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Ozili, Peterson K

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Effect of gender equality on financial stability and financial inclusion

Peterson K. Ozili
Central Bank of Nigeria

Abstract

Little attention has been paid to the role of gender equality in promoting financial stability and financial inclusion. This article examines the effect of gender equality on financial stability and financial inclusion for 14 developing countries using yearly data from 2005 to 2021. The findings reveal that gender equality has a significant positive effect on financial stability and financial inclusion in developing countries. Gender equality has a significant positive effect on financial stability and financial inclusion in African countries. Gender equality has a significant positive effect on financial stability but not for financial inclusion in non-African countries.

Keywords: gender equality, gender inequality, financial inclusion, financial stability, access to finance, ZSCORE, bank branches.

JEL Classification: G21, G28, J16.

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1. Introduction

This study investigates the effect of gender equality on financial stability and financial inclusion. Gender inequality is a major problem in many societies, and it has many consequences (Shastri, 2014; Redding et al, 2017). The negative consequences of gender inequality have led to calls for gender equality reforms in the financial sector especially in the area of financial inclusion and financial stability (Kumar and Quisumbing, 2015; Guiso and Zaccaria, 2023).

In terms of definition, gender equality occurs when people of all gender have equal rights, responsibilities and opportunities (Shannon et al, 2019; Carli, 2020). The term 'gender equality' was previously used to mean equality for men and women (Shannon et al, 2019). The term has recently been extended to include men, women and people with a non-binary gender (Dodgson, 2022). Financial stability refers to the stability of major financial institutions and financial markets in the financial system (Schinasi, 2004). Financial stability is crucial because it instills confidence in the financial system and encourages investors, depositors and savers to supply the funds that would be channeled to borrowers to undertake productive activities in the economy (Adrian and Shin, 2010; Antunes et al, 2018). Financial inclusion is the provision of affordable formal financial services and granting access to affordable financial services for everyone (Ozili, 2021a). Financial inclusion ensures that everyone has access to formal financial services which they can use to meet their needs and improve their economic welfare (Ozili, 2018a).

Gender inequality leads to gender discrimination, it widens the gender pay gap, it reduces access to job opportunities, it leads to poverty and it discourages women from competing with men for the same opportunities in society (Cleveland et al, 2013; Auspurg et al, 2017). Several studies show evidence that women are adversely affected by gender inequality in society (e.g., Iversen et al, 2010; Fenstermaker et al, 2013; Cleveland et al, 2013; Auspurg et al, 2017). This has led to calls for gender equality in society and an urgent need for gender equality institutions, policies and laws that can advance equality of rights and opportunities for people of all gender (Ahrens, 2018; Alonso and Lombardo, 2018; Shannon et al, 2019). Advocates of gender equality want gender equality to permeate all facets of society including the financial sector (Bermeo, 2016; Perrin and Weill, 2022).

With regard to the financial sector, the main argument is that strong gender equality advocacy, supported by institutional enforcement, policies and laws, will ensure that people of all gender have equal access to available formal financial services which is beneficial for financial inclusion (Bermeo, 2016). Strong gender equality advocacy, supported by institutional enforcement, policies and laws will also ensure that people of all gender have equal opportunity to participate in the financial sector, build a career in the financial sector and contribute to preserving the stability of the financial system, thereby promoting financial stability.

In the real-world, corporate executives in the financial sector accept that gender equality is a moral obligation for financial institutions and is highly desirable in the financial sector[1], but they also claim that there is no verifiable evidence that gender equality in the financial sector significantly improves the use of formal financial services or the performance of financial institutions and by extension the stability of the financial sector. This makes it important to investigate the potential effect of gender equality on financial stability and financial inclusion.

In the academic literature, existing studies have focused on the effect of gender discrimination on women financial inclusion (e.g., Ghosh and Vinod, 2017; Mndolwa and Alhassan, 2020; Perrin and Weill, 2022) and the role of women in firm risk-taking in the financial sector (Elsaid and Ursel, 2011; Faccio et al, 2016). But the literature has not examined the role of gender equality institutions, policies and laws in promoting financial inclusion and financial stability. Accordingly, it remains questionable whether gender equality institutions, policies and laws can improve financial stability and financial inclusion.

The empirical analysis in this study is based on a sample of 14 developing countries from 2005 to 2021. We divide the sample into the African countries subsample and the non-African countries subsample. We use the two-stage least squares (2SLS) regression method, which is robust to endogeneity problems, and the generalized linear model (GLM) regression method which addresses potential non-linearity between the response variable and the predictors using a link up function. The findings show that gender equality has a significant positive effect on financial

[1] https://www.bloomberg.com/news/articles/2022-09-20/european-banks-promising-more-diversity-appoint-only-male-ceos

stability and financial inclusion in developing countries. In the subsample analysis, it was found that gender equality has a significant positive effect on financial stability and financial inclusion in African countries, while gender equality has a significant positive effect on financial stability but not for financial inclusion in non-African countries.

This study contributes to the literature in three ways. First, the study contributes to the gender studies literature that examine the beneficial effects of gender equality in society (e.g., Iversen et al, 2010; Fenstermaker et al, 2013; Cleveland et al, 2013; Auspurg et al, 2017), but which have not captured the beneficial effect of gender equality for financial stability and financial inclusion. Moreover, the study adds to the sizable literature that examine the effect of gender equality on the financial sector (see. Ghosh and Vinod, 2017; Ozili, 2020; Perrin and Weill, 2022). Second, the study contributes to the literature that examine the determinants of financial stability (e.g., Schinasi, 2004; Lee and Hsieh, 2013; Ozili, 2018b; Ozili and Iorember, 2023). This study contributes to this literature by showing the gender equality institutions, policies and laws are significant determinants of financial stability in developing countries. Therefore, financial sector regulators and supervisors in developing countries should consider the role of gender equality institutions, policies and laws in preserving the stability of the financial system. Third, the study contributes to the literature that examine the determinants of financial inclusion (e.g. Ghosh and Vinod, 2017; Mndolwa and Alhassan, 2020; Ozili, 2021a). This study contributes to this literature by showing that gender equality institutions, policies and laws are significant determinants of the level of financial inclusion.

