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Abstract

This present study examines the role of financial inclusion dynamics (depth, access and efficiency) in mitigating the incidence of income inequality on gender inclusion in terms of women in business and women in politics. The following main findings are established. Income inequality reduces gender inclusion while financial inclusion dynamics dampen the negative effect of income inequality on gender inclusion. The corresponding net effects are negative. Considering positive conditional or interactive effects and the negative net effects, financial institution thresholds at which income inequality no longer reduces gender inclusion are provided and discussed. At the established thresholds, the financial institution dynamics become both necessary and sufficient conditions for the simultaneous mitigation of income inequality and promotion of gender inclusion. The established findings are contingent on initial levels of gender inclusion, measurement of gender inclusion, estimation approach and proxy for financial inclusion. Policy implications are discussed.

Keywords: Financial inclusion; women; inequality; sub-Saharan Africa
JEL Classification: G20; O40; I10; I20; I32

1. Introduction

The foundational elements of this study on the role of financial inclusion in the incidence of income inequality on gender inclusion in terms of women in business and women in politics are based on four main factors, three of which are directly related to the sustainable development goals (SDGs) of the United Nations, notably: (i) the importance of financial inclusion in driving inclusive development; (ii) the concern of income inequality that is standing on the way to inclusive development; (iii) the role of gender inclusion in sustainable development and (iv) gaps in the extant contemporary literature on the subject. In discussing the first-three factors, the elements of style in scientific scholarly communication are tailored such that, the importance of the main factors in SDGs is first highlighted before, the specificity of sub-Saharan Africa (SSA) within the remit of SDGs is articulated. The highlighted factors are substantiated in the same chronological order as provided.

First, the role of the financial system in driving economic development is a consensus in both scholar and policy circles (Asongu & Odhiambo, 2019), not least because governments, corporations and households, irrespective of wealth status depend on the health of financial inclusion for the running of operations. The fundamental essence of a financial system that is inclusive is even more apparent in the light of a central or key role of financial inclusion in achieving most SDGs. In other words, if the financial system is tailored to be inclusive, such financial inclusivity is connected to the achievement of most of the 17 SDGs (see Asongu & Nting, 2022; UNCD, 2022). The specificity of SSA is premised on the fact that the region is the least developed in the world in terms of financial inclusion (Tchamyou, 2019). As argued in the extant literature, variables and indicators that have a potential for development in the light of saturation levels are good proxies of policy or moderating variables because when policy thresholds are established from robust empirical analysis, policy makers can work on the actionable policy thresholds in order to influence the outcome variables in the desired outcome via the main channels or independent variables of interest (Tchamyou, 2021; Nchofoung *et al*., 2021, 2022). It is on this underlying basis that financial inclusion is employed in the present study as moderating or policy variables.

Second, the policy syndrome of income inequality is fundamental in the achievement of most SDGs because when the fruits of economic prosperity are not equally divided amongst the population, wealth is skewed to only a fraction of the population and hence, the other fraction of the population is not provided with the necessary means through which to finance its

households and socio-economic needs (Tchamyou *et al*., 2019a; UNCD, 2022). The specificity of SSA in this narrative is founded on the fact that in spite of the continent experiencing a recent growth resurgence about a decade prior to the end of the millennium development goals (MDGs), about haft of countries in the sub-region did not achieve the poverty reduction target related to MDGs (Asongu & le Roux, 2019). By extension, with respect to SDGs, a recent study has concluded that most SDGs, especially the SDG extreme poverty target is unlikely to be achieved in SSA unless the concern of income inequality is substantially addressed in the region (Bicaba *et al*., 2017). It is worthwhile of emphasis that SDG1 is focused on poverty reduction while SDG10 is related to the mitigation of income inequality.

Third, SDG5 which focuses on gender inclusion and empowerment is relevant to the present study because outcome variables of gender inclusion (i.e. women in business and women in politics) are employed. The concern of gender exclusion is very significant because about 160 trillion USD of GDP is lost owing to the exclusion of women in society (World Bank, 2018). Hence, building on the discussed premise of income inequality in sustainable development in the previous paragraph, gender exclusion is a concern for sustainable development, not least because gender exclusion is associated with higher income inequality among women, with the most notable cases in SSA (Asongu & Odhiambo, 2020).

