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Abstract

This paper examines the effect of board gender diversity on bank risk. The empirical analysis is conducted using 21 sample Kenyan commercial banks during the period 2010-2022 in a panel regression framework. Two key results are documented: first, that the share of women in Kenyan bank boards is low (sample average of about 19%), although it has made progress, rising from about 13% in 2010 to about 26% by end of 2022. Second, the paper provides evidence that increasing women directors in banks' boards, curtails excessive bank risk-taking and promotes bank stability. Thus, regulators may consider imposing gender quotas in bank boards as a way of mitigating bank risk.

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1.0 Introduction

Bank risk-taking is a recurrent topic in economic policy debates, especially, after the 2008 global financial crisis. Excessive bank risk-taking has potential for causing a banking crisis which can easily mutate into an economic crisis as witnessed in 2008. For this reason, regulators are often keen to gain a better understanding of what drives bank risk-preferences and more importantly what prudential regulations can ameliorate excessive risk-taking by banks. This paper revisits this recurring debate (on bank risk-taking) that is far from settled (Martínez-Malvar & Baselga-Pascual, 2020).

Menicucci and Paolucci (2021) observes that there has been a recent line of debate on whether having women on banks' boards can be an effective corporate governance mechanism of reducing excessive risk-taking. This line of argument is inspired by a certain strand of cognitive psychology and behavioral economics literature which indicates that there exists gender-based behavioral differences in risk preferences. Particularly, this strand of the literature suggests that women are more conservative and risk averse compared to men, as they exhibit less risky behavior in major strategic and financial decisions (see Croson & Gneezy, 2009 for an extensive survey of this literature). In the context of banking, a testable implication that arises from the growing evidence that women are more risk averse, is that, having more women directors in top management decision making positions will lower the risk profile of banks.

Interestingly, empirical tests of this claim have produced an admixture of results. Some studies indeed show that increasing the share of women in bank boards curtail excessive risk-taking (see for example Mateos de Cabo et al., 2012, Sahay et al., 2017 and Skała & Weill, 2018) while other studies show that women-led banks are actually risk-seeking (see Adams & Funk and 2012 Berger et al., 2014). Still other studies find no relationship between gender diversity and bank risk-taking (Sila et al., 2016). The inconclusive nature of this debate motivates the present study. Specifically, the present study provides supplementary evidence on the relationship between gender diversity and bank risk-taking from the Kenyan banking industry. This is the first study (to my knowledge) that has examined whether increasing women in banks executive boards serves to reduce risk-taking in Kenyan commercial banks..

2.0 Literature review and hypothesis development

On emotions, Croson and Gneezy (2009) point out that a large literature (mainly from psychology) indicate that women experience emotions more strongly than men. More specifically, women report more nervousness and fear in the face of potentially negative situations. Accordingly, women derive lower utility from negative outcomes, and this explains their elevated risk-aversion tendencies.

Additionally, the psychology literature document that, in identical challenging situations, women tend to feel fear while men tend to feel anger (Grossman & Wood, 1993). This literature further argues that when individuals are angry, they tend to positively assess future gambles, while individuals who are afraid, tend to pessimistically assess future risky situations. Thus, emotional perceptions of gambles, provides an explanation of the gender differences in risk attitudes.

Concerning overconfidence, prior literature find that women tend to be less overconfident in their financial decisions (see Niederle & Vesterlund, 2007). The low confidence of women can potentially cause them to be reluctant to accept risky situations. Finally, the challenge-threat view suggested by Arch (1993) posits that there are differences in how men and women respond to a risky situation. Men on one hand, view a risky situation as a challenge that calls for action, women on the other hand, interpret a risky situation as a threat to be avoided. The author argues that these differences spring from the differing motivations between men and women. For example, men are mostly stimulated by challenging, ego-centric environments while women are not.