The next section presents the literature review and the hypothesis development. Section 3 presents the research methodology. Section 4 reports the empirical results. Section 5 concludes the study.

2. Related Literature and hypothesis

2.1. Literature review

Several studies have examined gender related issues in the financial sector. But such studies have not have examined how gender equality institutions, policies and laws affect financial stability. For instance, Ozili (2020) investigates gender equality in terms of whether a female central bank governor performs better in promoting financial stability compared to a male central bank governor. The study analysed publicly available information about male and female central bank governors from 2000 to 2016 together with financial stability data and find that the financial system is more stable when the central bank governor is older and male while the financial system is also stable during the tenure of a female central bank governor that has high social capital or high cognitive abilities. Perrin and Weill (2022) examine whether greater gender equality in access to formal credit improves financial stability. They find evidence that gender equality in access to formal credit enhances access to credit for women and is beneficial for financial stability. Palvia et al (2015) examine whether bank capital ratios and default risk are associated with the gender of the bank's Chief Executive Officer (CEO) and Chairperson of the Board. They analyse a large panel of U.S. commercial banks and find that banks with female CEOs hold more conservative levels of capital. They also find that smaller banks with female CEOs and board Chairpersons were less likely to fail during the financial crisis, implying that female-led banks are more financially stable. Menicucci and Paolucci (2022) find that female board of directors and executives are more risk averse, less overconfident, and report higher capital adequacy and equity to assets ratios than their male colleagues.

Other studies examine the gender-related issues affecting financial inclusion or access to financial services. For instance, Wellalage and Thrikawala (2021) show evidence of gender discrimination against female-owned and female-led firms in credit markets, and such firms experience more difficulty in obtaining credit. Moro et al (2017) show that female-run firms obtain less bank financing not because their loan application is denied by the lender but because they anticipate being rejected, implying that women business owners hold the belief that women will be discriminated against in the credit market. Mascia and Rossi (2017) also show that female-led

enterprises are more likely to face unfavourable bank financing conditions compared to their male-led counterparts, and firms whose leadership changes from female to male are more likely to receive improved interest rate. Demirgüç-Kunt et al (2013) examine how legal discrimination affects the financial inclusion of women. They find that women are less likely to own a formal account or to save and borrow if they live in countries where women face legal restrictions in their ability to work, head a household, choose where to live, and receive an inheritance. Ghosh and Vinod (2017) examine whether gender matters for financial inclusion. They find that, compared to male-headed households, female-headed households are less likely to access formal financial services and are more likely to access informal finance from family, friends or money lenders. Bermeo (2016) analyzes the gender differences in the use of formal financial services using the Global Financial Inclusion Survey data. They find that countries that promote gender equality and have strong enforcement mechanisms to uphold gender equality laws have greater financial inclusion for women.

2.2. Hypothesis development

Establishing gender equality institutions, policies and laws in a country can have a significant positive effect on financial stability in the financial sector. The main channel through which gender equality institutions, policies and laws influence financial stability is through financial sector policies and regulations. This can be achieved by ensuring that financial sector policies and regulations are gender-sensitive and incorporate gender-balanced opportunities and outcomes that will ensure that people of all gender are able to, and allowed to, participate in the financial sector and contribute to the stability of the financial sector. When gender equality institutions, policies and laws are in place, it will motivate and enable people of all gender to rise to the top of their financial institution and exert their influence in reducing financial institutions' risk-taking to mitigate risks to financial system stability. For example, existing studies show that gender equality is beneficial for women in the financial sector. The literature shows that female managers play an important role in reducing risk-taking among financial firms which helps to preserve financial stability (Elsaid and Ursel, 2011; Faccio et al, 2016; Ozili, 2020). Therefore, giving women equal managerial and leadership opportunities in the financial sector can have a

positive effect for financial stability through their risk-averse traits and characteristics that helps to mitigate financial stability risks. However, there may be existing indigenous social, cultural and institutional factors in some countries, such as in African countries, that prevent or make it difficult for women or other affected gender to rise to the top of their financial institution to exert their influence in reducing financial institutions' risk-taking and preserving financial stability. These factors include societal mindsets, racism, uneven access to education, lack of employment equality, job segregation, lack of legal protections, lack of bodily autonomy and lack of religious freedom (Lorber, 2001; Jayachandran, 2015; Sumanjeet, 2016). These factors can be mitigated through effective implementation and strict enforcement of gender equality policies and laws in a country to ensure that people of all gender have equal opportunity to contribute to reducing financial institutions' risk-taking and to mitigate risks to financial stability. This implies that effective gender equality institutions, policies and laws in a country can have a positive effect on financial stability. Therefore, the first hypothesis is that gender equality has a positive effect on financial stability.

Hypothesis (H1) – Gender equality has a positive effect on financial stability.

Establishing gender equality institutions, policies and laws in a country can also have a significant positive effect on the level of financial inclusion. The main channel through which gender equality institutions, policies and laws influence financial inclusion is through gender-sensitive financial sector policies and regulations. This is because financial sector regulators can issue gender-sensitive financial sector policies and regulations that require financial sector agents to create gender-balanced financial products and services and remove all known barriers to financial inclusion that exist in the financial sector. Such barriers may include high bank charges, high interest rates, burdensome account opening documentation requirements and lengthy loan application processes. Introducing gender-sensitive financial sector policies and regulations will ensure that people of all gender will have equal access to affordable formal financial services towards greater financial inclusion. In the literature, existing studies show that gender equality can increase financial inclusion for all gender because gender equality advocacy seeks to empower all gender by giving them equal access to formal financial services to improve their welfare (Ghosh and Vinod, 2017; Mndolwa and Alhassan, 2020; Perrin and Weill, 2022).