Fourth, the extant contemporary literature on gender inclusion has largely focused on *inter alia,* the importance of involving more women in education (Elu, 2018; Asongu *et al*., 2019); nexuses between information technologies, social responsibility at the corporate level and the economic inclusion of more women (Uduji *et al*., 2019; Uduji & Okolo-Obasi, 2018, 2019, 2020); connections between microfinance, bank channels, mobile money and the entrepreneurship of women (Ngono, 2021); the role of mobile money in the financial inclusion of women (Kim, 2022); linkages between mobile money, the use of information technology (IT) and financial access to the female gender (Asongu & Odhiambo, 2018a; Osabuohien & Karakara, 2018) as well as gender variations with respect to financial inclusion (Mndolwa & Alhassan, 2020).

Of the highlighted studies in the extant literature, the closest to the positioning of the present study is Ngono (2021) which has investigated how mobile money, microfinance and mechanisms of the bank affect funding used for the entrepreneurship of women in SSA. Accordingly, Ngono (2021) has used data for the period 2004-2018 within the framework of a generalized method of moments (GMM) regression technique. The results show that services

from the bank do not engender a substantial effect on women's self-employment whereas alternatives such as services from microfinance and mobile money engender a significant impact. The present study converges with Ngono (2021) from two main standpoints: (i) the importance of financial inclusion in gender economic inclusion and (ii) the positioning on SSA. The present study also steers clear of Ngono (2021) on at least four premises: (i) periodicity and data (48 countries during the period 2004-2018 versus 42 countries for the period 1980 to 2019); (ii) methodology (GMM estimations versus Quantile estimations that are subsequently complemented with Tobit regressions); (iii) a focus on both gender economic inclusion and gender policy outcomes, contrary to Ngono (2021) which focuses on gender economic outcomes and (iv) distinct policy outcomes in that, the present study accounts for both the initial levels of the outcomes variables are well computes financial institution critical levels that policy makers can leverage to reduce inequality in income levels while promoting gender inclusion within the frameworks women involved in business and politics. It is worthwhile to provide more insights into this fourth distinctive element.

Two main points are worth substantiating with respect to the fourth distinctive element in the light of Ngono (2021). First, it is argued in the present research that mainly providing nexuses between gender inclusive outcomes and the independent variables of interest, as done by Ngono (2021) is not enough, not least, because policy makers are yearning to know what specific policy instruments should be applied to influence the outcome variables in targeted directions. Hence, in this study, it is argued that providing policy makers with estimated signs and significance between independent variables and dependent variables is a necessary but not a sufficient condition for actionable policy implications. Furthermore, the present study is framed such that whatever policy thresholds are recommended to policy makers are contingent on existing levels of gender inclusion. Accordingly, we establish financial inclusion' critical masses or thresholds that are relevant in dampening the negative incidence of income inequality on the engaged gender inclusion dynamics (i.e., women in business and women in politics). Second, considering the estimation technique adopted by Ngono (2021), it is reasonable to posit that the corresponding policy implications are blanket or broad, not least, because the estimations are based on the mean values of the outcome variables. In the light of this shortcoming, the present study argues that broad/blanket policy implications are unlikely to be effective unless the investigated nexuses are contingent on initial levels of the outcome variables, such that policy effectiveness is contingent on initial levels of women in business and women in politics. The argument therefore extends to the position that policy measures

designed to improve gender inclusion can be more effective when such policies are contingent on existing levels of gender inclusion and tailored differently across countries with varying initial levels (i.e., low, intermediate and high) of the various gender inclusion dynamics. The study takes the highlighted concern on board by employing an interactive quantile regression technique.

The rest of the study is structured as follows. The theoretical underpinnings and related testable hypotheses are covered in Section 2 while the data and methodology are disclosed in Section 3. Section 4 provides the empirical results while the study concludes in Section 5 with implications and future research directions.

2. Theoretical underpinnings and testable hypotheses

The elements of style in the introduction are tailored such that the following three fundamental perspectives are taken into account in the narratives, notably: (i) an exposition of the theoretical underpinnings; (ii) contextualizing the discussed theoretical framework with respect to the problem statement being considered and (iii) a statement of hypotheses to be examined in the empirical section of the study. These highlighted three strands are substantiated in the same chronology as highlighted.

