Dividend policy framework and bank risk-taking in Africa: do women inclusion in governance system offer new insight?

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Abstract

This study examines the role of women included in governance system in explaining the impact of dividend policy framework on the risk-taking of banks, using a panel dataset of 52 African countries over the period, 2006–2020. The empirical outcome confirms that independent women on the board has a lower probability of paying dividend, reduce dividend yield and induce less risk-taking of banks while women in country-level governance position seek to protect the interest of shareholders and subsequently increase the likelihood of dividend payments and risk-taking of banks. The study found that banks that pay dividends face stricter market discipline, which in turn reduces banks' risk-taking. The study found that dividend policy framework generally acts as a complement for risk-taking when independent women are included in corporate boards while it acts as a substitute control device for banks' risk-taking when women are included in country-level governance positions. Based on the net effects, the study found robust and strong evidence to support that the dividend policy framework reduces the risk-taking at higher level of women included in governance system.

Keywords Women inclusion in governance system, Dividend policy, Risk-taking

JEL Classification G3, G32, G35, G38, D46

Introduction

Over the past decade, banks' payout policies have received increased attention with the enactment of banking reforms by regulators to limit the payment of dividends or other forms of distribution when banks are under distress [2, 81, 83]. This implies that when capital in the financial system was depleted during the 2007–2009 global financial crisis, some banks around the world restricted dividend payments, while others continued to pay dividends at the height of the crisis. Thus, the dividend payment decision shifts or changes the relative value of stakeholder claims on banks in times of crisis, hence, reducing the risk-taking activities of banks, as well as enhancing the financial and economic stability [2, 50, 81]. However, the question is, do banks really reduce risk-taking when taking the decision to either pay dividend or not?

In this study, we find out whether dividend policy framework affects risk-taking of banks. On one hand, the debate on the relationship between dividend policy and bank risk-taking has recently attracted research and policy interest [5, 80, 82, 83, 85], yet, these studies provided mixed results. While studies have argued for a negative effect of dividends on bank risk-taking through the dividends-stability channel (see, [27, 51], others have argued for a positive impact of dividend payouts on bank risk-taking [16, 46, 66]. The dividend-stability channel, for instance, can be explained by the fact that banks that pay dividends are compelled to

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borrow money from the financial markets more frequently, which puts them under more external scrutiny and, as a result, limits risk-taking.

A dividend increase typically weakens banks' capital buffers and decreases bank stability due to the dividend-fragility channel, which is caused by the positive impact of risk on the value of deposit insurance and promotes higher risk-taking. Despite the extant literature on dividend-risk nexus [10, 16, 38, 73] from the context of developing and developed economies, on the other hand, the literature is silent on the impact of women inclusion in government system on the dividend-risk nexus.

In addition, the study examines the role of women in the governance system on the impact of dividend policy framework on risk-taking of banks. The issue of women inclusion in governance system has received much attention from practitioners, policymakers and academics [12, 21, 49, 70, 74, 76, 77]. The literature argues in support that women in governance bring varied ideas and expertise [74] that tend to protect the interest of shareholders [21, 47], which affect dividend payment policy [53, 62, 73, 78] and risk-taking behaviours [31, 68]. For instance, the women stewardship theory posits that women embrace a stewardship role, nurture resilience, and shape networks to contribute to the wealth of shareholders [30]. Women in governance roles tend to frequently give greater consideration to the interests of shareholders [3, 4] and thus, increase dividend payout [14, 53]. In addition, gender socialization theory argues that women directors can add valuable resources and perspectives to decision making on the board, resulting in less risk-taking [56, 73]. Interestingly, while studies that investigate women participation in governance are limited and scanty in the context of Africa (see, [6, 7, 63], the few that exist have focused on corporate level governance in single and cross-country studies. Moreover, research on dividend policy and risk-taking has been extensive around the world, particularly in developed and developing markets [33, 48]. The African market has however, in general, seen little of such dedicated inquiry. Given that the goal '5' of the Sustainable Development Goals (SDGs) spells out the call for all economies to "achieve gender equality and empower all women and girls", the role of women in country level governance system can transcend to corporate-level governance in order to achieve a sustainable inclusive governance system and a desirable outcome for maintaining a stable banking system. It will be therefore, informative to policymakers to understand how different measures of women inclusion in governance system, including country-level governance indicators, can influence dividend policy framework and risk-taking of banks.

Following from the above, the significance of the study, thus lies in its contributions to the literature by providing a perspective of the role that women in governance play in the nexus between dividend policy and risk-taking in Africa, considering that most studies were focussed in developed and developing economies, and that corporate governance structures, reforms on women in leadership, ownership structure, and financing decision and risk governance frameworks in most countries and continents function differently. In addition, the debate on the concept of dividend policy and risk-taking in recent developments cannot be overemphasised, and thus, this study attempts to provide new insight into how women included in different levels of governance system influence the dividend-risk nexus in Africa. Drawing from the diverse literature [8, 70, 80], there are possible complementarity or substitutability and interactive effects of women inclusion in governance that impact on the dividend-risk nexus for African countries. Hence, understanding the impact of women in governance system on the dividend-risk nexus is critical and can offer useful policy insight for regulators, practitioners, and policymakers.

Given this background, we offer novel contributions to the literature in several ways. First, the study extends the data by considering alternative measures of women in governance system (independent women on board and country-level indicators of women in governance) to examine how they influence dividend policy framework. It does this by employing the instrumental variable probit regression. Second, the study provides empirical evidence on the effects of women in governance system and dividend policy decision on risk-taking of banks. In addition, it lends support to extant literature by examining how women in governance system affect the impact of dividend policy framework on risk-taking of banks. Lastly, it sheds some insight on the complementarity versus substitutability between dividend policy framework and women in governance for the African context.

The rest of the section is divided into four sections. Sect. "Literature review" presents the literature review of related studies. Sect. "Data and methodology" discusses the data and methodology. The empirical results are contained in Sect. "Empirical results and discussion" and Sect. "Conclusion and policy implication".

Literature review
A significance function of governance encompasses the system and structure by which an organization is controlled and guided, and the mechanisms by which it, and its resources, are held accountable. This study is inspired by theories related to corporate governance, gender diversity, dividend policy and risk-taking. First, we draw

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on the stewardship theory [32] which is more observable in recent studies because stewardship practices and behaviours have a greater tendency to be observed in corporations [40, 44]. Women stewardship complements the knowledge that women serving as stewards want to safeguard the company's assets rather than seeking for their own benefit [30]. Second, resource dependency theory explains the rationale for the board to view women as unique resources that increase the success of the corporation by providing diverse perspectives in terms of ideas, expertise, experience, skills, good relationship skills, and problem-solving techniques for improving decision-making in the governance system [17, 52, 69, 86]. Given this background, it is argued that the women on board, due to their experience, networking and socialization skills, are better able to monitor communication channels and thus, lead to an improved information environment [54, 55]. Additionally, the gender socialization theory contends that women are more kind and socially conscious, conservative, and impressive [26, 34], and thus, their qualities help manage the relationship with stakeholders [57], as well as increasing the likelihood of dividend initiation that induces higher dividend payout ratios for shareholders.