Although not prominently reviewed by Croson and Gneezy (2009), social psychology literature provides yet another perspective to the gender differences in risk preferences. This perspective, generally referred to in the literature as the approach/inhibition theory of power (AITP), argues that individuals who possess power tend to focus primarily on positive outcomes (approach behavior) while individuals with less power focus their attention on avoiding negative outcomes (inhibition behavior).

Abou-El-Sood (2021) point out that conflict theories view women as the constituent with less power. This gender discrimination, embedded in many societies, stems from the view that access rights to resources tend to be held dominantly by the male gender (Andersen & Taylor, 2006). In the context of risk-taking therefore, the approach/inhibition theory of power would predict that female directors (assumed to be less powerful) will focus on the negative attributes of risky activities hence undertaking less risky strategic decisions, while men (assumed to be more powerful) will focus on the positive aspects of risk-taking and so undertake excessive risk. This leads to the first hypothesis of this study, namely:

H1: Increased women representation in the corporate board leads to decreased bank risk-taking.

Empirical literature on the relation between gender diversity and bank risk-taking has to date produced admixture results. Some results document a negative relation between gender diversity and risk-taking, others show a positive, yet others indicate no relation between these two constructs (see **appendix table 1** for a summary of the literature on this relationship).

Adams and Ragunathan (2017) observe that although an expansive literature suggest that women are risk-averse than men, this could be stereotyping. The authors find that women who choose finance as a career and hence end up in bank boards may be significantly different from women in general population. These authors hypothesize that women in finance are likely to have similar risk aversion levels as the men in finance. Using a large dataset from the U.S banking industry, they fail to reject the hypothesis that there is no risk-aversion differential between women and men in finance. Specifically, the authors show that board gender diversity does not constrain excessive bank risk-taking. Given that their empirical results are at variant with majority of the gender banking literature, they suggest that more research is needed before a consensus can be attained on this debate.

3.0 Data and Methodology

3.1 Sample description

The data sample in this study consist of 21 commercial banks operating in Kenya over the period 2010 to 2022. According to the Central Bank of Kenya (CBK), there were 39 banks operating as at December 2022, 20 of them being private local, 2 being public and 17 being foreign commercial banks. 9 banks controlled 75% of the asset base. Annual banks' balance sheet and income statement was provided by the Kenya Bankers Association. However, data on bank board executives was hand-collected from annual bank reports available on their respective websites. .

3.2 Bank risk-taking measure

Abou-El-Sood (2021) warns that risk-taking is a multifaceted construct and cannot be measured by a single measure. The author further observes that the many proxies of risk-taking documented in prior literature can be considered from two aspects. The first category features the bank's potential of insolvency. Among the proxies considered in this perspective are the Z-score, non-performing loan ratio and asset return variance. The second category considers measures from a regulatory perspective. Drawing directly from the Basel accords, the prominent measures under this category include: the risk weighted assets ratio, capital-asset ratio, and the deposit-loan ratio.

3.3 Board gender diversity measure

To measure the board gender diversity among the bank boards in Kenya, the study follows an expansive prior literature and defines the measure simply as the number of females on boards as a proportion of total board members (see for instance, Menicucci & Paolucci, 2021, Abou-El-Sood, 2021). Alternative measures are adopted to check the robustness of the baseline results.

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3.4 Empirical Model

To examine how gender diversity and economic uncertainty influences bank risk-taking, the following baseline regression model is specified:

$$Risk\text{-}taking_{it}=\alpha_0+\alpha_1\, Gender\ Diversity_{it\text{-}1}+\sum_{j=1}^{n}\beta_j Controls_{it\text{-}1}+\mu_i+\phi v_t+\varepsilon_{it} \quad (1)$$

Where the indices i and t correspond to bank and year, respectively. The outcome variable, risk-taking is multifacted and cannot be captured by a single measure. Therefore, the dependent variable $Risk\text{-}taking_{it}$ is proxied by four measures; non-performing loans ratio (NPL), the Z-Score, deposit to loans ratio (Drisk), and the risk-weighted assets ratio (RWA). The key explanatory variable $Gender\ Diversity_{it\text{-}1}$ is discussed in **section 3.3**.