Therefore, gender equality institutions, policies and laws can play a positive role in ensuring equal access to affordable financial services for people of all gender towards greater financial inclusion for everyone. However, there may be existing indigenous social, cultural and institutional factors in some developing countries, such as in African countries, that prevent gender equality institutions, policies and laws from having a significant positive effect on financial inclusion for people of all gender. Such factors can be mitigated through effective implementation and strict enforcement of gender equality policies and laws in a country to ensure that people of all gender have equal access to affordable financial services which they can use to improve their welfare towards greater financial inclusion. Therefore, the second hypothesis is that gender equality has a positive effect on financial inclusion.

Hypothesis (H2) – Gender equality has a positive effect on financial inclusion.

3. Research methodology

3.1. Data and sample

Data were collected for 14 developing countries that have sufficient data for all the variables used in the study. The list of countries is reported in table 2. The countries were selected based on availability of data. Country-level annual data were collected from the World Bank's Country Policy and Institutional Assessment (CPIA) database, the World Development Indicators (WDI) and the Global Financial Development Indicators (GFDI). The sample is an unbalanced panel data of 14 developing countries during the 2005 to 2021 period. The selection of the 2005 to 2021 sample period allows us to capture two full economic cycles. See table 1 for variable description.

Table 1. Variable description and source			
Variable	**Variable description**	**Definition**	**Source**
ZSCORE	Bank ZSCORE	The ZSCORE captures the probability of default of a country's commercial banking system. ZSCORE compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns. It is a common measure of banking system stability	World Bank GFDI
GND	CPIA gender equality rating (1=low to 6=high)	The CPIA gender equality rating assesses the extent to which the country has installed institutions and programs to enforce laws and policies that promote equal access for men and women in education, health, the economy, and protection under law.	World Bank CPIA database
NPL	Bank nonperforming loans to gross loans (%)	The NPL ratio is the ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans (total value of loan portfolio). The loan amount recorded as nonperforming includes the gross value of the loan as recorded on the balance sheet, not just the amount that is overdue.	World Bank GFDI
EFF	Bank cost to income ratio (%)	The efficiency ratio of the banking sector is defined as the operating expenses of the banking sector as a share of sum of net-interest revenue and other operating income.	World Bank GFDI
GDPR	Annual GDP growth rate (%)	Annual GDP growth rate is the percentage change in annual gross domestic product (GDP)	World Bank WDI
FST	CPIA financial sector rating (1=low to 6=high)	The CPIA financial sector rating assesses the structure of the financial sector and the policies and regulations that affect it.	World Bank CPIA database
COST	Bank overhead costs to total assets (%)	Bank overhead costs to total assets ratio measures operating expenses of the banking sector as a share of the value of all assets held by the banking sector. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets.	World Bank GFDI
ECO	CPIA macroeconomic management rating (1=low to 6=high)	The CPIA macroeconomic management rating assesses the monetary, exchange rate, and aggregate demand policy framework of a country.	World Bank CPIA database
FCL	Bank branches per 100,000 adults	Number of commercial bank branches per 100,000 adults. This is the measure of financial inclusion used in this study	World Bank GFDI

Source: World Bank database

3.2 Variable description and justification

The financial inclusion dependent variable is the number of commercial bank branches per 100,000 adults (FCL). It is a widely used indicator of financial inclusion in the financial inclusion literature (Ozili 2021b). Commercial banks are widely considered to be the most important agents of financial inclusion because of their ability to expand their branch networks to remote locations to reach people in rural communities especially women and girls. As commercial banks expand their branches to more communities, people of all gender, including women, will be able to access basic formal financial services which leads to financial inclusion (Fareed et al, 2017). Therefore, the number of commercial bank branches is an important indicator of the level of financial inclusion because it enables equal access to financial services for people of all gender.

The financial stability dependent variable is the bank ZSCORE. The bank ZSCORE is a widely used indicator of financial stability in the banking and finance literature (Lee and Hsieh, 2013; Ozili, 2018b). The ZSCORE is a measure of insolvency risk of the banking sector (Ozili, 2018b). The ZSCORE is computed as the sum of return on assets ratio (ROA) and equity to asset ratio (CAR), divided by the standard deviation of return on assets (Ozili and Iorember, 2023). A high ZSCORE means that the banking sector is solvent and distant from systemic default, thereby making the banking sector stable and safe from a risk perspective (Ozili, 2018b). People of all gender should be given equal opportunity to contribute to the stability of the banking system or the financial system. If men and women are given equal opportunities in the financial sector, they can contribute their own efforts to reduce risks and preserve the stability of financial system.

The gender equality rating variable (GND) is the main explanatory variable of interest in the analysis and is the variable used to measure gender equality in this study. Previous studies have used the gender equality rating of a country to measure gender equality (see, for example, Seema et al, 2021; Xu et al, 2022). A positive relationship between GND and financial stability is expected because existing gender equality institutions, policies and laws can give men and women equal opportunity to contribute positively in preserving the stability of the financial system. Also, a positive relationship between GND and financial inclusion is expected because existing gender equality institutions, policies and laws can give men and women equal access to formal financial

services for greater financial inclusion. Therefore, the GND variable is expected to have a positive relationship with the financial stability variable (ZSCORE) and the financial inclusion variable (FCL).

Regarding the control variables, the GDPR variable measures real GDP growth rate or the rate of economic growth. Existing studies show that economic growth has a complementary effect on financial stability and financial inclusion because economic growth, reflected in increases in national output, leads to higher levels of business activities for economic agents and higher profit for financial sector agents which helps to improve their stability (Creel et al, 2015). Higher economic growth also encourages financial sector agents to expand their services to new geographical areas through the opening of new bank branches to serve unbanked adults, thereby, increasing the level of financial inclusion (Ozili et al, 2022). Therefore, the GDPR variable is expected to have a positive relationship with the financial stability variable (ZSCORE) and the financial inclusion variable (FCL).

The FST variable measures the quality of the structure, policies and regulations of the financial sector in a country. Countries that have effective and market-enabling financial sector structure, policies and regulations tend to have a stable financial sector because existing regulations will be designed to improve the performance of financial sector agents and to preserve financial stability. Such countries will also have a high level of financial inclusion because financial sector policies and regulations will ensure that existing barriers in the financial sector that limit access to financial services are removed. Therefore, the FST variable is expected to have a positive relationship with the financial stability variable (ZSCORE) and the financial inclusion variable (FCL).