Thus, from the above theories, we deduce that women in governance provide a wide range of views by incorporating different perspectives on boards—which consequently induce a positive impact on dividend payouts [52, 69], yet some studies have shown an opposing result. For example, [60] found a negative correlation between dividend announcements and gender diversity []. We argue that the above-mentioned studies benefit from a distinct empirical methodology, but with a focus on corporate governance at the firm level. Moreover, the mixed findings in the literature could be attributed to the use of gender diversity indicators at different levels (firm level or country level), and that it may be informative to policymakers to understand how corporate-level and country-level indicators of gender diversity can affect dividend policy framework. In view of the theoretical underpinnings under this study, we hypothesize that:

H1   Independent women on board negatively affect dividend policy while country-level women in governance system positively affect dividend policy

Secondly, prior research has used resource dependency theory to demonstrate the impact of board gender diversity for a variety of firm-level outcomes, including financial performance [54, 58] and potential risk-taking behaviour. It explains that companies that include more women on board reflect protection of the interests of different stakeholders, hence a positive relationship between

the presence of women on board and risk-taking [88]. Resource dependency theory posits that female directors conduct more close supervision, attend committee meetings more often, and are more likely to ensure the stability of the banking system. Huang and Kisgen [42] claim that female leaders choose to make fewer investments decision, leading to lower risk-taking. Although some studies argue that female executives have a significant impact on bank stability and risk-taking, these impacts only occur in markets with little competition [13]. Srinidhi et al. [78], Balachandran et al. [18], Ngo et al. [62], Kang et al. [47] provide empirical evidence that the presence of women on the board is beneficial for corporate governance decisions and that female directors tend to give shareholders' welfare more consideration [53] and engage in lower risk-taking behaviours due to the fear of future financial conditions [71, 72].

From a psychological and economic point of view, women are more risk-averse than men. For example, women are more risk-averse and conservative when it comes to investment decisions. Empirical evidence on the impact of board gender diversity on risk-taking is somewhat ambiguous [75]. Although many studies support the claim that greater gender diversity translates into lower risk [39, 41, 59], there are only few studies document that female directors pose more risks [20, 67], and others found no relationship [24, 75]. Based on the discussion above, we argue that the presence of women may not be accepted at all levels of governance and may have different implications for women's willingness to influence risk-taking decisions. Thus, we hypothesize that:

H2   Independent women on board reduces risk-taking of banks while country-level women in governance system increases risk-taking of banks

Thirdly, corporate governance theories assert that dividends are efficient tools for resolving agency issues, specifically the issue of free-cash-flow between managers and shareholders [35]. The free cash flow hypothesis can have positive or negative implications for corporate governance systems in explaining the link between dividend payment policies and bank stability. The free cash flow hypothesis states that a bank that produces a lot of free money will be less disciplined in its investments than a bank that has legal obligations (debts) on which the money must be spent. Thus, if profits are realized, the bank can provide owners with a cash dividend equal to a certain percentage of the profits or capital realized on an investment project. While managers' frequently want to keep free cash flows and spend on negative NPV projects, shareholders prefer that managers pay free cash flow rather than keeping it for their own interest [35],

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thus, affecting the risk-taking behaviours or risk appetite of banks. This creates a dividend-stability channel that negatively impacts the link between dividends and risk-taking. According to Chae et al. [27], dividend payments require banks to borrow money more frequently on the capital markets, which increases outsider scrutiny of directors and lowers banks' risk appetite. In a different sense, Onali [66] argues how the dividend fragility channel has a positive impact on the dividend-risk nexus. Onali [66] demonstrates how the trend for increases in dividend tend to reduce the stability of banks and encourage greater risk-taking through the positive effect of risk on the protection value of bank deposits. Trans et al. [84] examined the impact of dividends on bank stability, based on a sample of US banks. They document that dividend-paying banks reduce risk appetite, but dividend-paying banks become riskier by paying excessive dividends.

Following previous studies, the study is motivated by the dividend-stability channel that dividend-paying banks are less risky than non-paying ones and that stewardship and resource dependency theories are important to explain the dividend-risk nexus. Thus, we hypothesize that:

H3   Dividend policy framework negatively affect the risk-taking of banks

Recently, Ain et al. [8] employ a large dataset over the period 2003–2017 in China, and examine the relationship between gender diversity and dividend payouts. They show that gender diversity on the board facilitates corporate governance and promotes dividend payouts. In addition, [70] used a data panel of 525 Indonesia-listed companies over the period 2011–2018 to examine whether the presence of women on corporate boards of commissioners and boards of directors is associated with greater dividend payments. They found that the influence of women on company boards on dividend policy depends on their role as executive or non-executive on the board. While female directors reduce cash dividend payouts, female directors only increase dividend payouts for family businesses. Chatjuthamard et al. [28] emphasize that companies with more gender diversity on the board provide stronger incentives for managers to take risks. Despite the number of studies that have investigated the relationship between dividend policy, gender diversity and risk taking [8, 37, 61, 87, 89], there are no empirical studies on the role played by women in the governance system in connection with dividend policy and risk-taking behaviour in Africa. In view of that we hypothesize the following:

H4   Women in governance system moderates the negative dividend-risk nexus of banks

Data and methodology

The study uses a panel dataset of 52 African economies from 2006 to 2020. The motivation for selecting the countries and time period is based on data availability at the time of the study.We utilize the baseline model, which is expressed as:

$$\text{Z\_score} = f(\text{Dividend policy framework,} \\ \text{Women included in governance system,} \\ \text{Control variables}) \tag{1}$$

Model specification

We begin by examining the relationship between women in governance system and dividend policy framework. We employ two measures of dividend policy framework including the decision to pay dividend and the dividend yield. This allows us to use both the probit estimation technique and the Two Stage Least Square (2SLS) estimation technique). First, since the dependent variable can only take the values zero (0) and one (1), we first analyze the dividend payment decision's predictive ability using the dynamic panel instrumental variables probit regression approach (ivprobit). Second, we use the 2SLS to explain the effect of women in governance system on the level of dividend payout (dividend yield). The model is specified as follows:

$$\text{Dividend policy framework}_{jt} \\ = \sum_{l=1}^{n} \alpha_l \text{Dividend policy framework}_{jt-i} \\ + \sum_{l=1}^{s} \beta_l \text{Women in governance system}_{jt} \\ + \sum_{k=1}^{N} \beta_k X_{jt} + \delta_j + \mu_t + \beta_{jt} \tag{2}$$

where "subscript j denotes cross-sectional dimension (country specifics), $j=1, …, M$; and t denotes the time-series dimension (time); α is the coefficient of the lag of the dependent variable and $t-i$, $i=1,…, n$, denote the lags of the time-series dimension; β_1 is the coefficient of risk-taking behaviour; β_l, $l=1,…, s$, is the coefficients of the indicators of women in governance system;β_k: $k=1, …, N$, are regression parameters for vector X (control variables) to be estimated; δ_j is the country fixed effect; and μ_t is the time fixed effect t; and ε_{jt} is

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idiosyncratic error term which controls for unit-specific residual in the model for the *jth country* at *period t*."

Measurements: dividend policy framework

Consistent with recent dividend policy literature [8, 65], the dependent variable in Eq. 2 is the dividend policy framework.