Several bank characteristics that are hypothesized to influence bank risk-taking are incoporated drawing insights from prior literature. The specific control factors are chosen so as to capture the asset structure, the funding structure as well as the historical performance of a typical bank. Accordingly, the following characteristics are selected; the bank size, measured as the logarithm of total bank assets, the return on assets, bank leverage and the cost to income ratio (as a measure of efficiency). To control for macroeconomic conditions, two further controls are included; the real GDP growth and the inflation rate.

The baseline model (**equation 1**) is estimated by a simple static panel regression. Preliminary tests are conducted to select the model that characterizes the data well. Particularly, the poolability test is conducted to check if a pooled OLS fits the data against the fixed effects or random effects. The study finds that the data is not poolable. In the next stage, a hausman test conducted to select between fixed effect and random effect. The Hausman test reveals that fixed effects is appropriate for the sampled data.

4.0 Empirical Results and Discussion

The main objective of this study is to examine the effect of board gender diversity on bank risk-taking. This section first presents the descriptive statistics, stylized facts, and correlations. Thereafter, the main estimation results are presented and then finally, some robustness checks are provided. The descriptive statistics of the key variables for the entire sample are presented in **Table 1.**

Table 1: Descriptive statistics – Kenyan Commercial Banks (2010-2022)

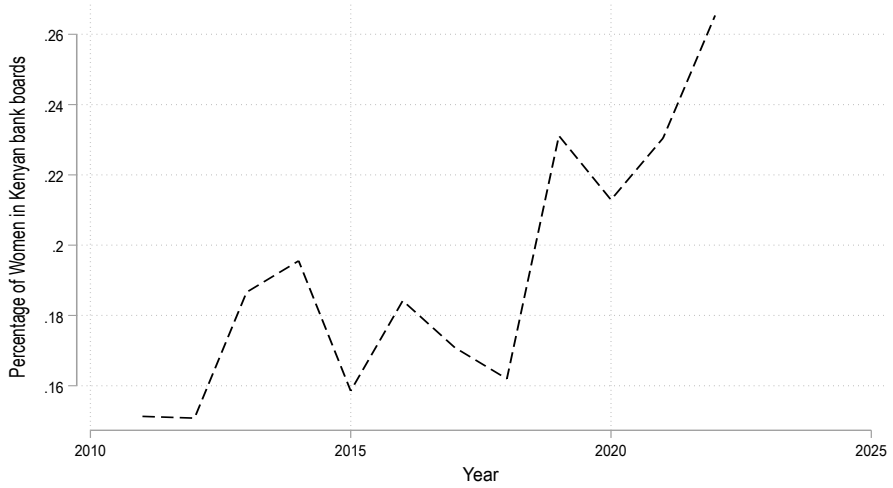
	N	Mean	Median	Min	p25	p75	Max
NPL	196	0.110	0.088	0.010	0.050	0.144	0.450
ZScore	196	3.992	3.889	2.098	3.394	4.428	6.823
Drisk	196	1.433	1.338	0.891	1.206	1.597	2.511
RWA	196	0.720	0.722	0.363	0.626	0.844	0.974
Gender diversity	196	0.192	0.167	0.000	0.095	0.286	0.500
Bank size	196	17.923	17.941	15.431	16.564	19.251	20.533
Return on assets	196	0.028	0.026	0.000	0.013	0.042	0.077
Leverage	196	0.840	0.842	0.716	0.819	0.867	0.913
Cost-to-income	196	0.685	0.668	0.134	0.530	0.828	1.423
Econ. Growth	196	4.516	4.850	-0.250	3.838	5.118	7.517
Inflation	196	7.143	6.297	4.690	5.717	7.660	14.022

The statistics provided in **Table 1** show that the average level of non-performing loans during the period 2010-2022 was about 11% although the ratio ranged from a minimum of 1% to a maximum of 45%. However, the ratio seems to be positively skewed since the mean exceeds the median. This implies that credit risk has been increasing over the sampled period.