The ECO variable measures the quality of macroeconomic management in a country. Countries that have effective macroeconomic management will have high levels of financial inclusion because effective macroeconomic management will ensure that all market barriers that limit access to financial services are removed or reduced, thereby increasing the level of financial inclusion. Therefore, the ECO variable is expected to have a positive relationship with the financial inclusion variable (FCL).

The COST variable measures overhead expenses as a percentage of total asset of banks. A banking sector that incurs high operating cost may be reluctant to spearhead efforts to increase the level of financial inclusion especially when expanding access to financial services lead banks to incur higher cost. Therefore, the COST variable is expected to have a negative relationship with the financial inclusion variable (FCL).

The NPL variable measures the asset quality of banks. A banking sector that has a very low nonperforming loan ratio is financially stable than a banking sector that has a high nonperforming loan ratio (Kellard et al, 2022; Perrin and Weill, 2022). Therefore, the NPL variable is expected to have a negative relationship with the financial stability variable (ZSCORE).

The EFF variable measures the efficiency of banks in terms of their ability to increase income while reducing cost. A banking sector that has a very low cost-to-income ratio is efficient and stable compared to a banking sector with a high cost-to-income ratio (Ozili, 2018b). Therefore, the EFF variable is expected to have a negative relationship with the financial stability variable (ZSCORE).

3.3. Empirical models

The model used to estimate the effect of gender equality on financial stability and financial inclusion is a modified form of the models used in Ozili (2018b) and Perrin and Weill (2022). The first equation, Eq. (1), estimates the effect of gender equality on financial stability in the developing countries in the sample. The second equation, Eq. (2), estimates the effect of gender equality on financial inclusion in the developing countries in the sample.

$$ZSCOREi,t = \beta o + \beta 1GNDi,t + \beta 2NPLi,t + \beta 3EFFi,t + \beta 4GDPRi,t + \beta 5FSTi,t + ei,t \ldots..Eq\ 1$$

$$FCLi,t = \beta o + \beta 1GNDi,t + \beta 2GDPRi,t + \beta 3COSTi,t + \beta 4FSTi,t + \beta 5ECOi, + ei,t \ldots\ldots\ldots\ldots\ldots Eq\ 2$$

Where i, t represents country and year. The ZSCORE variable is the financial stability dependent variable and is measured using the bank ZSCORE. The FCL variable is the financial inclusion dependent variable representing the number of commercial bank branches per 100,000 adults. The GND variable is the CPIA gender equality rating (1=low to 6=high). The NPL variable is the ratio of bank nonperforming loans to gross loans (%). The EFF variable is the bank cost to income ratio (%). The GDPR variable is the annual real GDP growth rate (%). The FST variable is the CPIA financial sector rating (1=low to 6=high). The COST variable is the ratio of bank overhead costs to total assets (%). The ECO variable is the CPIA macroeconomic management rating (1=low to 6=high). εit is the error term of the model.

3.4. Estimation procedure

The main estimation method used in this study to investigate the effect of gender equality on financial stability and financial inclusion is the two-stage least squares regression method. The two-stage least squares regression estimation was used because it controls for potential endogeneity problems in the data especially when the explanatory variables are correlated with the error term of the regression model (Kelejian, 1971; Sheikhi et al, 2022). The two-stage least squares regression method mitigates potential endogeneity problems between gender equality and the dependent variables by using instrumental variables which are correlated to the endogenous variables but not correlated with the error term of the model. We also use the generalized linear model regression estimation which takes into account the potential non-linearity between the response variable and predictors through a link function and when the response variable is not normally distributed (Thompson and Baker, 1981).

3.5. Descriptive statistics and correlation of the variables

Table 2 presents the summary of the descriptive statistics. The countries with the highest level of gender equality rating in the sample are Rwanda, Honduras and Cambodia while Chad and Pakistan have the lowest gender equality rating during the period examined. Regarding the financial inclusion variable (FCL), Honduras and Pakistan have high levels of financial inclusion while Cameroun and Chad have a low level of financial inclusion. In terms of financial stability (ZSCORE), Cambodia and Honduras have better financial stability as indicated by the relatively

high ZSCORE compared to Zambia and Cameroun that have a low level of financial stability during the period examined. The nonperforming loans ratio (NPL) is lower in Cambodia and Pakistan which suggests greater financial stability while the NPL ratio is higher in Chad and Ghana. Also, the overhead cost to total asset ratio (COST) is higher in Zambia and Rwanda and lower in Bangladesh and Pakistan. The cost-to-income ratio is higher in Nigeria and Rwanda and lower in Bangladesh and Cambodia. The macroeconomic management rating (ECO) is higher in Kenya and Cambodia, and lower in Chad and Pakistan. Economic growth rate (GDPR) is much higher in Bangladesh and Cambodia and lower in Lesotho and Madagascar. The financial sector rating (FST) is higher in Pakistan and Kenya and lower in Bangladesh and Cambodia.

The Pearson correlation between the dependent variables and the independent variables in table 3 are all below 0.55 which suggest that multi-collinearity is not a problem in the empirical analysis. The GND variable has a significant positive correlation with the ZSCORE variable and a positive correlation with the FCL variable, indicating that high levels of gender equality rating is correlated with greater financial stability and financial inclusion. We also conduct a variance inflation factor analysis to test for multi-collinearity.

The variance inflation factor (VIF) analysis is reported in tables 8 and 9 in the appendix. The NPL and GDPR variables have a low correlation with the ZSCORE variable compared to other variables in table 8, while the GDPR and COST variables have a low correlation with the FCL variable compared to other variables in table 9.