The term "dividend policy" describes how banks repay their creditors with capital in the form of dividends and share purchases [9, 45]. Dividend is the total amount of money paid to shareholders [1]. We decompose the dividend policy framework into two proxies in accordance with the works of Ofori-Sasu et al. [64], including: (1) The dividend choice, and (2) the dividend yield. Dividend payout decision is constructed as an index for the banks aggregated in a given country. This is a bank-level data aggregated at the country level and is the policy indicator for the framework that records the banks that pay dividends during the sample period and is constructed as a dummy equal to 1 if, and only if, the dividend-to-earnings ratio is strictly greater than zero (or positive) or otherwise zero(0). The ratio of the dividend per share to the market price per share is used to calculate dividend yield (see, [64]. Data on the dividend-per-share, earnings per share and market value per share (captured in the dividend policy framework) were taken from the collection of banks audited financial reports and the Bankscope database, in addition to the fact books of the different stock markets, including the Johannesburg Stock Exchange, the Nigerian Stock Exchange, the Ghana Stock Exchange, and the Nairobi Stock Exchange. We expect the impact of the dividend payment decision to persist in the short and long term. Therefore, we introduce lag 1, 2 and 3 of the dependent variable in the model. Delays in the dividend payment decision are expected to have different impacts on the actual values of the dividend payment decision. This is possible because a change in policy, such as a financial decision on a dividend, is bound to have multiple effects on the likelihood of a dividend payment decision in the subsequent period. We expect interesting results between the indicators of women in governance system and dividend policy framework.

Women included in governance system

In Eq. 2, women included in governance system is decomposed into two indicators: (1) independent women directors on the board; and (2) women in country-level governance positions.

Independent women directors on the board is a dummy variable equal to 1, if the board has at least one female,

otherwise zero (0). It is an aggregate index of the dummies of women on the board of the banks over the sample. Data on gender diversity was extracted from a compilation of banks' audited annual reports and the Bankscope database. Women in country-level governance position consists of two indicators at the country-level, including *women in government ministry* (measured as an index capturing the proportion of women elected into ministerial position) and women in parliament (measured as an index capturing the proportion of seats held by women elected into parliament). Data on the "proportion of women in ministerial position" and the "proportion of seats held by women in parliament" were retrieved from the World Bank's Gender Statistics database. The index ranges from 0 (no woman in governance position) to 100% (governance positions are all dominated by women). Based on that, we expect either a positive effect of women included in governance system on the decision to pay dividend. A positive relationship suggests that women that seek to strengthen efforts to safeguard shareholders' interests increase the likelihood of dividend payout while the opposite is true for a negative impact.

In the 2nd equation, X is a vector of control variables including; bank concentration (the ratio of a country's three largest commercial banks' assets to all of its commercial banks' assets); bank overheads (ratio of overheads to total assets); credit risk (non-performing loans to gross loans ratio); capital regulation (proportion of risk-adjusted weighted assets to total assets); foreign bank entry (a dummy equal to 1 if there is at least 1 entry of foreign bank into a given country, 0 otherwise); Inflation rate is a country's annual inflation rate; real GDP per capita (real gross domestic product (GDP) per person; institution (calculated as the sum of six indicators: political stability, rule of law, control of corruption, regulatory quality, voice and accountability, and government effectiveness); – taken from the World Governance Indicators). Data are drawn from the Bank's Global Financial Development Database of the World Bank. We expect interesting results for the effect of the control variables on the likelihood of a dividend payout.

Independent and interaction effects of dividend policy framework and women in governance system on the risk-taking of banks

We expand the baseline model in Eq. 1 and analyse the effect of d*ividend policy framework and women in governance system on the risk-taking of banks by employing the dynamic system GMM estimation as specified below:*

We specify our baseline equation as:

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$$Z\_score_{jt} = \alpha_1 Z\_score_{jt-1}$$

$$+ \sum_{l=1}^{2} \beta_l \text{Dividend policy framework}_{jt}$$

$$+ \sum_{l=1}^{3} \beta_l \text{Women in governance system}_{jt} \qquad (3)$$

$$+ + \sum_{k=1}^{N} \beta_k C_{jt} + \gamma_j + \mu_t + \varepsilon_{jt}$$

where "subscript j denotes cross-sectional dimension (country specifics), $j = 1, ..., M$; t denotes the time-series dimension (time), $t = 1, ..., T$ and $t - 1$ denotes a year lag of the time-series dimension; α_1 represents the coefficient of the lag of the dependent variable; , represent the regression coefficients of a vector of two dividend policy framework variables; , represent the regression coefficients of a vector of three indicators of women in governance system; β_k: $k = 1, ..., N$, are regression parameters for vector C (control variables) to be estimated; γ_j is the country fixed effect; and μ_t is the time-fixed effect; and ε_{jt} is idiosyncratic error term, which controls for unit-specific residual in the model for the *banks* in the jth *country* at *period t*."

Measurements: Z_score
In Eq. 3, the Z_score is the dependent variable. Following Tran [83], Chatjuthamard et al., [28], Tran et al. [82], the study employs the Z_score as a proxy for risk-taking of banks. The Z_score (dependent) measures the distance from insolvency, so that a higher Z_score will mean that the bank is more stable but takes less risk. The Z_score (which is the return on assets plus the equity ratio divided by the standard deviation of asset returns) is an inverse measure of the bank's risk appetite and the Z_score data was obtained from the Global Database Financial Development.

As defined earlier, we use the dividend payout decision and the dividend yield as proxies for dividend policy framework. Robustness tests were conducted using these measures. According to the data, the board's policy decision to increase dividend payments is indicated by higher values of the dividend policy variables. We anticipate that the dividend policy factors will have a positive impact on the Z_score, leading to a lower banks' risk-taking. This is consistent with the dividend-stability channel by showing that dividend-paying banks instill discipline in the banking system, which in turn limits banks' risk-taking.

In Eq. 3, the indicators of women included in the governance system are: (1) independent women on the board, (2) the proportion of women in ministerial positions, and (3) the proportion of seats held by women in

Parliament. These variables have already been explained. In Eq. 3, we expect the women included in the governance system to have a positive or negative impact on the Z_score. A positive Z_score effect suggests that women in the governance system take on less risky activities due to their conservative nature, while a negative Z_score effect suggests that women in the governance system are take more risk in the bank.

In what follows, we argue that women in the governance system play an important role in shaping the impact of dividend policies on banks' risk appetite. To capture possible unobserved heterogeneity and the impact of women in governance system on the dividend-risk behaviour, the study specifies the model as follows:

$$Z\_score_{jt} = \alpha_1 Z\_score_{jt-1} + \sum_{l=1}^{n} \Omega_l \text{Dividend policy framework}_{jt}$$

$$+ \sum_{l=1}^{m} \lambda_l \text{Women in governance system}_{jt}$$

$$+ \sum_{q=1}^{p} \delta_q (\text{Dividend policy framework}_{jt}$$

$$* \text{Women in governance system}_{jt}) + \sum_{k=1}^{N} \beta_k V_{jt}$$

$$+ \sigma_j + \theta_t + \mu_{jt}$$

$$(4)$$

where "δ_q : denote the coefficients of the interaction terms between the dividend policy variables and women in governance system; α_1 denotes the coefficient of the lag of the dependent variable in Eq. 4; $\Omega_l, l = 1, ..., n$ represent the coefficients of the dividend policy framework in a country; λ_l: $l = 1, ..., m, r$ epsent the coefficients of women in governance system as defined above; and δ_q is the coefficients of the interaction terms; β_k, k = 1, ..., N are the coefficients of the control variables (for vector V); σ_j is the individual country effects; θ_t is the time fixed effects and μ_{jt} is the composite error term."

