
AQ	494	.037	.04	.003	.322

LIQ	494	.575	.177	.11	1.966
lnCAP	492	-2.332	.488	-3.814	.082

Note. The table reports number of observations (N), mean (M), standard deviation (SD), minimum (Min), and maximum (Max) of all the observations used in the study.

Pairwise Correlations

Table 3

Variables	**BGD**	**lnVATM**	**ROA**	**ROE**	**AQ**	**LIQ**	**nCAP**
BGD	1.000						
lnVATM	0.041	1.000					
	(0.368)						
ROA	-0.039	0.627	1.000				
	(0.384)	(0.000)					
ROE	-0.071	0.196	0.696	1.000			
	(0.113)	(0.000)	(0.000)				
AQ	-0.137	-0.395	-0.424	-0.355	1.000		
	(0.002)	(0.000)	(0.000)	(0.000)			
LIQ	0.253	0.326	0.214	-0.118	0.015	1.000	
	(0.000)	(0.000)	(0.000)	(0.008)	(0.745)		
lnCAP	0.100	0.642	0.598	-0.024	-0.352	0.386	1.000
	(0.027)	(0.000)	(0.000)	(0.591)	(0.000)	(0.000)	

Correlation Matrix

The table 3 presents the pairwise correlation coefficients between variables along with their significance levels (p-values in parentheses). According to the analysis BGD is having very weak positive correlation not statistically significant with lnVATM, very weak negative correlation not statistically significant with ROA & ROE, weak negative correlation statistically significant with AQ, weak positive correlation statistically significant with LIQ and very weak positive correlation statistically significant with lnCAP. Further, lnVATM is having strong positive statistically significant correlation with ROA, weak positive correlation statistically significant with ROE, moderate negative correlation statistically significant with AQ and LIQ, strong positive correlation statistically significant with lnCAP. Moreover, ROA is

having strong positive correlation statistically significant with ROE & lnCAP, moderate negative correlation statistically significant with AQ, weak positive correlation, statistically significant with LIQ. Similarly, ROE is having moderate negative correlation statistically significant with AQ, very weak negative correlation statistically significant with LIQ, very weak negative correlation not statistically significant with lnCAP. In summary, a p-value less than 0.05 indicates a statistically significant correlation. In your data, correlations involving lnVATM, ROA, ROE, AQ, LIQ, and lnCAP are mostly significant with each other, highlighting strong or moderate linear relationships among these variables. The correlations between BGD with lnVATM, ROA, ROE and AQ, LIQ with AQ do not show significant relationships, indicating weak or non-existent linear relationships.

Table 4	**Model 1**		**Model 2**	**Model 3”**	
VARIABLES	**ROA**	**ROE**	**lnVATM**	**ROA**	**ROE**
Lag of DV	0.389***	0.475***	0.992***	0.452***	0.538***
	(0.038)	(0.040)	(0.007)	(0.025)	(0.037)
Independent Variable					
BGD	0.002**	0.079***	-0.474***	0.001**	0.061***
	(0.001)	(0.012)	(0.045)	(0.001)	(0.010)
Mediating Variable					
lnVATM				0.001***	0.008***
				(0.000)	(0.002)
Controlling Variables					
AQ	-0.022***	-0.163	-4.787***	0.008	0.055
	(0.008)	(0.129)	(0.788)	(0.006)	(0.100)
LIQ	-0.014***	-0.246***	0.694***	-0.013***	-0.194***
	(0.001)	(0.028)	(0.066)	(0.001)	(0.010)
lnCAP	0.007***	0.021***	-0.452***	0.004***	-0.012**
	(0.000)	(0.007)	(0.022)	(0.000)	(0.006)

Constant	0.031***	0.250***	-1.039***	0.020***	0.088***
	(0.002)	(0.030)	(0.128)	(0.001)	(0.026)
Observations	455	455	455	455	455
Number of PANEL	38	38	38	38	38
AR(2): p-value	0.524	0.178	0.652	0.432	0.129
Hansen's J: p-value	0.935	0.948	0.962	0.997	0.999
No. of Instruments	57	57	57	68	68
P-value	0	0	0	0	0