First, the theoretical framework is borrowed from Tchamyou *et al*. (2019a) who have focused on the nexus between financial inclusion and inclusive development within the remit of income inequality. The present study is also connected to how financial inclusion affects income inequality before ultimately promoting gender inclusion in terms of women in business and women in politics. According to the attendant literature, two main theories articulate the premise for a nexus between financial inclusion and inclusive development, notably: the intensive and extensive margin theories. The former (i.e. intensive margin theory) argues that financial inclusion can enhance services offered to existing customers of the financial institution and in so doing can lead to some degree of income inclusive development, especially when women among existing customers are provided with more financial opportunities with which to improve their wealth possibility frontiers.

The latter (i.e. the extensive margin theory) maintains that when financial institutions extend their services to the elements of society that were previously not opportune to use formal financial services, such a process of extension can lead to income inequality reduction, not least because the fraction of the population that *hitherto* did not have access to formal banking

activities are provided with enhanced financial access avenues that they can leverage upon to address consumption and investment needs that ultimately reduce income inequality. The underlying theoretical premises informing the intensive and extensive margin strands are consistent with an extant strand of the literature focusing on the nexus between financial inclusion and inclusive development (Evans & Jovanovic, 1989; Greenwood & Jovanovic, 1990; Galor & Zeira, 1993; Holtz-Eakin *et al*., 1994; Black & Lynch, 1996; Galor & Moav, 2004; Aghion & Bolton, 2005; Beck *et al*., 2007; Bae *et al*., 2012; Chipote *et al*., 2014; Batabyal & Chowdhury, 2015; Chiwira *et al*., 2016; Tchamyou & Asongu, 2017a; Zahonogo, 2017; Asongu & Odhiambo, 2018b).

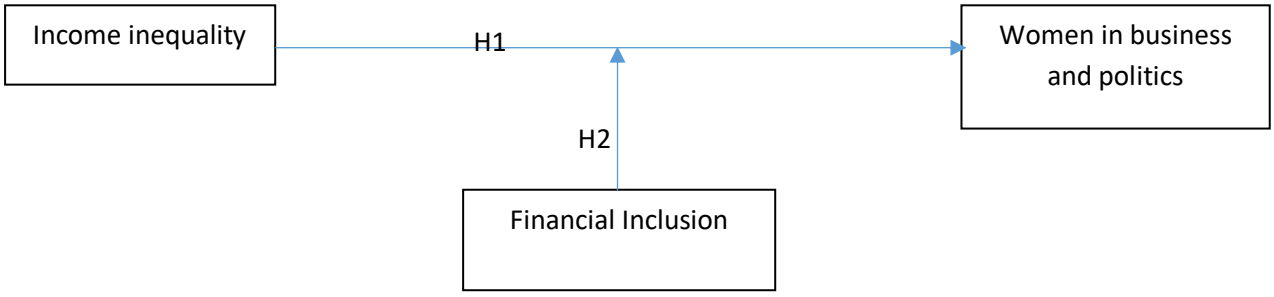
In the second strand focusing on the contextualization of the theoretical expositions, it is important to articulate that the theoretical nexuses are founded on the relevance of financial inclusion in inclusive development (i.e., gender inclusion being the proxy of inclusive development in the present study). In essence, financial inclusion dynamics which are employed in this study as moderating variables are consistent with the premise of financial inclusion discussed in the theoretical underpinnings. The channel of income inequality through which financial inclusion affects gender economic participation is also relevant because income inequality is also a dimension of exclusive development. Hence, the narrative on the nexus between financial inclusion and gender inclusion also holds for the nexus between financial inclusion and income inequality.

Third, in the light of the theoretical underpinnings in the first strand and context of the theoretical underpinnings in the second strand, the intuition of this study which is consistent with the attendant theoretical underpinnings is simple to follow: on the premise that income inequality reduces gender inclusion in SSA (see Asongu & Odhiambo, 2020), financial inclusion can moderate the negative incidence of income inequality on gender inclusion in terms of women in business and women in politics. The underlying, leads to the following two testable hypotheses.