Table 2. Summary of descriptive statistics

	GND	ECO	FST	FCL	EFF	NPL	COST	ZSCORE	GDPR
Countries	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Bangladesh	3.53	3.79	2.79	8.07	43.83	8.63	2.37	15.91	6.34
Cambodia	3.97	4.14	2.79	6.05	44.92	2.07	2.79	27.26	6.54
Cameroon	3.06	4.00	3.00	1.71	56.35	11.12	4.16	10.09	3.68
Chad	2.50	3.08	2.58	0.72	53.47	16.74	5.17	11.01	3.53
Ghana	4.00	3.44	3.41	5.89	53.29	13.77	6.85	12.81	6.13
Honduras	3.73	3.55	3.41	19.37	66.25	3.23	5.67	30.23	3.58
Kenya	3.35	4.44	3.61	4.57	50.86	8.47	5.33	21.82	4.73
Lesotho	4.00	3.76	3.14	3.15	57.30	3.29	5.81	18.14	1.97
Madagascar	3.71	3.73	2.94	1.77	52.72	9.12	4.37	15.48	2.67
Nigeria	3.00	3.71	3.12	5.24	76.79	10.31	5.86	16.62	4.25
Pakistan	2.32	3.17	3.71	9.06	60.19	10.64	2.69	11.16	3.96
Rwanda	4.05	4.00	3.50	4.68	65.98	10.06	7.15	18.71	7.23
Uganda	3.32	4.17	3.50	2.39	57.98	4.23	6.67	13.89	5.94
Zambia	3.17	3.52	3.44	3.93	63.97	9.71	7.41	9.52	5.36
Aggregate statistics:									
Mean	3.41	3.75	3.21	5.53	57.65	8.55	5.15	16.86	4.71
Median	3.50	4.00	3.50	4.46	56.34	7.67	5.15	15.35	4.83
Maximum	4.50	4.50	4.50	22.68	202.04	37.30	12.53	34.15	17.33
Minimum	2.00	2.00	2.00	0.35	34.64	1.55	1.82	6.45	-8.96
Std. Dev.	0.58	0.51	0.45	4.75	16.45	5.79	2.03	6.47	3.54
Observations	238	238	238	226	222	189	221	222	238

Source: Author's computation

Table 3. Pearson correlation of the variables

Variables	GND	ZSCORE	FCL	ECO	FST	EFF	NPL	COST	GDPR
GND	**1.000**								

ZSCORE	**0.489*** **	1.000							
	(0.00)	-----							
FCL	**0.061**	0.607***	1.000						
	(0.42)	(0.00)	-----						
ECO	**0.262*** **	0.195***	-0.263***	1.000					
	(0.00)	(0.00)	(0.00)	-----					
FST	**-0.155** **	-0.019	0.126*	0.208***	1.000				
	(0.04)	(0.79)	(0.09)	(0.00)	-----				
EFF	**-0.206*** **	-0.132*	0.113	-0.164**	0.274***	1.000			
	(0.00)	(0.08)	(0.13)	(0.03)	(0.00)	-----			
NPL	**-0.271*** **	-0.543***	-0.254***	-0.298***	-0.068	0.190**	1.000		
	(0.00)	(0.00)	(0.00)	(0.00)	(0.37)	(0.01)	-----		
COST	**0.324*** **	-0.064	-0.172**	0.151**	0.351***	0.476***	0.068	1.000	
	(0.00)	(0.39)	(0.02)	(0.04)	(0.00)	(0.00)	(0.36)	-----	
GDPR	**0.098**	-0.045	-0.081	0.346***	0.201***	-0.012	0.027	0.189**	1.000
	(0.19)	(0.54)	(0.28)	(0.00)	(0.00)	(0.86)	(0.71)	(0.01)	-----

P-values are in parenthesis. ***, **, * represent statistical significance at the 1%, 5% and 10% level.

Source: Author's computation

4. Empirical Results

4.1. Effect of gender equality on financial stability

This section examines the effect of gender equality institutions, policies and laws (GND) on financial stability (ZSCORE). The results are reported in columns 1 and 2 of table 4. The GND variable is statistically significant and positively related to the ZSCORE variable in the two-stage least squares (2SLS) regression estimation in column 1 of table 4. The GND variable is also statistically significant and positively related to the ZSCORE variable in the generalized linear model (GLM) regression estimation in column 2 of table 4.

The significant GND coefficient in columns 1 and 2 indicates that gender equality institutions, policies and laws have a significant positive effect on financial stability in the developing countries that make up our sample. This result supports the hypothesis that gender equality has a positive effect on financial stability (hypothesis: H1). This result implies that the institutions, policies and laws installed to enforce gender equality can help to preserve financial stability in developing countries. In terms of economic significance, the GND coefficient is economically significant in columns 1 and 2 of table 4 which indicates that a unit increase in gender equality institutions, policies and laws will lead to more than 400 percent improvement in financial stability in developing countries.

Regarding the control variables, the NPL variable is significant and negatively related to the ZSCORE variable in columns 1 and 2 of table 4 as expected. This indicates that fewer nonperforming loans is associated with greater financial stability. The implication is that a banking sector that has fewer loan default is more stable, thereby confirming the expected negative relationship between banking sector nonperforming loans and financial stability. The EFF variable reports a positive coefficient sign which is insignificant in columns 1 and 2 of table 4. This is contrary to the expectation of a negative relationship between the EFF and ZSCORE variables. The implication is that an efficient banking sector does not have a significant effect on financial stability in the developing countries in our sample. The GDPR variable is negatively related to the ZSCORE in columns 1 and 2 of table 4. The negative GDPR coefficient is contrary to

the expectation of a positive relationship between GDP growth and financial stability. This indicates that economic growth does not have a significant positive complementary effect on financial stability as predicted. This suggests that economic growth, reflected in increases in national output, may not translate to greater financial stability. The FST variable has an insignificant effect on the ZSCORE variable in columns 1 and 2 of table 4.