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1, Year Effects: Yes

Table 5: Hypotheses Acceptance and Rejection Test

H. No	Hypothesis	Relationship	Coeff.	P-Value	Sig.	Decision
H1a	Board Gender Diversity has positive and significant impact on Financial Performance (ROA)2	IV → DV BGD → ROA	0.002	p<0.01	Sig. +	Accepted
H1b	Board Gender Diversity has positive and significant impact on Financial Performance (ROE)	IV → DV BGD → ROE	0.079	p<0.05	Sig. +	Accepted
H2	Board Gender Diversity has positive impact	IV → MED	-0.074	p<0.01	Sig./ Negative	Rejected

	on financial innovation.					
H3a	Financial Innovation mediates the relationship between board gender diversity and bank's financial performance (ROA)	IV →MED → DV BGD →lnVATM→ROA	0.001	p<0.01	Sig./ Partially Mediate	Accepted
H3b	Financial Innovation mediates the relationship between board gender diversity and bank's financial performance (ROE)	IV →MED → DV BGD →lnVATM→ROE	0.008	p<0.01	Sig./ Partially Mediate	Accepted

The table 4 presents the results of GMM analysis, examining the impact of Gender Diversity (BGD) on bank performance (ROA & ROE) with the mediating effect of financial innovation (lnVATM). Model 1 shows that BGD has positive and significant impact on ROA (0.002 with significance level 5%) and ROE (0.079 with significance level 1%) suggesting that greater gender diversity leads to increase in financial performance of banks. In model 2, we check the impact of BGD on mediating variable lnVATM and found that it has negative but strong significant impact on lnVATM suggesting that greater gender diversity is associated with a decrease in lnVATM. The BGD has negative but significant effect on lnVATM which in contrary to our hypothesis H2 which states that board gender diversity positively affects bank performance has been rejected based on the data. This negative significant effect suggests that the inclusion of gender diversity may have complex impacts not initially

anticipated. In some developing countries, cultural norms and gender biases might hinder the positive impact of gender diversity, further limited resources and support for diversity programs might prevent the full realization of their benefits.

Model 3 represents the mediating effect of financial innovation. From the above table, the differences in the regression results before and after introduction of mediating variable financial innovation has played a critical role on the relationship between board gender diversity and bank's financial performance in the developing economies. The analysis of the coefficients of BGD and ROA gives evidence of partial mediation and the effect is significant at 1 % significant level. Similarly, the analysis of the coefficients of BGD and ROE shows partial mediation and the effect is significant at 1% significance level. This implies that hypotheses H2a and H2b which stated that VATM mediated the relationship between BGD and ROA, between BGD and ROE were supported.

In summary, the financial innovation (lnVATM) plays a crucial role in enhancing the positive impact of gender diversity (BGD) on bank performance metrics like ROA and ROE. Specifically, while gender diversity directly improves both ROA and ROE, the inclusion of lnVATM as a mediating variable highlights a significant pathway through which gender diversity influences performance. Furthermore, the persistence of significant direct effects of gender diversity on both ROA and ROE, even after accounting for financial innovation, suggests that gender diversity contributes to performance improvements both directly and indirectly. These findings underscore the multifaceted benefits of gender diversity on corporate boards, emphasizing the strategic value of fostering both diversity and mediating role of innovation in achieving superior financial outcomes.

Conclusion

This study examined the mediation effect of financial innovation on the relationship between board gender diversity and financial performance of banks. The analysis demonstrated that gender diversity on boards positively impacts bank performance, both directly and indirectly through financial innovation (lnVATM). This dual impact emphasizes the strategic importance of promoting gender diversity and innovation to enhance financial outcomes. Further, this study investigated the link between board gender diversity and financial innovation in developing countries where female directors are under-representing corporate boards and top management positions. In our study, we found that board gender diversity has a negative and significant effect

on financial innovation in developing countries. This contrasts with the literature that generally supports a positive impact. Our findings suggest that cultural norms, resistance to change, and resource constraints might play a role in this negative effect. Further research is needed to explore these factors and develop strategies to harness the benefits of gender diversity in these contexts.