Hypothesis 1: income inequality reduces the presence of women in politics and business

Hypothesis 2: financial inclusion moderates the negative influence of income inequality on the presence of women in politics and business.

Figure 1: The moderating effect of financial inclusion on the relationship between income inequality and women in business and politics



The conceptual framework underlying the testable hypothesis is provided in Figure 1 in order to enhance readability and flow. Accordingly, given that the study involves interactive regressions, the relevance of the transmission channel and moderating variable have been discussed prior to stating the testable hypotheses. Accordingly, income inequality which is the main channel is articulated in Hypothesis 1 whereas financial inclusion which moderates the effect of income inequality on the outcome variables, is captured in Hypothesis 2. Whether the testable hypotheses withstand empirical scrutiny is a matter of empirical validity which is the focus of the next section.

3. Data and methodology

3.1 Data

The focus of this study is on 42 countries in SSA with data from 1980 to 2019[2]. The data originates from two main sources, namely: the World Development Indicators (WDI) of the World Bank and (ii) the Global Findex database. Two main dependent variables are used in the study, in accordance with contemporary gender empowerment literature (Bezinna *et al*., 2021; Min *et al*., 2021; Achuo *et al*., 2022), notably: (i) women in business proxied by women in businesses and law index score (scale 1 to 100)[3] and (ii) women in politics proxied with the proportion of seats held by women in national parliament (%) (Bezzina et al., 2022). It is important to note that the women in business indicator should be more anchored in countries

[2]The 42 countries are: "*Angola; Benin; Botswana; Burkina Faso; Burundi; Cabo Verde; Cameroon; Central African Republic; Chad; Comoros; Congo Democratic Republic; Congo Republic; Cote d'Ivoire; Ethiopia; Gabon; Gambia, The; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Namibia; Niger; Nigeria ; Rwanda; Sao Tome and Principe; Senegal; Seychelles; Sierra Leone; South Africa; Sudan; Tanzania; Togo; Uganda and Zambia*".

[3] While the proxy for women in politics is the proportion of seats held by women in national parliament because of data availability constraints, it is relevant to note that in Africa, women serve as city council members, mayors of sizable cities, and ministers. Additionally, they have representation on village councils in rural communes. In political parties, they also occupy responsible positions as well.

with a robust and increased private sector because, it measures how laws and regulations affect women's economic opportunity. Accordingly, overall scores are calculated by taking the average score of each of the eight dimensions (i.e., starting a job, going places, getting paid, getting a pension, having children, getting married, running a business and managing assets), with 100 representing the highest possible score.

The income inequality indicator that is selected is the Gini index, which is also in accordance with contemporary income inequality literature (Tchamyou, 2021). Concerning the moderating variables, three main financial institutional variables are employed, namely: financial inclusion depth (FID) index; financial inclusion access (FIA) index and financial inclusion efficiency (FIE) index. The choice of three financial inclusion variables is consistent with contemporary financial development literature on the importance of engaging more financial variables in order to improve room for policy implications (Tchamyou *et al*., 2019a).

In order to mitigate the concern of variable omission bias, the following control variables are taken into account, namely: inflation, foreign aid, government expenditure, gross domestic product (GDP) growth, foreign direct investment, remittances and trade. The choice of the control variables is in line with contemporary inclusive development literature (Ofori *et al*., 2021; Asongu *et al*., 2021b).

It is also important to provide clarity on the expected signs of the elements in the conditioning information set. Accordingly, in the light of the interactive nature of the corresponding specifications (i.e. in which multiplications for interactions are employed), concerns about multicollinearity are apparent. It is essentially for this reason that as documented by Brambor *et al*. (2006), owing to the concern of multicollinearity that is always apparent in interactive regressions, estimated coefficients are not interpreted as in linear additive models which is the reason; net effects and thresholds are computed. Such net effects and corresponding thresholds entail both the unconditional incidence of income inequality as well as the conditional or interactive incidence of income inequality. It follows that it is essentially on the premise that interactive regressions are not interpreted as in linear additive models that expected signs from the variables adopted in the conditioning information set cannot be established with certainty. However, we expect most of the adopted variables in the conditioning information set to be significant, though the corresponding estimated signs cannot be established in the light of the narrative above. This narrative on the computation of net effects and thresholds in interactive regressions in order to avoid pitfalls in interactive regressions documented in Brambor *et al*.