Here we argue that dividend policy and women in governance can act as a "substitute" or "complement" in determining banks' risk-taking. In line with Compton and Giedeman [29], we take the interaction coefficient and the sign of the coefficient of the key variable into consideration. For example, the interactions between dividend policy and women's governance variables, which have the same sign as the dividend policy coefficient, suggest that dividend policy is a complement to women in governance in explaining the banks' risk-taking. However, the interactions between dividend policy and women in governance, which contrast with the dividend policy coefficient's sign, suggest that women in governance is a complement for dividend policy to explain banks' risk-taking.

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Furthermore, in interaction regressions, we calculated the net effects before interpreting the results to avoid potential problems mentioned by Brambor et al. [23]. The effects of dividend policy variables are seen as having a conditional marginal impact. Consequently, the dividend policy's impact on the Z_score depends on women in the governance system.

From Eq. 4, the net effect is computed as:

$$
\text{Net Effect} = \frac{\partial Z\_score_{j,t}}{\partial \sum_{l=1}^{n} \Omega_l \text{Dividend policy framework}_{jt}}
$$
$$
= \Omega_l + \sum_{q=1}^{p} \delta_q \left(\text{Women in governance system}_{jt} \right)
$$

(5)

where, Ω_l is the coefficient of the dividend policy variables and δ_q is the coefficient of the interaction terms.

Estimation technique

The study uses a number of diagnostic tests to test the cross-sectional dependence, normality, and multicollinearity in order to improve the reliability, effectiveness, and correctness of the outcome. We use the instrumental variable probit regression model and the Two Stage Least Square (2SLS) in Eq. 2 due to the varying nature of the measures of dividend policy framework. Based on this, we have the opportunity to study the dynamic behaviour of dividend payout probabilities and to address any endogeneity between variables using the dynamic panel instrumental variable probit regression [11]. The instrumental variable probit regression model is preferred if one or more independent variables are endogenous. Estimating this model requires the formulation of the probit regression model which could have inconsistent parameter if the suspected endogeneity problem is not properly addressed. The variables for which instrumental equations were related to the inclusion of women in governance system and dividend policy. Additionally, because the dependent variable has values of 0 and 1, it helps us to analyze the predictability of dividend payments of banks in Africa. Lagging the dependent variable also helps us to control bias from omitted variables. In estimating the effect of women in governance on dividend yield, the study used 2SLS estimation (see [25] to address potential endogeneity and cross-correlation between the error terms. For a robustness check, the study employs the 2SLS, which is used in the analysis of structural equations – especially when the dependent variable's error terms are correlated with the independent variables. In the system of equation, an instrument variable was used to create a new variable by replacing the problematic variable. The lag and lead or future institutional values are considered as instrumental variables. Given that the

minimum eigenvalues were greater than the 2SLS magnitude of the 5% nominal Wald test, this demonstrates that the instruments are not weak [79]. In Eqs. 3 and 4, we use the dynamic system Generalized Methods of Moments Method (SGMM) two-stage dynamic estimator with small sample fits, direct orthogonal deviations, and robust standard errors. This improves efficiency and reduces finite sample biases (see [15, 22]. The GMM solves problems of unobserved heterogeneity that can arise across countries and endogeneity that can arise from bi-causality and measurement errors. The system GMM corrects for any correlation between the unobserved country-specific effect and the difference variables, thus allowing for the use of lagged first difference as instruments for levels; this quality makes it more efficient estimator than the static fixed effect estimator [19]. For robustness purpose, the lm, Pesaran and Shin (IPS) [43] test for stationarity and the Sargan test for over-identification are used to investigate the validity of instruments. Also, to correct for autocorrelation, Arellano and Bond [15] test for serial correlation is conducted.

Empirical results and discussion

Table 1 shows the descriptive statistics of all variables used for the study after winsorizing the extreme values of 1 percent and 99 percent. In this study, the Z_score measures the distance of the bank to the risk of insolvency and captures the risk behaviour of banks. A higher Z_score indicates a more stable banking system and a lower probability of bankruptcy risk and therefore less risk taken by banks. The mean Z_score is 13.91 (see Table 1). Table 1 shows that an average of 38 percent of the banks in our sample have independent women on their boards. The proportion of women in ministerial positions averaged 19.32 percent, and the proportion of women in parliament averaged 19.42 percent. Table 1 shows that banks, on average, 13.3 percent of the banks in our sample pay dividends to shareholders, ranging from 0 (no dividend payment) to 1 (dividend payment), while banks pay average dividends yield of 41.6 percent ranging between − 0.001 percent and 100 percent. We do not report the descriptive statistics of the control variables due to space. In Table 2, we observe "no multicollinearity issues" between the variables (see also Kennedy, 2008), as confirmed by a "mean variance inflation factor (VIF)" of 1.419, which is below the threshold of 10.

Regression results

The regression results show the interrelationship between women in governance system, dividend payout policy and bank risk-taking of banks in Africa. First, the

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Table 1 Descriptive statistics

Variables	Obs	Mean	Std. Dev	Min	Max	*p*1	*p*99
Z_score	659	13.911	7.234	2.176	47.573	3.071	37.863
Independent women on board	877	.379	.485	0	1	0	1
Women in ministry	517	19.318	10.255	0	54.839	3.3	50
Women in parliament	841	19.421	11.538	1.762	63.75	2.863	61.25
Dividend payout decision	877	0.133	0.34	0	1	0	1
Dividend yield	875	0.416	0.446	− 0.001	1	0	1
Bank concentration	571	70.91	18.691	17.164	100	23.024	100
Overhead cost	651	4.162	4.688	0.001	89.423	.661	13.423
Credit risk	728	4.255	3.409	− 0.212	45.3	.596	19.3
Capital regulation	678	12.37	3.272	5.472	16.3	5.472	16.3
Inflation	844	7.496	13.721	− 9.798	324.997	− 1.409	32.905
Foreign bank entry	877	0.456	.239	0	1.045	0	1
Realgdppc	836	7.268	.578	5.53	9.23	5.958	8.97
Institution	796	− .051	.921	− 2.333	1.96	− 1.719	1.848

Z_score (equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns) and it is an inverse measure of bank risk-taking; Dividend Policy framework is measured with dividend payout decision and dividend yield. Dividend payout decision is measured as a dummy equal 1 if the ratio of dividend per share to earnings per share is strictly greater than 0 and 0 otherwise. Dividend yield is measured as the ratio of dividend per share to market price per share; Independent women directors on the board is a dummy variable equal to 1, if the board has at least one female, otherwise zero (0); Women in country-level governance position consists of two indicators at the country-level, including women in ministry (measured as the proportion of women in ministerial position) and women in parliament (measured as the proportion of seats held by women in parliament); It is an aggregate index of the dummies of women on the board of the banks in a given country; Bank Concentration is the industry asset concentration of banks, measured as the ratio of asset of the three largest commercial natural logarithm of total bank assets; bank overhead cost (ratio of overhead cost to total asset); Credit Risk is the ratio of nonperforming to gross loan; capital regulation is the ratio of bank regulation capital to risk weighted assets; inflation rate is the inflation rate per year of a country; real GDP per capita (real gross domestic product (GDP) per capita); Institutions is measured as an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality and voice and accountability) from the World Governance Indicators; Data on these control variables were obtained from the World Bank Global Financial Development database

study examines the effect of women in governance system on dividend payout policy (see Table 3).