Table 1 also reveals that the gender diversity variable (Gender diversity) shows a considerable heterogeneity across banks in terms of board gender composition. The percentage of women directors on boards ranges from 0% to 50%. The average proportion of women directors in Kenyan bank boards is about 19%. Although relatively low, this percentage is better compared to the percent of women who hold bank board seats in Europe and US. For example Mateos de Cabo et al. (2012) show that for a large sample of European banks, women hold a paltry 7.5% of bank board seats while Abou-El-Sood (2021) shows a percentage of 12% for US banks. A notable exception is Russia, where the percentage is about 30% (Davydov et al., 2022) and Italy 31% (Menicucci & Paolucci, 2021).

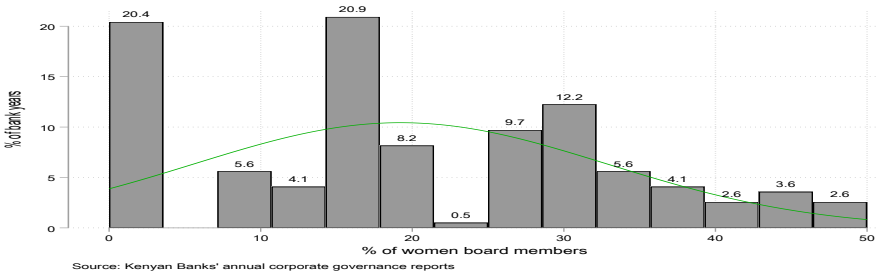
To gain further insights on women participation in executive boards in the Kenyan banking industry, **Figure 1** presents the evolution of the proportion of women directors in bank boards over the period 2010-2022. Notably, the participation of women in Kenyan bank boards has been growing steadily over the sample period. The average annual representation doubled over the sample period (from 13% to about 26%).

Figure 1: Gender diversity in Kenyan bank boards (2010-2022)



Source: Kenyan Banks' annual corporate governance reports

Figure 1: Gender diversity in Kenyan bank boards (2010-2022)



Source: Kenyan Banks' annual corporate governance reports

Figure 2 illustrates the distribution of women representation in executive boards of the sampled banks. The figure shows that about 20% of the sample observations feature zero women representation in executive boards of banks. Further approximately 50% of the banks have between 10% and 30% female board representation. About 18% of the sampled banks have more than 30% of their board members being female.

Table 2 reports the pairwise correlation matrix of the key variables of interest in this study. The correlations are generally low implying that there is no issue of severe multicollinearity. The correlation coefficient between risk-taking and female is negative as hypothesized (H1).

Table 2: Matrix of pairwise correlations of key variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) NPL	1.00										
(2) ZScore	-0.10	1.00									
(3) DRISK	-0.10	-0.08	1.00								
(4) RWA	-0.09	0.01	-0.52*	1.00							
(5) Diversity	0.23*	-0.02	0.16*	-0.14	1.00						
(6) Bank size	-0.29*	0.01	0.01	0.46*	0.04	1.00					
(7) Return on assets	-0.62*	0.09	0.05	0.30*	-0.22*	0.57*	1.00				
(8) Leverage	-0.02	-0.18*	0.07	-0.02	0.02	0.22*	-0.13	1.00			
(9) Cost to income	0.66*	-0.12	-0.28*	0.05	0.08	-0.40*	-0.64*	0.08	1.00		
(10) Econ. Growth	0.03	0.11	0.04	-0.07	0.01	-0.04	0.06	-0.04	-0.08	1.00	
(11) Inflation	-0.20*	0.02	-0.03	-0.20*	-0.10	-0.14	0.17*	0.06	-0.14	0.14	1.00

* shows significance at p<.05

4.1 Baseline panel regression results

The estimation results of model (1) are presented in **Table 3**. Columns 1-4 present the regression results with four risk-taking measures (NPL, ZScore, Drisk, and RWA) taken as the dependent variables. The key independent variable of interest in this study is board gender diversity.