(2006) is consistent with contemporary economic development literature on the subject of interactive regressions (Nchofoung *et al*., 2021; Nchofoung & Asongu, 2022a).

The appendix section of the study is characterized by a disclosure of the employed variables and their corresponding sources in Appendix 1 while in Appendix 2, there is a summary statistic that is used by the study for computing net effects and verifying the computation of thresholds. The picture of the appendix section is completed with a correlation matrix in Appendix 3 which provides preliminary insights into the potential nexuses between the gender inclusion outcomes and the independent variables of interest on the one hand and nexuses among independent variables on the other.

3.2 Methodology

3.2.1 Quantile regressions

Consistent with the motivational elements outlined in the introduction, a quantile regression (QR) estimation approach is adopted in this study because it enables the assessment of considered linkages throughout the conditional distribution of females that are engaged in politics and business. It is important to note that with the QR approach, high, intermediate and low initial levels of the dependent variables are clearly articulated in the corresponding estimations (Billgerv & Goel, 2009; Tchamyou & Asongu, 2017b; Asongu, 2017; Boateng *et al*. 2018).

What is also worth articulating is the perspective that while in the ordinary least squares (OLS), the procedure is based on the premise of normally distributed error terms, this is not the case with the QR approach, given that in the QR approach, the parameters are modelled at a plethora of points in the conditional distribution of the outcome variables (Koenker & Bassett, 1978; Keonker & Hallock, 2001; Asongu et al., 2023a, 2023b).

In the light of the above, the θ^{th} quantile estimator of females that are involved in politics and business is obtained by solving for the optimization problem in Equation (1), which is provided in the absence of subscripts for simplicity in presentation.

$$\min_{\beta \in R^k} \left[\sum_{i \in \{i: y_i \geq x_{i'}\beta\}} \theta \left| y_i - x_{i'}\beta \right| + \sum_{i \in \{i: y_i < x_{i'}\beta\}} (1-\theta) \left| y_i - x_{i'}\beta \right| \right], \qquad (1)$$

where $\theta \in (0,1)$. Compared to OLS estimations that are for the most part based on a procedure in which the sum of squared residuals is minimised, the QR technique is characterised by the sum of absolute deviations for the corresponding quantiles. For instance, when employing the

QR approach, many quantiles such as the 90th and 75th quantiles (with θ=0.90 or 0.75, respectively) are reduced by approximately weighing the residuals. Accordingly, the conditional quantile of women in politics and women in business or y_i given x_i is:

$$Q_y(\theta / x_i) = x_{i'}\beta_\theta \qquad (2)$$

where for the respective θ^{th} specific quantile, unique slope parameters are modelled. It is worthwhile to emphasize that the underlying formulation is orthogonal to $E(y / x) = x_{i'}\beta$ in the OLS slope based on which the assessed parameters are exclusively at average of the conditional distribution of females that are engaged in business and politics. In essence, for the underlying model in Eq. (2), the dependent variable y_i is the women in politics or women in business indicator while x_i contains a constant term, *financial inclusion access, financial inclusion depth, financial inclusion efficiency, income inequality, foreign aid, inflation, gross domestic product (GDP) growth, government expenditure, foreign direct investment, remittances and trade*.

3.2.2 Tobit regressions

While the estimation technique in Section 3.2.1 accounts for initial levels of the outcome variables, another characteristic that is worth taking into account in order to define which complementary estimation technique is appropriate, is the limited range of the outcome variables, which motivates the choice of the Tobit regression technique. Accordingly, the outcome variables are censored on both sides of the corresponding distribution because they are defined between 0.00% and 100%. It follows that a double censored Tobit model is also appropriate for investigating the problem statement within an empirical framework. This justification for the choice of the double censored estimation which is in accordance with the behavior of the outcome variable is consistent with both contemporary and non-contemporary Tobit-centric literature (Kumbhakar & Lovell, 2000; Koetter & Vins, 2008; Coccorese & Pellecchia, 2010; Ariss, 2010; Ajide *et al*., 2019; Nchofoung *et al*., 2021; Nchofoung & Asongu, 2022).