However, the study has some limitations. The dataset focuses on a specific region and banking sector, which may limit the generalizability of the findings to other industries or geographic areas. Additionally, the use of lnVATM as a proxy for financial innovation, while effective, may not capture all dimensions of innovation activities within the banks. The research is limited to developing countries and should be expended to developed countries to have in-depth understanding of board gender diversity in the context of financial innovation.

Future research could address these limitations by expanding the dataset to include multiple industries and regions, providing a broader understanding of the gender diversity-performance relationship. Moreover, incorporating additional measures of financial innovation could offer a more comprehensive view of how innovation mediates this relationship. Exploring other potential mediators and moderators, such as bank type, could also provide deeper insights into the mechanisms through which gender diversity influences bank performance. By addressing these avenues, future studies can build on the current findings and contribute to a more nuanced understanding of the interplay between gender diversity, innovation, and financial performance.

Acknowledgement

We are highly thankful to Miss Tayyaba Rasheed Ahmed, Facility of Business and Law, University of Wollongong, Australia for her support in arranging data from Bloomberg and Refinitiv Data Streams.

Availability of Data and Material

We declare that all data and materials are available.

Competing Interests

We declare that there is no conflict of interest between authors regarding publication of this paper.

Funding

Authors received no financial support for the research.

References

Adam, M. H. M. (2014). Evaluating the Financial Performance of Banks Using Financial Ratios-a Case Study of Erbil Bank for Investment and Finance. *European Journal of Accounting Auditing and Finance Research*, *2*(2), 156–170.

Alshirah, M. H., Alfawareh, F. S., Alshira'h, A. F., Al-eitan, G., Khalid, T. B., & Alsqour, M. (2022). Do Corporate Governance and Gender Diversity Matter in Firm. *Economies*, *10*(84), 1–21.

Amidu, M., & Wolfe, S. (2013). Does bank competition and diversification lead to greater stability? Evidence from emerging markets. *Review of Development Finance*, *3*(3), 152–166. https://doi.org/10.1016/j.rdf.2013.08.002

Amin, A., Rehman, R., & Ali, R. (2022). *Corporate Governance and Capital Structure : Moderating Effect of Gender Diversity*. https://doi.org/10.1177/21582440221082110

Arthur, K. N. A. (2017). Financial innovation and its governance: Cases of two major innovations in the financial sector. *Financial Innovation*, *3*(1).

Arthur, K. N. A. (2017). The emergence of financial innovation and its governance - a historical literature review. In *Journal of Innovation Management* (Vol. 5, Issue 4, pp. 48–73).

Barman, R. D., Hanfy, F. B. A., Rajendran, R., Masood, G., Dias, B., & Maroor, J. P. (2022). A critical review of determinants of financial innovation in global perspective. *Materials Today: Proceedings*, *51*(xxxx), 88–94.

Bart, C., McQueen, G., 2013. Why women make better directors. Int. J. Bus. Gov. Ethics 8 (1), 93–99. 27

Baselga-Pascual, L., & Vähämaa, E. (2021). Female leadership and bank performance in Latin America. *Emerging Markets Review*, *48*(xxxx), 100807. https://doi.org/10.1016/j.ememar.2021.100807

Bhatia, M., & Gulati, R. (2021). Board governance and bank performance: A meta-analysis. *Research in International Business and Finance*, *58*(February 2020), 101425. https://doi.org/10.1016/j.ribaf.2021.101425

Chalabi, F. (2020). The Impact of Innovation on Banking Performance: Evidence from Lebanese Banking Sector. *Journal of Applied Finance & Banking*, *10*(6), 175–202.