Impact of women inclusion in governance system on dividend policy framework

In Table 3, we use the decision to pay dividend by banks (constructed as a dummy) over the sample period as the dependent variable. This allows us to apply the instrumental variable probit regression with the lag values of the dependent variable. We observe that the 1st lag of dividend payout decision reduces the probability of dividend payout in the current year while the 2nd and 3rd lag values of dividend payout decision increases the probability of dividend payout by banks. The implication is that banks reduce the likelihood of dividend payout in the short term but increases the likelihood of dividend payout in the long term.

In Table 3, we find that independent women on the board reduces the likelihood of dividend payout (see model 1). This supports the argument that women are more risk averse, have lower self-confidence than men, and make fewer investment decisions than male executives (see [42]). Thus, independent women on corporate boards are directly involved in oversight responsibility and hence, reduce the likelihood of dividend payment.

This supports the findings of 70, who show evidence that female directors are negatively associated with cash dividend payments. In model 2, the proportion of women in ministerial position increases the likelihood of dividend payout. Similarly, the proportion of seats held by women in parliament increases the probability of dividend payout (see model 3). This implies that women in governance positions at country-level tend to protect shareholders' interests and therefore maximize dividend policies. This supports the women stewardship theory, which is consistent with investor protection theory of 70, who show that in a two-tier system of governance, the presence of women on the board of directors is positively associated with dividend payment policies. Therefore, our results confirm that women in country-level governance have a greater interest in protecting the well-being of shareholders, and hence increases the likelihood of dividend payment (see also, [18, 53, 61, 62, 78]).

In Table 3, we find that our results are robust when dividend yield was used as the dependent variable in the 2SLS estimation. Independent women on the board has a negative and significant impact on dividend yield (model 5). This explains the principle that banks that allow the participation or involvement of women on their board tend to reduce the level of dividend payments.

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Table 2 Pairwise correlations

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Independent women on board	1.07	1.000												
(2) Women in ministry	1.49	0.047 (0.282)	1.000											
(3) Women in parliament	1.47	0.048 (0.165)	0.511 (0.000)	1.000										
(4) Dividend payout decision	1.53	−0.044 (0.198)	0.022 (0.615)	0.064 (0.063)	1.000									
(5) Dividend yield	1.36	−0.048 (0.156)	0.100 (0.023)	0.056 (0.104)	−0.260 (0.000)	1.000								
(6) Bank concentration	1.08	0.078 (0.063)	0.029 (0.593)	−0.039 (0.366)	0.024 (0.566)	0.096 (0.022)	1.000							
(7) Overhead costs	1.13	−0.003 (0.934)	−0.006 (0.906)	0.002 (0.955)	−0.009 (0.812)	−0.091 (0.021)	0.009 (0.836)	1.000						
(8) Credit risk	1.60	0.027 (0.471)	−0.027 (0.556)	−0.040 (0.289)	−0.016 (0.665)	−0.234 (0.000)	0.072 (0.119)	−0.014 (0.743)	1.000					
(9) Capital regulation	2.51	0.088 (0.022)	0.179 (0.000)	0.262 (0.000)	0.024 (0.530)	0.215 (0.000)	−0.093 (0.047)	0.029 (0.509)	−0.293 (0.000)	1.000				
(10) inflation	1.28	−0.030 (0.387)	0.028 (0.534)	−0.063 (0.071)	0.014 (0.683)	−0.071 (0.038)	0.028 (0.506)	−0.053 (0.186)	0.109 (0.004)	−0.118 (0.003)	1.000			
(11) Foreign bank entry	1.35	0.099 (0.003)	0.026 (0.562)	−0.010 (0.772)	−0.110 (0.001)	−0.003 (0.935)	−0.036 (0.395)	−0.089 (0.022)	0.154 (0.000)	−0.014 (0.712)	0.032 (0.347)	1.000		
(12) realgdppc	1.74	−0.082 (0.018)	0.031 (0.497)	0.025 (0.487)	0.167 (0.000)	−0.040 (0.247)	−0.077 (0.071)	−0.051 (0.200)	0.026 (0.484)	−0.062 (0.114)	0.176 (0.000)	−0.036 (0.293)	1.000	
(13) institution	1.04	0.045 (0.209)	0.057 (0.215)	−0.014 (0.701)	−0.024 (0.494)	−0.015 (0.664)	0.053 (0.228)	−0.017 (0.676)	−0.003 (0.943)	0.030 (0.451)	0.009 (0.814)	0.043 (0.223)	0.018 (0.619)	1.000

Z_score (equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns) and it is an inverse measure of bank risk-taking; Dividend Policy framework is measured with dividend payout decision and dividend yield. Dividend payout decision is measured as a dummy equal 1 if the ratio of dividend per share to earnings per share is strictly greater than 0 and 0 otherwise. Dividend yield is measured as the ratio of dividend per share to market price per share; Independent women directors on the board is a dummy variable equal to 1, if the board has at least one female, otherwise zero (0); Women in country-level governance position consists of two indicators at the country-level, including women in ministry (measured as the proportion of women in ministerial position) and women in parliament (measured as the proportion of seats held by women in parliament); It is an aggregate index of the dummies of women on the board of the banks in a given country; Bank Concentration is the industry asset concentration of banks, measured as the ratio of asset of the three largest commercial natural logarithm of total bank assets; bank overhead cost (ratio of overhead cost to total asset); Credit Risk is the ratio of nonperforming to gross loan; capital regulation is the ratio of bank regulation capital to risk weighted assets; inflation rate is the inflation rate per year of a country; real GDP per capita (real gross domestic product (GDP) per capita); Institutions is measured as an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality and voice and accountability) from the World Governance Indicators; Data on these control variables were obtained from the World Bank Global Financial Development database

Table 3 Effect of women inclusion in governance system on dividend policy framework