Table 3: The effect of board gender diversity on bank risk-taking

	(1)	(2)	(3)	(4)
	NPL	Z-Score	Drisk	RWA
Gender diversity	-.038	3.583***	.534**	-.177
	(.049)	(1.199)	(.246)	(.128)
Bank size	-.023	-.316	.16	-.068
	(.014)	(.381)	(.148)	(.062)
Return on assets	-.646	3.992	5.523*	-.733
	(.531)	(12.612)	(2.828)	(1.597)
Leverage	-.343	.997	1.043	-.493
	(.226)	(4.225)	(.849)	(.472)
Cost to income	.082*	.903*	.211	-.113
	(.042)	(.433)	(.173)	(.093)
Economic growth	.002*	-.024	-.004	.004
	(.001)	(.054)	(.008)	(.003)
Inflation	-.032**	.278	-.039	.013
	(.012)	(.538)	(.084)	(.038)
Constant	.924**	5.769	-2.466	2.436**
	(.326)	(9.427)	(2.832)	(1.088)
Observations	140	140	140	140
R-squared	.593	.132	.31	.362
Firm Dummies	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes
Standard errors are in parentheses				

*** p<.01, ** p<.05, * p<.1

Table 3 reveals the following results regarding the relationship between gender diversity and bank risk-taking: First, when NPL is used as a risk-taking proxy, the coefficient on diversity is negative although not statistically significant. This would imply that banks with more women on their boards tends to have relatively lower credit risk albeit the evidence is weak. Second, there is a positive and statistically significant (at 1% level) association between the share of women on bank boards and the bank stability measure ZScore. Thus, the evidence suggests that banks with a higher share of women board members are generally more stable, and that an increase in the proportion of women in bank boards is associated with increased measured stability. Third, there is also a positive and significant relationship between share of women in bank boards and Drisk. This result provides evidence that banks with more women in the executive boards tend to be more liquid (as measured by deposit-to-loan ratio). This can also be interpreted to imply that the increase in the share of women in banks' boards reduces excessive risk taking. This would support hypothesis H1 that, compared to men, women tend to be more conservative in risk-taking.

4.2 Robustness Checks

4.2.1 Alternative measures of board gender diversity

To test the robustness of the baseline estimation of model (1), the study replaces the baseline gender diversity measure (number of women in board/total board members) with two alternative measures of gender diversity identified in prior studies. It is worth noting that the traditionally used ratio of women directors to total board members is not truly a gender diversity measure since having 100% women in the board (the maximum number this measure can have) depicts a completely homogeneous board. The alternative measures attempt to capture whether a board is truly gender diverse or not. The two measures capture two key aspects of diversity, that is, variety (whether the board encompasses representatives from each gender) and balance (how equally men and women are represented). A proxy of the 'variety' aspect is the Blau index (Blau, 1977) which is computed as follows:

$$Blau_{it}=[1-\sum_{g}^{G}P_{g}^{2}] \qquad (2)$$

where, P is the fraction of females and males to the total number of board members, and g indexes gender. By construction, the Blau index range between a minimum of 0 for a homogenous board (100% one gender) to 0.5 perfect gender diversity (50-50). Therefore, higher values indicate more gender diversified board.

The other alternative measure of diversity is the SHANNON index which checks on the balance (between men and women) in the board is computed as follows:

$$SHANNON_{it}=-[\sum_{g}^{G}P_{g}\,lnP_{g}] \qquad (3)$$

where is calculated in the same way as in the Blau index. This proxy ranges from 0 (no diversity) to 0.69 (perfect diversity). After replacing the baseline gender diversity proxy with these two alternative measures the regression results of model (1) are

reported in **Table 4**. The results are qualitatively like the baseline estimations. Notably, when gender diversity is measured by the Blau index (which captures the variety aspect of board composition), the results appear to strongly support hypothesis H1, that is, gender diversity is significantly associated with low bank risk. The Shanon index does not appear to have a statistically significant relationship with the sampled risk measures. Taken together, this evidence strengthens the hypothesis that women are risk averse and then to reduce bank risk-taking.