Table 4. Regression estimation for the effect of gender equality on financial stability

	(1)	(2)
	Dependent variable: **ZSCORE**	Dependent variable: **ZSCORE**
Variables	Two-stage Least Squares (2SLS) Estimation	Generalized Linear Model (GLM) Estimation
	Coefficient (T-statistic)	Coefficient (Z-statistic)
c	1.589 (0.24)	5.727 (1.23)
GND	4.655*** (5.63)	4.237*** (6.11)
NPL	-0.583*** (-5.05)	-0.589*** (-7.09)
EFF	0.042 (0.44)	0.026 (0.59)
GDPR	-0.526* (-1.69)	-0.141 (-1.23)
FST	1.216 (0.91)	0.158 (0.17)
Adjusted R-square	38.28	
F-statistic	21.05	
Instrument rank	6	
LR Statistic		421.14
P(LR Statistic)		0.000

The 2SLS instrumental variables are the one-year lagged explanatory variables in each model. Lagging the explanatory variables allows us to mitigate endogeneity issues. T-statistics and Z-statistics are reported in parenthesis. ***, * represent statistical significance at the 1% and 10% levels.

Source: Author's computation

4.2. Effect of gender equality on financial inclusion

This section examines the effect of gender equality institutions, policies and laws (GND) on financial inclusion (FCL). The results are reported in columns 1 and 2 of table 5. The GND variable is statistically significant and positively related to the FCL variable in the two-stage least squares (2SLS) regression estimation in column 1 of table 5. The GND variable is also statistically significant and positively related to the FCL variable in the generalized linear model (GLM) regression estimation in column 2 of table 5.

The significant GND coefficient in columns 1 and 2 indicates that gender equality institutions, policies and laws have a significant positive effect on financial inclusion in developing countries. This result supports the hypothesis that gender equality has a positive effect on financial inclusion (hypothesis: H2). This result implies that the institutions, policies and laws installed to enforce gender equality can help to increase the level of financial inclusion in developing countries. In terms of economic significance, the GND coefficient is economically significant in columns 1 and 2 which indicates that a unit increase in gender equality institutions, policies and laws will lead to more than 270 percent increase in the level of financial inclusion in developing countries.

Regarding the control variables, the GDPR variable report mixed signs in relation to the FCL variable in columns 1 and 2 of table 5; therefore, no meaningful conclusion can be drawn for the GDPR control variable. The COST variable is significant and negatively related to the FCL variable in columns 1 and 2 of table 5 as expected. This indicates that a low overhead cost ratio in the banking sector leads to greater financial inclusion in developing countries. The implication is that developing countries whose banking sector have a low overhead cost ratio will experience higher level of financial inclusion, thereby confirming the expected negative relationship between banking sector overhead costs and financial inclusion. The ECO variable is significant and negatively related to the FCL variable in columns 1 and 2 of table 5. This indicates that strong macroeconomic management is associated with reduced financial inclusion in developing countries. The implication is that developing countries that have a high macroeconomic management rating may experience low levels of financial inclusion. The FST variable is significant and positively related to the FCL variable in columns 1 and 2 of table 5. This indicates

that strong financial sector policies and regulations are helpful in improving the level of financial inclusion. The implication is that developing countries that have strong financial sector policies and regulations will experience high levels of financial inclusion.

Table 5. Regression estimation for the effect of gender equality on financial inclusion

	(1)	(2)
Variables	Dependent variable: **FCL**	Dependent variable: **FCL**
	Two-stage Least Squares (2SLS) Estimation	Generalized Linear Model (GLM) Estimation
	Coefficient (T-statistic)	Coefficient (Z-statistic)
c	-1.582 (-0.29)	-0.291 (-0.08)
GND	3.296*** (4.84)	2.718*** (4.73)
GDPR	-0.248 (-0.67)	0.029 (0.33)
COST	-0.753*** (-3.27)	-0.665*** (-4.16)
FST	4.739*** (4.44)	4.164*** (5.31)
ECO	-3.749*** (-3.43)	-3.549*** (-5.38)
Adjusted R-square	16.43	
F-statistic	10.34	
Instrument rank	6	
LR Statistic		58.76
P(LR Statistic)		0.000

The 2SLS instrumental variables are the one-year lagged explanatory variables in each model. Lagging the explanatory variables allows us to mitigate endogeneity issues. T-statistics and Z-statistics are reported in parenthesis. *** represents statistical significance at the 1% level.

Source: Author's computation

4.3. Sensitivity analysis

4.3.1. African countries vs non-African countries subsample analysis

This section examines the effect of gender equality on financial stability and financial inclusion after dividing the developing countries into two subsamples: (i) the African countries subsample and (ii) the non-African developing countries. Existing studies, such as Steel and Kabashima (2008), Bericat (2012), Ozili (2018b), Beck et al. (2015) and Ozili (2021a), show that different regions are at different stages of gender equality and these regions also have dissimilar levels of financial inclusion and financial stability. Therefore, we test this expectation by re-estimating the results in the two subsamples: the African countries subsample and the non-African countries subsample.

The result for the effect of gender equality on financial stability for the African countries sub-sample is reported in columns 1 and 2 of table 6. The GND variable has a significant positive effect on the ZSCORE variable in the two estimations in columns 1 and 2 in the African countries subsample. The result is robust and indicates that gender equality has a significant positive effect on financial stability in African countries. This result confirms our earlier result in table 4 and supports the hypothesis that gender equality has a positive effect on financial stability (hypothesis: H1). In terms of economic significance, the GND coefficient is economically significant in columns 1 and 2 of table 6 and indicates that a unit increase in gender equality institutions, policies and laws will lead to more than 250 percent increase in financial stability in African countries. This result implies that the institutions, policies and laws installed to enforce gender equality in African countries can increase financial stability in African countries.

The result for the effect of gender equality on financial inclusion for the African countries sub-sample is reported in columns 3 and 4 of table 6. It can be observed that the GND variable has a significant positive effect on the FCL variable in the two estimations in columns 3 and 4 in the African countries subsample. The result is robust and indicates that gender equality has a significant positive effect on financial inclusion in African countries. This result confirms our earlier result in table 5 and supports the hypothesis that gender equality has a positive effect on financial inclusion (hypothesis: H2). In terms of economic significance, the GND coefficient is

economically significant in columns 3 and 4 of table 6 and indicates that a unit increase in gender equality institutions, policies and laws will lead to more than 100 percent increase in the level of financial inclusion in African countries. This result implies that the institutions, policies and laws installed to enforce gender equality in African countries can increase the level of financial inclusion in African countries.