VARIABLES	Instrumental variable probit regression Dependent variable: dividend policy decision				Two stage least square (2SLS) Dependent variable: dividend yield			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Dividend policy framework$_{t-1}$	0.496***	0.0426***	0.0421***	0.0426***	0.113***	0.0559***	0.113***	0.104***
	(0.0482)	(0.00544)	(0.00225)	(0.00205)	(0.0354)	(0.0181)	(0.0346)	(0.0329)
Dividend policy framework$_{t-2}$	− 0.0959**	− 0.0835**	− 0.0875**	− 0.0988**	− 0.00423	− 0.00122***	− 0.00337	− 0.00249*
	(0.0414)	(0.0419)	(0.0423)	(0.0327)	(0.00403)	(0.000453)	(0.00312)	(0.00139)
Dividend policy framework$_{t-3}$	− 0.064**	− 0.0564**	− 0.0587**	− 0.0556**	− 0.0314	− 0.0365*	0.000216	− 0.0353*
	(0.0258)	(0.0237)	(0.0239)	(0.0231)	(0.0194)	(0.0194)	(0.00710)	(0.0213)
Independent women on board	− 0.0911*			0.0942***	− 0.0805*			− 0.480**
	(0.0488)			(0.0330)	(0.0477)			(0.215)
Women in ministry		0.179***		0.240***		0.00332		0.00415
		(0.0404)		(0.0448)		(0.00254)		(0.00306)
Women in parliament			0.227***	0.161***			− 0.000160	− 0.000921
			(0.0632)	(0.0396)			(0.00196)	(0.00275)
Bank concentration	0.00289**	0.00291**	0.00266**	0.00260*	0.00319***	0.00392***	0.00302**	0.00359**
	(0.00121)	(0.00147)	(0.00126)	(0.00153)	(0.00118)	(0.00142)	(0.00122)	(0.00146)
Overhead cost	− 0.0200**	− 0.0120	− 0.0195*	− 0.00922	-0.0124	0.00956	-0.0115	0.0104
	(0.0100)	(0.0122)	(0.0104)	(0.0127)	(0.00977)	(0.0123)	(0.0101)	(0.0126)
Credit risk	− 0.0616***	− 0.0573***	− 0.0599***	− 0.0523**	− 0.0545***	− 0.0447**	− 0.0531***	− 0.0394*
	(0.0112)	(0.0195)	(0.0117)	(0.0207)	(0.0110)	(0.0204)	(0.0113)	(0.0210)
Capital regulation	− 0.0251**	− 0.0101	− 0.0224**	− 0.00560	− 0.0140	0.0129	− 0.0124	0.0177
	(0.0108)	(0.0198)	(0.0112)	(0.0212)	(0.0104)	(0.0200)	(0.0107)	(0.0207)
Inflation	− 0.00118	− 0.0126	− 0.00104	− 0.0127	− 0.000661	− 0.0137	− 0.000372	− 0.0130
	(0.00377)	(0.00889)	(0.00383)	(0.00907)	(0.00374)	(0.00852)	(0.00377)	(0.00865)
Foreign bank entry	0.358***	0.394**	0.326**	0.416**	0.309**	0.258	0.290**	0.278
	(0.126)	(0.187)	(0.131)	(0.199)	(0.124)	(0.197)	(0.127)	(0.204)
Real GDP per capita	− 0.0460	0.145	− 0.0502	0.128	− 0.0166	0.185*	− 0.0217	0.170
	(0.0549)	(0.111)	(0.0577)	(0.117)	(0.0519)	(0.0985)	(0.0540)	(0.103)
Constant	1.102**	− 0.618	1.085**	− 0.545	0.694	− 1.307	0.699	− 1.258
	(0.507)	(1.049)	(0.525)	(1.108)	(0.478)	(0.935)	(0.491)	(0.976)
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	327	224	307	211	351	237	333	226
					R-square:			
Pseudo R-squared	0.6698	0.6690	0.9043	0.8323	0.108	0.127	0.103	0.130
					Chi^2			
Wald Chi-square	332.22***	331.82***	399.82***	367.99***	97.52***	88.25***	98.75***	90.12***

Table 3 shows the effect of women in governance system on the likelihood of dividend payout using the instrumental variable (iv) probit estimation; as well as the effect of women in governance system on dividend yield (level of dividend payment) using the 2SLS. The dependent variable is the decision to pay dividend. The control variables are described under Tables 1 and 2 above

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

This suggests that independent women, who are directly involved in decision making man identify growth opportunities to invest the banks' capital rather than distributing cash to shareholders. However, women inclusion in country-level governance has no direct effect on the level of dividend payments (see models 6 and 7). This is possible because women in ministerial positions and parliamentary position have no direct dealings with dividend payments of the bank. Our findings support the work of [8] a, b, which confirm that gender diversity on the board

facilitates corporate governance and, consequently, promotes dividends payout.

In Table 3, in terms of the control variables, bank concentration increases the likelihood of dividend payout; overhead costs reduces the likelihood of dividend payout; credit risk dampens the likelihood of dividend payout; capital requirement reduces the likelihood of dividend payout; and foreign bank entry increases the likelihood of dividend payout.

Effect of women inclusion in governance system on the risk-taking of banks across different dividend payout decision

Table 4 shows that the effect of women in governance position on bank risk-taking differ across dividend payout decision. We have explained that a higher Z_score implies a more stable banking system, and hence leads to lower risk-taking by banks. In applying the dynamic system GMM estimation, independent women directors on the corporate board have a positive effect on the Z_score, leading to lower risk-taking (model 9). Thus, banks that include independent women on the board reduce the risk-taking of banks. This supports the argument that appointing female executives to corporate boards reduces excessive risk-taking, as women are more likely to show risk aversion in financial decisions [13, 37], exhibit more conservative behaviour than undiversified teams [17], resulting in less risky corporate outcomes [3]. However, in models 9, the proportion of women in ministerial positions and the proportion of seats occupied by women in parliament respectively have a negative effect on the Z_score, leading to greater risk-taking of banks. This suggests that women in country-level governance position increase risk-taking of banks. This does not support many empirical results in the literature [28, 36, 39, 59, 89], as these studies show that greater gender diversity on the board leads to less risk-taking. However, our findings agree with some studies [20, 67] that female directors may engage in aggressive risk-taking. Further, women in country-level governance position may not be directly involved in the oversight responsibility of the bank, and may not relatively have adequate information compared to insiders of the bank, hence, can probably take-decision that may magnify the risk-taking behaviour of banks – leading to a positive women in governance-risk nexus. The implication from our findings is that governance system with greater diversity on the board may give executives greater incentives to take risks than suppress the risk-averse behaviour of female leaders, and hence leads to more risk-taking.

Table 4 Impact of women inclusion in governance system on bank risk-taking: dynamic system GMM estimation

Variables	Full sample	Banks that pay dividend	Banks that do not pay dividend
	Model 9	Model 10	Model 11
Bank risk-taking$_{t-1}$	0.761***	0.552**	0.482**
	(0.267)	(0.172)	(0.189)
Independent women on board	0.181***	0.0542**	0.00874***
	(0.0501)	(0.0260)	(0.00241)
Women in ministry	− 0.170***	0.181***	− 0.718***
	(0.0471)	(0.0444)	(0.239)
Women in parliament	− 0.0728*	0.637***	-0.0293***
	(0.0400)	(0.126)	(0.0106)
Bank concentration	− 0.0257	− 0.0596	− 0.0395*
	(0.0201)	(0.0490)	(0.0228)
Overhead cost	− 1.469***	− 2.561***	− 1.451***
	(0.167)	(0.458)	(0.176)
Credit risk	− 0.0867	0.850	− 0.831**
	(0.271)	(0.634)	(0.404)
Capital regulation	0.149	0.198	− 0.0327
	(0.277)	(0.812)	(0.317)
Inflation	0.116	− 0.516***	0.331**
	(0.119)	(0.183)	(0.153)
Foreign bank entry	− 3.417	26.23**	− 2.733
	(2.604)	(10.22)	(2.842)
Real GDP per capita	3.316**	1.545	2.685
	(1.531)	(2.409)	(2.334)
Institution	0.549	1.247	0.482
	(0.430)	(0.858)	(0.480)
Constant	− 3.361	26.67	5.820
	(14.53)	(26.56)	(20.84)
Time fixed effect	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes
Observations	211	339	372
Number of id	43	40	40
No. of instruments	16	20	16
AR(1)	− 1.748	− 1.784	− 1.471
P-value	0	0.0744	0
AR(2)	− 1.062	0.851	− 0.663
P-value	0.288	0.0412	0.473
Hansen's test	8.512	9.067	12.12
P-value	0.284	0.431	0.335
F-test	129.7	13,757	33.61
P-value	0.000	0.395	0.508

Table 4 shows the effect of women inclusion in governance system on bank risk-taking across different dividend policy decisions, using the dynamic system GMM estimation. Model 9 shows the full sample while models 10 and 11 respectively show the differences in the relationships in banks that pay dividend and those that do not. Dependent variable is the *Z-score (equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns)*. Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

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Robustness checks

For robustness checks, the study splits the sample into two: (1) banks that strictly pay dividend (model 10) and (2) those that do not pay dividend (model 11). In Table 4, independent women on the board reduce risk-taking of banks that pay dividend (model 10) and those that do not pay dividend (model 11). However, the positive impact of independent women on the board on the Z_score of banks that pay dividend (model 10) is relatively more than those that do not pay dividend (model 11). This implies that independent women on the board of banks that pay dividend reduce risk-taking relatively more than those that do not pay dividend. We observed that the proportion of women in ministerial positions and the proportion of women in parliament have a positive effect on the Z_score, which leads to a lower risk-taking of banks that pay dividends (model 10). However, for banks that do not pay dividends, this affects the Z_score negatively, leading to greater risk-taking (model 11). In general, women in governance position reduce risk-taking of banks that pay dividend while they induce greater risk-taking in banks that do not pay dividend.