Table 4: The effect of board gender diversity on bank risk-taking

-alternative measures of gender diversity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	NPL	ZScore	Drisk	RWA	NPL	ZScore	Drisk	RWA
Blau index	-.072**	1.748*	.621***	-.303**				
	(.033)	(.98)	(.168)	(.115)				
Bank size	-.02	-.404	.133	-.056	-.017	-.635	.138	-.054
	(.015)	(.411)	(.141)	(.059)	(.015)	(.418)	(.162)	(.062)
Return on assets	-.614	3.283	5.254*	-.600	-.757	7.952	3.636	-.506
	(.522)	(12.666)	(2.664)	(1.503)	(.671)	(12.793)	(2.715)	(1.717)
Leverage	-.345*	.173	.991	-.495	-.384	-2.921	.756	-.728
	(.199)	(4.083)	(.787)	(.44)	(.308)	(5.277)	(1.01)	(.518)
Cost to income	.082*	1.001*	.221	-.114	.046	1.181*	.2	-.091
	(.042)	(.501)	(.172)	(.087)	(.028)	(.604)	(.199)	(.101)
Economic growth	.002**	-.022	-.004	.004	.002**	-.035	-.003	.003
	(.001)	(.055)	(.008)	(.003)	(.001)	(.054)	(.009)	(.003)
Inflation	-.032**	.335	-.033	.011	-.032**	.321	-.023	.022
	(.012)	(.551)	(.079)	(.038)	(.013)	(.56)	(.085)	(.034)
Shanon index					-.027	.945	.609*	-.254**
					(.061)	(1.555)	(.296)	(.119)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	NPL	ZScore	Drisk	RWA	NPL	ZScore	Drisk	RWA
Constant	.886***	7.994	-2.034	2.266**	.872*	14.671	-2.045	2.402*
	(.311)	(9.721)	(2.737)	(1.07)	(.44)	(11.158)	(3.414)	(1.156)
Observations	140	140	140	140	111	111	111	111
R-squared	.606	.096	.332	.394	.567	.129	.315	.309
Firm Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are in parentheses ***** p<.01, ** p<.05, * p<.1**

4.2.2 Endogeneity issues in estimating the relationship between board gender diversity and bank risk-taking.

The gender diversity in the boardroom could be endogenous in the risk-gender regressions for at least two reasons (Sila et al., 2016) . The first reason relates to omitted unobservable factors. Omitted unobservable factors may simultaneously affect both bank risk and selection of female board directors. For example, a bank's desire to act as a responsible corporate entity could influence their risk-taking preferences as well as their choice of board directors. Specifically, banks might prefer to take low risks and appoint more women to their boards as a way of getting higher scores in corporate social responsibility evaluations. In this way, one might observe a negative statistical relationship between risk and gender diversity even in absence of a causal link between these variables. Another example of an unobserved factor that may simultaneously influence risk and the share of women in bank boards is managerial ability.

Hermalin and Weisbach (1998) develop a model that shows that a high ability CEO may have influence on managing risk as well as significant influence on who is appointed to the board. Along this thought, Sila et al. (2016) argues that it is plausible to belief that such a CEO might want to choose board directors who are less likely to hold him to account. Prior empirical literature shows that Women directors tend to be more effective monitors of CEOs and hence it is possible that managerial ability will drive both risk and gender diversity.

The second reason relates to a possible reverse causality between risk and gender diversity. Hermalin and Weisbach (1998) also argue that when a board is unable to judge a CEO's performance especially in risky environment (in which case the market indicators provide only noisy signals) it hires more women who have a reputation for effective monitoring. In this case, risk will influence female director(s) appointment. Alternatively, due to their risk-aversion attitude,

women may self-select to lower risky firms. In both scenarios one might observe a positive link between risk and the share of women in bank boards.