In the non-African developing countries subsample, the result for the effect of gender equality on financial stability is reported in columns 5 and 6 of table 6. The GND variable has a significant positive effect on the ZSCORE variable in the two estimations in columns 5 and 6 in the non-African developing countries subsample. This result is robust and indicates that gender equality has a significant positive effect on financial stability in non-African developing countries. This result confirms our earlier result in table 4. Regarding the result for the effect of gender equality on financial inclusion in the non-African developing countries sub-sample, the effect of GND on the FCL variable is mixed and insignificant in columns 7 and 8. The GND variable is negative in column 7 and positive in column 8 of table 6, indicating that the results are not robust. A possible reason for the insignificant result might be because of the indigenous social, cultural and institutional norms that exist in some non-African developing countries which prevent gender equality institutions, policies and laws from having a significant effect on financial inclusion in non-African developing countries.

Table 6. Effect of gender equality on financial stability and financial inclusion *(Subsample analysis)*

Variables	African countries subsample (columns 1-4)				Non-African countries subsample (columns 5-8)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2SLS Estimation	Generalized Linear Model Regression	2SLS Estimation	Generalized Linear Model	2SLS Estimation	Generalized Linear Model	2SLS Estimation	Generalized Linear Model
	ZSCORE	**ZSCORE**	**FCL**	**FCL**	**ZSCORE**	**ZSCORE**	**FCL**	**FCL**
	Coefficient (T-statistic)	Coefficient (Z-statistic)	Coefficient (T-statistic)	Coefficient (Z-statistic)	Coefficient (T-statistic)	Coefficient (Z-statistic)	Coefficient (T-statistic)	Coefficient (Z-statistic)
c	-15.749	0.144	-7.465	-3.519**	-36.531**	-15.396*	22.897	2.000
	(-1.61)	(0.04)	(-1.17)	(-2.25)	(-2.38)	(-1.74)	(0.14)	(0.37)
GND	3.047***	2.626***	1.205***	1.242***	11.029***	7.621***	-1.809	1.404
	(2.87)	(3.99)	(3.49)	(4.51)	(5.14)	(5.65)	(-0.07)	(1.36)
NPL	0.045	-0.221***			-0.381	-0.856***		
	(0.26)	(-3.34)			(-1.20)	(-4.24)		
EFF	0.722**	0.699***			0.199*	0.209***		
	(2.56)	(5.19)			(1.88)	(4.89)		
GDPR	-1.389**	-0.207**	-0.269	0.004	-0.298	-0.101	-7.288	-0.258*
	(-2.08)	(-2.06)	(-0.67)	(0.10)	(-0.52)	(-0.73)	(-0.16)	(-1.87)
FST	5.386*	0.179	2.272***	1.676***	4.272*	1.666	-6.624	1.636
	(1.84)	(0.19)	(2.68)	(3.79)	(1.88)	(1.28)	(-0.11)	(1.40)
COST			0.494	0.116			1.217	2.400***
			(1.08)	(1.27)			(0.13)	(6.69)
ECO			-0.555	-0.873***			12.747	-2.237**
			(-0.54)	(-2.63)			(0.12)	(-2.08)
Adjusted R^2	36.73		1.55		87.91		45.56	
F-statistic	10.52		12.56		86.57		27.37	
Instrument rank	6		6		6		6	
LR Statistic		80.52		58.08		446.73		134.69
P(LR Statistic)		0.000		0.000		0.000		0.000

The 2SLS instrumental variables are the one-year lagged explanatory variables in each model. Lagging the explanatory variables allows us to mitigate endogeneity issues. T-statistics and Z-statistics are reported in parenthesis. ***, **, * represent statistical significance at the 1%, 5% and 10% level.

Source: Author's computation

4.3.2. Crisis years vs non-crisis years: subsample analysis

This section examines the effect of gender equality on financial stability and financial inclusion during crisis years and non-crisis years. We compare the relationship between gender equality, financial stability and financial inclusion in the two period subsamples. We divide the full sample period into two subsamples. The first subsample is the crisis years subsample (i.e., 2007, 2008, 2009, 2020 and 2021). This subsample captures the global financial crisis period (from 2007 to 2009) and the COVID-19 pandemic period (from 2020 to 2021). The second subsample is the non-crisis years subsample (i.e., from 2005 to 2006 and from 2010 to 2019). The second subsample captures the period of absence of global crisis events.

The result for the effect of gender equality on financial stability during the crisis years is reported in columns 1 and 2 of table 7. The GND variable is insignificant in the two estimations in columns 1 and 2 in the crisis years subsample. The result is not robust to the earlier results in table 4 and indicates that gender equality does not have a significant effect on financial stability during crisis years. Also, the result for the effect of gender equality on financial inclusion during crisis years is reported in columns 3 and 4 of table 7. The result for the GND variable is mixed – it is insignificant in column 3 and significant in column 4; therefore, the result is not robust. Similarly, the result for the effect of gender equality on financial stability during non-crisis years is reported in columns 5 and 6 of table 7. The GND variable is insignificant in the two estimations in columns 5 and 6 in the non-crisis years subsample. The result is not robust to the earlier results and indicates that gender equality does not have a significant effect on financial stability during non-crisis years. Also, the result for the effect of gender equality on financial inclusion during non-crisis years is reported in columns 7 and 8 of table 7. The result for the GND variable is mixed – it is insignificant in column 7 and significant in column 8; therefore, the result is not robust.