Chang, Ruei-Fen. 2017. The Analysis of the Relationship of Financial Innovation and Bank Profitability. Master's thesis, Department of Wealth and Taxation

Management, National Kaohsiung University of Applied Sciences, Kaohsiung, Taiwan. (In Chinese)

Chi, Chen-Yen. 2017. The Effect of Corporate Governance on Financial Innovation—Taiwan's Financial Industry as an Example. Master's thesis, Department of Industrial Management and Information, Southern Taiwan University Science and Technology, Tainan, Taiwan

del Mar Fuentes-Fuentes, M., Quintana-García, C., Marchante-Lara, M., & Benavides-Chicón, C. G. (2023). Gender diversity, inclusive innovation and firm performance. *Sustainable Development*, *31*(5), 3622–3638. https://doi.org/10.1002/sd.2615

Dzombo, G. K., Kilika, J. M., & Maingi, J. (2018). The Mediating Effect of Financial Inclusion on the Relationship between Branchless Banking Strategy and Performance of Commercial Banks in an Emerging market Context: The Case of Kenya. *International Journal of Economics and Finance*, *10*(7), 161. https://doi.org/10.5539/ijef.v10n7p161

Effiom, L., & Edet, S. E. (2022). Financial innovation and the performance of small and medium scale enterprises in Nigeria. *Journal of Small Business and Entrepreneurship*, *34*(2), 141–174. https://doi.org/10.1080/08276331.2020.1779559

El Khoury, R., Nasrallah, N., & Alareeni, B. (2023). ESG and financial performance of banks in the MENAT region: concavity–convexity patterns. *Journal of Sustainable Finance and Investment*, *13*(1), 406–430. https://doi.org/10.1080/20430795.2021.1929807

Fan, Y., Jiang, Y., Zhang, X., & Zhou, Y. (2019). Women on boards and bank earnings management: From zero to hero. *Journal of Banking and Finance*, *107*, 105607. https://doi.org/10.1016/j.jbankfin.2019.105607

Flannelly, L. T., Flannelly, K. J., & Jankowski, K. R. (2014). Independent, dependent, and other variables in healthcare and chaplaincy research. Journal of Health Care Chaplaincy, 20(4), 161-170. doi: 10.1080/08854726.2014.959374

Griffin, D., Li, K., & Xu, T. (2021). Board gender diversity and corporate innovation: International evidence. *Journal of Financial and Quantitative Analysis*, *56*(1), 123–154. https://doi.org/10.1017/S002210901900098X

Habtoor, O. S. (2021). The Influence of Board Ownership on Bank Performance: Evidence from Saudi Arabia. *Journal of Asian Finance, Economics and Business*,

8(3), 1101–1111. https://doi.org/10.13106/jafeb.2021.vol8.no3.1101

Hassan, S. U., Maman, A., & Farouk, Musa A. (2013). Electronic banking products and performance of Nigerian listed deposit money banks. *American Journal of Computer Technology & Application*, 1(10), 138-148

Hazaea, S.A., Al-Matari, E.M., Farhan, N.H.S., & Zhu, J. (2023). "The impact of board gender diversity on financial performance: a systematic review and agenda for future research." *Corporate Governance*, 23(7), 1716-1747.

Islam, M. A., & Rana, R. H. (2017). Determinants of bank profitability for the selected private commercial banks in Bangladesh: A panel data analysis. *Banks and Bank Systems*, *12*(3), 179–192. https://doi.org/10.21511/bbs.12(3-1).2017.03

Jin, S., & Lee, K. (2020). The government R&D funding and management performance: The mediating effect of technology innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(4), 1–13. https://doi.org/10.3390/joitmc6040094

Khamees, B. A. (2023). Information Technology Governance and Bank Performance: A Situational Approach. *International Journal of Financial Studies*, *11*(1), 44.

Liu, Li-Ling. 2019. A Study on the Determinants of Taiwan Commercial banks' Performance. Master's thesis, Department of Finance, National Taipei University of Business, Taipei, Taiwan. (In Chinese)

Ma'aji, M. M., Anderson, E. O., & Colon, C. G. (2021). The Relevance of Good Corporate Governance Practices to Bank Performance. *Journal of Economics and Business*, *4*(2). https://doi.org/10.31014/aior.1992.04.02.343

Mohammad, S. J., Abdullatif, M., & Zakzouk, F. (2018). The effect of gender diversity on the financial performance of Jordanian banks. *Academy of Accounting and Financial Studies Journal*, *22*(2), 1–11.