Now, while the problem of unobserved factors is solved by using the panel fixed effects model, the issue of reverse causality cannot be solved by this technique. Moreover, Wintoki et al. (2012) argues that the relationship between corporate governance and bank performance is dynamic in nature. Sila et al. (2016) drawing on Wintoki et al. (2012)'s insight points out that current choice of female directors depend on past realizations of bank risk. Thus, to accurately measure the influence of board gender diversity on bank risk-taking behaviour, a dynamic model that considers the unobserved heterogeneity and reverse causality can be cast as follows:

$$Risk\text{-}taking_{it} = \alpha_0 + \rho Risk\text{-}taking_{it-1} + .\alpha_1 Gender\ Diversity_{it-1} + \sum_{j=1} \beta_{-j}\ Controls_{it-1} + \mu_i + \phi v_t + \varepsilon_{it} \quad (4)$$

To obtain consistent and unbiased estimators of the parameters in **equation (4)**, a dynamic panel GMM estimator is employed. This estimator was first suggested by Holtz-Eakin et al. (1988) but has received improvements since then, notably, by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998).

The estimation strategy consists of two key steps. The first step involves differencing equation (4) to remove any potential bias that may arise from the time-invariant unobserved factors. After differencing the equation, step two involves a GMM estimation using lagged values of the endogenous explanatory variables as instruments for those variables. At least two important tests are often undertaken to ensure validity of the dynamic GMM. The first test relates to serial correlation. By construction, the differencing of **equation (4)** induces a first order serial correlation. However, if the model is dynamically complete, then there should be no second order or higher order serial correlation. So, the first null hypothesis is that there is no second order serial correlation. Failure to reject (p-value $>$ 0.05) this null confirms the dynamic completeness of the model. The second important test in a dynamic GMM is a test of instrument validity. For the lagged explanatory variables to act as instruments for the current values of the explanatory variables, they need to meet two desirable properties: exogeneity and relevance. The null hypothesis in this case is that the instruments are valid. Again, failure to reject this null confirms the validity of the instruments.

The results of the dynamic GMM estimation of model (4) are presented in **Table 5**. The first observation is that the dynamic model appears complete (no second order serial correlation) and the instruments passes as valid.

Table 5: The effect of economic uncertainty and board gender diversity on bank risk-taking (dynamic panel GMM)

	(1)	(2)	(3)	(4)
	NPL	Zscore	Drisk	RWA
NPL (lagged)	.476**			
	(.289)			
ZScore (lagged)		.215**		
		(.267)		
Drisk (lagged)			.454**	
			(.213)	
RWA (lagged)				.464*
				(.245)
Gender diversity	-.028	4.14**	.188	-.115
	(.025)	(1.633)	(.188)	(.087)
Bank size	.002	-.756***	.163*	-.03
	(.003)	(.191)	(.082)	(.043)
Return on assets	-.600**	11.555	3.997	.227
	(.288)	(15.329)	(2.686)	(2.118)
Leverage	-.153	-.209	.865	-.105
	(.118)	(4.132)	(.794)	(.364)
Cost to income	.043	.796	.238	-.131
	(.053)	(.485)	(.142)	(.16)
Economic growth	0.000	.005	-.014*	.007**
	(.001)	(.019)	(.007)	(.003)
Inflation	-.001	-.044	.021***	-.017***
	(.001)	(.034)	(.006)	(.005)
Observations	119	119	119	119

	(1)	(2)	(3)	(4)
	NPL	Zscore	Drisk	RWA
AR (1) test (p-value)	.025	.079	.009	.101
AR (2) test (p-value)	.456	.609	.865	.828
Hansen test (p-value)	.357	.685	.298	.339

Robust standard errors are in parentheses ***** p<.01, ** p<.05, * p<.1**

Second, it is observed that risk measures tend to be persistent since the coefficients of the lagged dependent variables are positive and significant for all the four alternative risk measures. Third, the earlier results on the effect of board gender diversity on bank risk-taking are confirmed. That is, banks with a large share of women in their boards are associated with low risk and higher bank stability.