Table 7. Effect of gender equality on financial stability and financial inclusion

Subsample analysis: crisis years vs non-crisis years

Variables	Crisis Years sub-sample (columns 1-4)				Non-Crisis Years subsample (columns 5-8)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2SLS Estimation	Generalized Linear Model Regression	2SLS Estimation	Generalized Linear Model	2SLS Estimation	Generalized Linear Model	2SLS Estimation	Generalized Linear Model
	ZSCORE	**ZSCORE**	**FCL**	**FCL**	**ZSCORE**	**ZSCORE**	**FCL**	**FCL**
	Coefficient (T-statistic)	Coefficient (Z-statistic)	Coefficient (T-statistic)	Coefficient (Z-statistic)	Coefficient (T-statistic)	Coefficient (Z-statistic)	Coefficient (T-statistic)	Coefficient (Z-statistic)
squc	34.418	12.848	12.829	11.416	27.774***	3.507***	22.897	2.116***
	(0.57)	(0.96)	(0.23)	(1.23)	(3.18)	(7.78)	(0.14)	(3.07)
GND	1.047	2.479	4.649	3.833***	-0.496	-0.026	-1.809	-0.522***
	(0.25)	(1.45)	(1.61)	(2.97)	(-0.27)	(-0.27)	(-0.07)	(-4.08)
NPL	-0.968	-0.448*			-0.834***	-0.053***		
	(-1.23)	(-1.86)			(-4.12)	(-4.75)		
EFF	-0.455	0.179			-0.092	-0.006		
	(-0.66)	(1.43)			(-0.95)	(-1.23)		
GDPR	-0.472	-0.169	-0.326	0.138	-0.023	-0.004	-7.288	0.032
	(-0.74)	(-0.79)	(-0.51)	(0.92)	(-0.07)	(-0.24)	(-0.16)	(1.06)
FST	4.526	-3.266	3.045	1.871	0.118*	0.007**	-6.624	0.015***
	(0.46)	(-1.21)	(0.28)	(1.04)	(1.88)	(2.16)	(-0.11)	(2.61)
COST			-1.262	-0.547*			1.217	-0.078*
			(-1.09)	(-1.66)			(0.13)	(-1.97)
ECO			-6.561	-5.807***			12.747	0.441**
			(-1.22)	(-3.59)			(0.12)	(2.18)
Adjusted R-square	30.42		30.55		43.13		45.56	
F-statistic	11.42		13.78		15.56		27.37	
Instrument rank	6		6		6		6	
LR Statistic		11.32		18.62		46.66		94.45
P(LR Statistic)		0.000		0.002		0.000		0.000

The 2SLS instrumental variables are the one-year lagged explanatory variables in each model. Lagging the explanatory variables allows us to mitigate endogeneity issues. T-statistics and Z-statistics are reported in parenthesis. ***, **, * represent statistical significance at the 1%, 5% and 10% level.

Source: Author's computation

5. Conclusion

This study examined the effect of gender equality on financial stability and financial inclusion for 14 diverse developing countries using annual data from 2005 to 2021. It was argued that gender equality institutions, policies and laws will give people of all gender equal opportunity and will put them in a position where they can play a significant role in mitigating financial stability risks and in preserving financial stability. It was also argued that gender equality institutions, policies and laws can ensure that people of all gender have equal access to formal financial services towards greater financial inclusion for everyone.

The two-stage least squares (2SLS) regression estimation and the generalized linear model regression estimations were used to investigate the effect of gender equality on financial stability and financial inclusion. This study extended the literature by linking gender equality to financial stability and financial inclusion outcomes. The findings showed that gender equality has a significant positive effect on financial stability and financial inclusion in developing countries. In the subsample analysis, it was found that gender equality has a significant positive effect on financial stability and financial inclusion in African countries. Gender equality also has a significant positive effect on financial stability but not for financial inclusion in non-African developing countries.

The results have several implications. One, the findings provide evidence to support the ongoing debate about the benefits of gender equality for society. The findings add to the debate by showing that gender equality is beneficial not only for society, but also for financial stability and financial inclusion in developing countries. Two, the results emphasize that gender equality is fundamental to preserving financial stability and for greater financial inclusion, therefore, policymakers should constantly review existing gender equality frameworks and ensure that they promote fairness and equality of opportunities for people of all gender in the financial sector towards greater financial stability and financial inclusion. Three, the results emphasize the need for policymakers to develop gender equality institutions, policies and laws that enforce equal rights and opportunities for people of all gender in the financial sector. Policymakers should not only introduce gender equality institutions, policies and laws. They should also consider the

influence of indigenous social and cultural norms that affect the potency of gender equality efforts in their countries especially in African counties. Although human rights activists and development economists seem to agree that gender equality is beneficial for society, they should also consider the conditional positive or negative effect of gender equality on financial stability and financial inclusion in the presence of deep-root social, cultural and institutional norms that promote bias against women relative to men. Policymakers should counter such norms by developing strong gender equality regulatory frameworks in the financial sector.

One limitation of the study is the choice of gender equality and financial stability indicators. The study used a composite measure of financial stability (e.g. the ZSCORE) rather than using single measures of financial stability (e.g. the nonperforming loans ratio) that may offer new insights. However, the problem with using single measures of financial stability is that they often yield conflicting effects with the independent variables. Another limitation of the study is the few numbers of countries. Another limitation of the study relates to the choice of financial inclusion indicator. There are other indicators of financial inclusion that may offer additional insight. Another limitation of the study is that the gender equality variable used in this study is a macro indicator, consequently, this variable may not capture the salient micro-level gender equality issues in society such as the gender pay gap in individual firms, the unequal representation of women and other gender-related issues. These limitations open some fruitful areas for future research.

Future studies can replicate this study by using a larger set of developing countries and developed countries. Future studies can also investigate the effect of micro-level indicators of gender equality on financial stability and financial inclusion. Future studies can also extend this study by including other countries, additional measures of gender equality and other financial stability and financial inclusion indicators that may offer additional valuable insights to this line of research.

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Appendix

Table 8. Variance Inflation Factors:

Effect on financial stability

Sample: 2005 - 2021

Included observations: 177

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	21.66661	155.7146	NA
GND	0.481102	42.01380	1.148948
NPL	0.006922	4.296598	1.131467
EFF	0.001943	48.09608	1.152155
GDPR	0.012996	2.939361	1.082787
FST	0.882112	69.25213	1.179633

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Table 9. Variance Inflation Factors:

Effect on financial inclusion

Sample: 2005 - 2021

Included observations: 212

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	12.19132	142.0739	NA
GND	0.330106	46.68964	1.201316
GDPR	0.008142	3.291185	1.158101
COST	0.025426	9.286655	1.227442
FST	0.614374	76.88262	1.258018
ECO	0.434325	73.95852	1.251265