Impact of dividend policy framework on bank risk-taking

In Table 5, we show the effect of dividend policy framework on bank risk-taking while introducing the indicators of women in governance system. We observe that the decision to payout dividend has a positive effect on the Z_score, while the dividend yield has a positive effect on the Z_score. This shows that dividend policy framework reduces banks' risk-taking. From a theoretical perspective, agency theory suggests that paying dividends reduces the agency costs arising from the conflicts between owners and managers [35]. Managers, on one hand, want to conserve free cash flow and invest in projects that improve management benefits such as compensation, power, or reputation. Shareholders, on the other hand, want managers to pay free cash flow because projects that add value to management can often be spent on projects that reduce value [27, 38], affecting bank stability. In addition, paying dividends reduce the capacity of banks to strengthen their bank capital buffer, forcing them to borrow more frequently in the capital market, leading to greater scrutiny by independent authorities and, consequently, reducing risk-taking. Therefore, the results support the dividend-stability channel in the sense that dividend paying banks are less risky.

We observe that the coefficients of the independent variables of inclusion of women in governance have their expected signs. In relation to the control variables,

Table 5 Effect of dividend policy and women in governance system on bank risk-taking: dynamic system GMM estimation

Variables	Model 12
Bank risk-taking$_{t-1}$	0.0284*
	(0.0128)
Dividend payout decision	2.325**
	(1.146)
Dividend yield	1.805**
	(0.843)
Independent women on board	0.110***
	(0.0393)
Women in ministry	− 0.00194*
	(0.000999)
Women in parliament	− 0.0025**
	(0.00120)
Bank concentration	− 0.0507***
	(0.0184)
Overhead cost	− 1.551***
	(0.153)
Credit risk	− 0.257
	(0.178)
Capital regulation	− 0.618***
	(0.164)
Inflation	− 0.0432
	(0.0568)
Foreign bank entry	5.687***
	(1.917)
Real GDP per capita	3.520**
	(1.475)
Institution	0.204
	(0.386)
Constant	46.21***
	(7.779)
Time fixed effect	Yes
Country fixed effect	Yes
Observations	328
Number of id	40
No. of instruments	20
AR1	− 3.748***
AR(2)	− 1.062
P-value	0.288
Hansen's test	7.942
P-value	0.377
F-test	129.7
P-value	0.000
Net effect	n.a

Table 5 shows the independent effects of women in governance system and dividend framework on risk-taking of banks. Dependent variable is the *Z-score (equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns*

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

bank concentration has a positive effect on the Z_score (Table 5). This shows that concentrated banking system reduces their risk taking behaviour. Bank overhead cost has a negative impact on the Z_score. This indicates that bank overhead costs lead to greater risk-taking of banks. Regulatory capital has a positive effect on the Z_score, leading to a lower risk-taking of banks. Foreign bank entry has a positive effect on the average level of the Z_score, leading to lower risk-taking.

Interaction effect of dividend policy and women in governance system on bank risk-taking

In this section, we examine the role that the inclusion of women in governance system plays in shaping the relationship between banks' dividend policy framework and risk-taking. As discussed above, the dividend policy framework (dividend payment decision and dividend yield) has a positive impact on the Z_score, resulting in less risk-taking of banks. In Table 6, we interact the indicators of women's inclusion in governance with dividend policy variables and account for the net effects of dividend policy variables when conditioned on the indicators of women's inclusion in governance. In Table 6, the net effects are calculated from the unconditional dividend policy framework and the effects of the marginal (conditional) dividend policy framework, which are contingent on the complementarity or substitutability effects of including women in the system of governance. Before interpreting the net effects, we consider whether the variables in Table 6 are individual substitute or complement for the indicators of women inclusion in governance system – in determining banks' risk-taking (see Compton & Giedeman [29]). For example, in model 13, the coefficient of the decision to pay dividends is positive and the marginal or conditional effect (coefficient of the interaction term) is also positive. This implies that dividend payment decisions and independent women on board can respectively act as a complement in determining risk-taking. Similarly, the coefficient of dividend yield and the marginal or conditional effect (interaction term coefficient) are also positive (see, models 14). This implies that dividend yield and independent women on board can each serve as a complement to determine the level of risk banks can take. However, the coefficients of the dividend payout decision are positive, while the marginal or conditional effects (coefficients of the interaction conditions) are negative in models 14 and 15. This implies that dividend payout decision and women in country-level governance (women elected in ministry and women elected in parliament) can each act as a substitute control device for risk-taking. A similar interpretation applies to dividend yield and women in governance at the country level in models 17 and 18.

Based on Bramber et al. (2006), we interpret our results based on the net effects of dividend policy framework (dividend payment decision and dividend yield) on Z_score when interacting with women in governance variables. For example, in model 13 (using Table 6), the marginal effect (of the interaction term) is 0.0556, while the unconditional impact of the decision to pay a dividend is 0.0509. The corresponding net effect of the decision to pay dividend is 0.07197. The net effect is positive (on the Z_score) but more positive than the unconditional effect of the decision to pay dividend. Hence, banks that take the decision to pay dividend increase the reductive effect on risk-taking when independent women are included on the board. Similar interpretations can be seen for the net effects of the decision to pay dividend when interacted with women in country-level governance (i.e., the "proportion of women in ministerial position" and the "proportion of seats held by women in parliament") (see models 14 and 15). Thus, the decision to pay dividend by directors reduces the risk-taking of banks when the proportion of women in country-level governance increases in our model.

Interestingly, the unconditional effects of dividend yield on the Z_score remained positive and also, the net effects were positive (see models 16–18). Thus, banks that pay higher dividend yields tend to reduce more risk-taking when the levels of women in governance position increases. This supports the dividend stability channel, where increasing dividends tends to increase bank stability and tends to decrease bank risk-taking behaviour [66]. This consequently induces a positive impact of dividends on the Z_score, and thus, leads to lower risk-taking at higher levels of women in governance position.

Conclusion and policy implication

In this study, we examine the impact of women in governance system on the relationship between dividend policy framework and the risk-taking of banks. The study employs an aggregate bank dataset for 54 countries in Africa, covering the period, 2006–2020. First, we examine the effect of women in governance system on dividend framework by using the instrumental variable probit panel regression and the 2SLS estimations. Second, we examine the effects of women in governance system and dividend policy framework on the risk-taking of banks using the dynamic system GMM estimation. Finally, the effects of the dividend policy framework on the risk-taking of banks are determined when conditioned on the inclusion of women in the governance system.