5.0 Concluding Remarks

This paper examines the effect of board gender diversity on bank risk-taking. The paper makes several contributions. First, it documents the stylized facts on the share of women in bank boards in Kenya; namely that it is low (sample average of about 19%), although it has made progress, rising from about 13% in 2010 to about 26% by end of 2022. Second, the paper provides evidence that increasing women directors in banks' boards, curtails excessive bank risk-taking and promotes bank stability.

The finding that female directors in banks' boards promotes less risky strategies and promotes a stable banking system in line with shareholders' interests implies that regulators can curtail excessive risk taking by imposing gender quotas in executive bank boards.

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Appendix 1:

Literature review matrix table

Gender diversity and risk taking

Gender Diversity Measure	Risk-taking measure	Sample	Methodology	Effect of gender diversity on risk-taking	References
Proportion of women in the bank board	1. Standard deviation of ROA 2. Equity/Total assets	European banks over the period	OLS	Negative	Mateos de Cabo et al. (2012)
Proportion of women in the bank board	1. Risk weighted assets/total assets	German banks over the period 1994-2010	Difference-in-Difference (leveraging on mandatory executive retirements)	Positive	(Berger et al., 2014)
Proportion of women in the bank board	1. Zscore 2. NPL 3. Std. ROA 4. Liquidity risk	Czech Republic Banks over the period 2001-2012	Dynamic GMM	Mixed	(Zigraiova, 2016)
Share of women on boards of directors of banks	1. Z-score (and separately the components) 2. NPL	113 countries across the globe over the period 2003-2012	Panel fixed effects	Negative	(Sahay et al., 2017)
Dummy = 1 if CEO of the bank is female	1. Capital adequacy 2. Equity/assets 3. Zscore 4. NPL 5. Loan Loss Provisions	Polish cooperative banks over the period 2008-2012	Pooled OLS	Negative	(Skała & Weill, 2018)

Appendix 2:

Summary of variables construction

Dependent variable(s)- Risk measures	Description measure	Formula
Non-performing loans (NPL) ratio	The ratio of non-performing loans to total loans	$NPL_{i,t} = \frac{NPLs_{i,t}}{Total\ Loans_{i,t}}$
Z-Score (ZScore)	The measure of a bank's distance from default	$ZScore_{i,t} = \frac{(ROA_{i,t} + ETA_{i,t})}{SDROA_{i,t}}$ Where is ETA = equity/assets ratio and SDROA is the 3-year rolling standard deviation of return on assets (ROA)
	This measure is often referred to as the deposit risk (DRISK) measure. Lower values indicate more risk-taking behavior as more of the deposits are put into risk. It also in a way measures the liquidity preference level.	$DRISK_{i,t} = \frac{Deposits_{i,t}}{Loans_{i,t}}$
Risk weighted risk (RWA)	This is a risk-taking proxy. Constructed by adjusting assets for risk weights by bank regulators.	$RWA_{i,t} = \frac{Risk\text{-}weighted\ assets_{i,t}}{Total\ assets_{i,t}}$
Key explanatory variable		
Board gender diversity	The percentage of women on bank boards	Number of female directors/ total number of board members
Control variable(s)	**Description measure**	**Formula**
Bank size	Bank total assets	$Size_{i,t} = log\ (Total\ assets_{i,t})$

Return on assets		$ROA_{i,t} = \frac{Net\ income_{i,t}}{Total\ assets_{i,t}}$
Leverage		$Leverage_{i,t} = \frac{Total\ Liabilities_{i,t}}{Total\ Assets_{i,t}}$
Cost to income ratio	This is a measure of bank (in)efficiency	$Cost\_income_{i,t} = \frac{Operating\ cost_{i,t}}{Operating\ income_{i,t}}$
Economic growth		GDP growth rate
Inflation		Inflation rate (CPI-based)

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