Muthinja, M. M., & Chipeta, C. (2018). What Drives Financial Innovations in Kenya's Commercial Banks? An Empirical Study on Firm and Macro-Level Drivers of Branchless Banking. *Journal of African Business*, *19*(3). https://doi.org/10.1080/15228916.2017.1405705

Nazaritehrani, A., & Mashali, B. (2020). Development of E-banking channels and market share in developing countries. *Financial Innovation*, *6*(1). https://doi.org/10.1186/s40854-020-0171-z

Oláh, J., Hidayat, Y. A., Dacko-Pikiewicz, Z., Hasan, M. M., & Popp, J. (2021). Inter-organizational trust on financial performance: proposing innovation as a

mediating variable to sustain in a disruptive era. *Sustainability (Switzerland)*, *13*(17). https://doi.org/10.3390/su13179947

Owen, A.L. , Temesvary, J. , 2018. The performance effects of gender diversity on bank boards. J. Bank. Financ 90, 50–63 .

R.C., E., & I.V., O. (2021). Nexus Between Financial Innovation and Financial Intermediation in Nigeria's Banking Sector. *African Journal of Accounting and Financial Research*, *4*(3), 162–179. https://doi.org/10.52589/ajafr-vn7jrc1z

Sakawa, H., & Watanabel, N. (2018). Board structures and performance in the banking industry: Evidence from Japan. *International Review of Economics and Finance*, *56*, 308–320.

Sari, R. N., Pratadina, A., Anugerah, R., Kamaliah, K., & Sanusi, Z. M. (2020). Effect of environmental management accounting practices on organizational performance: role of process innovation as a mediating variable. *Business Process Management Journal*, *27*(4), 1296–1314. https://doi.org/10.1108/BPMJ-06-2020-0264

Teruel, M., & Segarra, A. (2017). "The Link between Gender Diversity and Innovation: What is the Role of Firm Size?" *IRE Review*.

Thaker, K., Charles, V., Pant, A., & Gherman, T. (2022). A DEA and random forest regression approach to studying bank efficiency and corporate governance. *Journal of the Operational Research Society*, *73*(6), 1258–1277. https://doi.org/10.1080/01605682.2021.1907239

TM, A., & Joseph, R.P. (2021). "Gender and firm innovation - A systematic literature review and future research agenda." *International Journal of Entrepreneurial Behavior & Research*, 27(2), 301-333.

Tufano, P. (2003). Chapter 6 Financial innovation. In *Handbook of the Economics of Finance* (Vol. 1, Issue SUPPL. PART A). Elsevier Masson SAS. https://doi.org/10.1016/S1574-0102(03)01010-0

Vafaei, A., Henry, D., Ahmed, K. and Alipour, M. (2021), "Board diversity: female director participation and corporate innovation", *International Journal of Accounting & Information Management*, Vol. 29 No. 2, pp. 247-279. https://doi.org/10.1108/IJAIM-06-2020-0080

Wang, K., Ma, J., Xue, C., & Zhang, J. (2024). Board Gender Diversity and Firm Performance: Recent Evidence from Japan. Journal of Risk and Financial Management, 17(1). https://doi.org/10.3390/jrfm17010020

Wang, L.-H., & Cao, X.-Y. (2022). Corporate Governance, Financial Innovation and Performance: Evidence from Taiwan's Banking Industry. International Journal of Financial Studies, 10(2), 32. https://doi.org/10.3390/ijfs10020032

Warrad, L., & Khaddam, L. (2020). The effect of corporate governance characteristics on the performance of jordanian banks. Accounting, 6(2), 117–126. https://doi.org/10.5267/j.ac.2019.12.001

You, Y., Srinivasan, S., Pauwels, K., & Joshi, A. (2020). How CEO/CMO characteristics affect innovation and stock returns: findings and future directions. *Journal of the Academy of Marketing Science*, *48*(6), 1229–1253. https://doi.org/10.1007/s11747-020-00732-4

Zelechowski, D.D., Bilimoria, D., 2004. Characteristics of women and men corporate inside directors in the US. Corp Gov. 12 (3), 337–34

Zouari-Hadiji, R. (2021). Financial innovation characteristics and banking performance: The mediating effect of risk management. *International Journal of Finance and Economics*, *December 2020*, 1–14.