It provides evidence showing that the independent women directors have a negative effect on dividend policy framework (i.e., the likelihood to pay dividends and dividend yield) while women in country-level governance have

Table 6 Interaction effect of dividend policy and women in governance system on bank risk-taking: dynamic system GMM estimation

VARIABLES	Interaction between women in governance and dividend payout decision			Interaction between women in governance and dividend yield		
	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
Bank risk-taking$_{t-1}$	0.2154***	0.2122***	0.0305*	0.0447**	0.0434**	0.0390**
	(0.0616)	(0.0639)	(0.0169)	(0.0209)	(0.0206)	(0.0194)
Dividend payout decision	0.0509**	0.0515**	0.0517**			
	(0.0239)	(0.0235)	(0.0237)			
Dividend yield				0.0147***	0.0836***	0.0390**
				(0.00454)	(0.0203)	(0.0194)
Independent women on board	0.0835**			0.715		
	(0.0419)			(0.970)		
Women in ministry		0.0174			0.0132	
		(0.0378)			(0.0460)	
Women in parliament			0.00579			-0.0101
			(0.0337)			(0.0400)
Dividend payout decision* Independent women on board	0.0556*					
	(0.0305)					
Dividend payout decision* Women in ministry		− 0.00194*				
		(0.000999)				
Dividend payout decision* Women in parliament			− 0.0024**			
			(0.00120)			
Dividend yield* Independent women on board				0.291***		
				(0.0878)		
Dividend yield*Women in ministry					− 0.0026**	
					(0.00128)	
Dividend yield* Women in parliament						− 0.00109***
						(0.000307)
Bank concentration	− 0.0577***	− 0.0214	− 0.0615***	− 0.0501***	− 0.0229	− 0.0551***
	(0.0184)	(0.0193)	(0.0191)	(0.0184)	(0.0195)	(0.0192)
Overhead cost	− 1.575***	− 1.510***	− 1.546***	− 1.596***	− 1.505***	− 1.582***
	(0.152)	(0.160)	(0.157)	(0.152)	(0.161)	(0.158)
Credit risk	− 0.169	− 0.180	− 0.179	− 0.297*	− 0.0860	− 0.305
	(0.171)	(0.256)	(0.178)	(0.177)	(0.264)	(0.187)
Capital regulation	− 0.604***	0.0148	− 0.596***	− 0.670***	0.0805	− 0.648***
	(0.163)	(0.262)	(0.171)	(0.164)	(0.261)	(0.172)
Inflation	− 0.0399	0.107	− 0.0420	− 0.0396	0.138	− 0.0405
	(0.0573)	(0.119)	(0.0582)	(0.0569)	(0.118)	(0.0580)
Foreign bank entry	6.161***	3.537	5.933***	5.675***	− 3.527	5.746***
	(1.916)	(2.467)	(2.004)	(1.920)	(2.475)	(2.004)
Real GDP per capita	− 1.391*	3.174**	− 1.448	− 1.401*	3.010**	− 1.472*
	(0.835)	(1.459)	(0.879)	(0.828)	(1.457)	(0.877)
Institution	0.246	0.474	0.304	0.225	0.477	0.309
	(0.388)	(0.406)	(0.409)	(0.386)	(0.409)	(0.409)
Constant	46.90***	− 0.711	47.20***	48.40***	− 1.146	49.70***
	(7.702)	(13.77)	(7.998)	(7.701)	(13.82)	(8.104)
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	224	308	311	328	327	311
Number of id	40	40	43	41	48	43
No. of instruments	20	16	16	16	16	16

Table 6 (continued)

VARIABLES	Interaction between women in governance and dividend payout decision			Interaction between women in governance and dividend yield		
	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
AR1	− 3.72***	− 3.71***	− 3.73***	− 3.61***	− 3.62***	− 3.61***
AR(2)	1.063	1.048	− 1.657	1.040	1.043	1.071
P-value	0.288	0.294	0.306	0.299	0.549	0.483
Hansen's Test	8.512	9.067	12.12	6.212	13.64	14.07
P-value	0.284	0.431	0.335	0.184	0.195	0.222
F-test	1543.74	1406.33	22,159	11,793	1.520e + 06	1.035e + 06
P-value	0.000	0.000	0	0	0	0.00282
Net effect	0.07197***	0.014***	0.0051***	0.1249***	0.0334***	0.01783***

Table 6 shows the interaction effects of women in governance system and dividend framework on risk-taking of banks. Dependent variable is the *Z-score (equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns*

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

a positive effect on the likelihood to pay dividend but no direct effect on dividend yield. The empirical outcome confirms that independent women on the board have a lower probability of paying dividend and also reduces the level of dividend payments. However, women in country-level governance system seek to protect the interest of shareholders and subsequently increase the likelihood of dividend payout. The study shows that the independent women directors have a positive effect on the Z_score while women in country-level governance position have a negative effect on the Z_score. This suggests that independent women directors reduce risk-taking of banks while women in country-level governance position increase risk-taking of banks. Our results support that women in governance system reduce risk-taking in banks that pay dividend while they induce greater risk-taking in banks that pay dividend.

The study found that dividend policy framework (decision to pay dividend and dividend yield) has a positive impact on the Z_score, leading to a lower risk-taking. This suggests that banks that pay dividend exposes them to stricter market discipline, then decreases the risk-taking behaviours. The study found that dividend policy framework (i.e., "decision to pay dividend" and "dividend yield") generally acts as a complement for risk-taking when independent women are included on corporate boards while it provides a substitute control device for banks' risk-taking when women are included in country-level governance positions. The study found robust and strong evidence to support that the decision or likelihood to pay dividend reduces the risk-taking of banks when women are included in governance system. Similarly, the study shows that banks that pay higher dividends reduce risk-taking when conditioned on women in governance position.

Therefore, policymakers and researchers need to design a model that enables the governance system to design a robust gender diversity framework that complements dividend payout policies by achieving a desirable (and optimal) investor risk-taking outcome. The policy implication is that strong gender diversity is required to strive for an optimal link between dividends and risk in the governance system. In particular, ensuring greater gender diversity in the governance system provides an incentive to review opportunistic behaviour by managers and to take prudent dividend payment measures that minimize excessive risk-taking by banks.

Limitation and future recommendation
The study suffers some limitations which provide opportunities for future studies. First it is limited to only Africa. Moreover, acquiring this data is very difficult as it is not publicly available as a secondary source. Future research is needed to examine this study in other regions of the world and to show how this model is applicable to other parts of the world. In addition, it was not able to collect data on different characteristics of risk-taking behaviours of banks but considers only the Z_score. Even though we believe that this is not a major issue, future studies may include intermediation risk to observe how the relationship will look like. Future research should extend data to include developing and emerging economies in the world. Some other moderators of policy variables should also be tested in this context to ensure their role in aligning wage policy with shareholder interests. Also, policymakers, researchers and practitioners should consider different risk governance and gender diversity frameworks in explaining the

relationship between dividend policy and bank risk-taking across different regions in the world.

Abbreviations

SDGs	Sustainable Development Goals
2SLS	Two Stage Least Square
GDP	Gross domestic product
SGMM	System Generalized Methods of Moments
VIF	Variance inflation factor

Availability of data and materials
The datasets used and/or analysed during the current study are available (with corresponding author) on reasonable request.

Declarations

Ethical approval and consent to participate
All authors have read and approved the final manuscript. Corresponding author is prepared to provide documentation of compliance with ethical standards and sent to the journal upon request.

Competing interests
The authors declare that they have no competing interests.

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