In the light of fundamental Tobit regressions studies (Tobin, 1958; Carson & Sun, 2007), Equations (1) and (2) provided below, articulate the Tobit regression framework.

$$y_{i,t}^{*} = \alpha_0 + \beta X_{i,t} + \varepsilon_{i,t}, \qquad (1)$$

where $y_{i,t}^{*}$ is a response variable that is latent, $X_{i,t}$ is an observed $1\times k$ vector of independent indicators and $\varepsilon_{i,t} \approx$ i.i.d. N(0, σ^2) and is independent of $X_{i,t}$. Contrary to observing $y_{i,t}^{*}$, we observe $y_{i,t}$:

$$y_{i,t} = \begin{cases} y_{i,t,}^{*} \; if \; y_{i,t}^{*} > \gamma \\ 0, \; if \; y_{i,t}^{*} \leq \gamma, \end{cases} \qquad (2)$$

where γ is a constant that is non-stochastic. Hence, the value of $y_{i,t}^{*}$ is missing in scenarios where it is less than or equal to γ.

Following both contemporary and non-contemporary literature on the subject (Amemiya, 1984; Asongu *et al.*, 2020), two marginal nexuses are linked to the main explanatory variables: (i) one that measures the marginal nexus of the independent variables of the unobserved and latent unobserved rate and (ii) the other which shows the observed and censored rate. Still in accordance with the attendant literature, only marginal linkages related to the censored rate are disclosed, given that such disclosure avails room for robust analytical interpretation (Lashitew *et al.*, 2019; Asongu *et al.*, 2021c).

4. Empirical results

4.1 Presentation of results

The empirical results are presented in this section in Tables 1-3. Table 1 provides linkages between financial depth, income inequality, women in politics and women in business, Table 2 shows results on nexuses between financial access, income inequality, women in politics and women in business while Table 3 focuses on connections between financial efficiency, income inequality, women in politics and women in business. Each of the three tables is divided into two main sections. While the right-hand side focuses on women in politics, the left-hand side focuses on women in business, respectively. When the OLS estimates are compared with the QR results, it is apparent that the choice of the QR approach is validated by differences in terms of significance, signs of significance and magnitude of significance. In other words, the validity of estimated coefficients is contingent on initial levels of the gender inclusion variable which is distinct from the blanket perspective provided by the OLS results.

Table 1: Financial depth, inequality and women in politics and business

	Women in Politics						Women in Business					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	**60.619*** **	**50.792*** **	**57.484*** **	**63.255*** **	**66.229*** **	**67.865*** **	**55.466*** **	**27.874*** **	**49.339*** **	**60.255*** **	**62.675*** **	**71.772*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Gini	**-0.072*** **	**-0.134*** **	**-0.100*** **	**-0.050*** **	**-0.062*** **	**-0.059*** **	**-0.249*** **	**-0.084** **	**-0.210*** **	**-0.335*** **	**-0.292*** **	-0.219
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.011)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.000)
FinDep	-2.101	3.840	-10.178	4.226	0.290	-1.405	**15.037*** **	**35.952*** **	**20.251** **	8.438	**16.024** **	14.681
	(0.665)	(0.650)	(0.153)	(0.104)	(0.927)	(0.746)	**(0.001)**	**(0.000)**	**(0.029)**	(0.142)	**(0.019)**	(0.238)
Gini ×FinDep	0.103	**0.370*** **	**0.253** **	0.036	0.052	0.033	0.052	**-0.600*** **	0.131	**0.276*** **	0.101	-0.038
	(0.177)	**(0.007)**	**(0.027)**	(0.931)	(0.300)	(0.628)	(0.472)	**(0.000)**	(0.382)	**(0.003)**	(0.356)	(0.848)
FinAcc	- **11.366*** **	- **64.395*** **	-2.122	**-2.595***	**-3.194***	**-4.851** **	**24.594*** **	**26.971*** **	**33.770*** **	**24.456*** **	**15.322*** **	**20.909*** **
	(0.000)	**(0.000)**	(0.568)	**(0.056)**	**(0.054)**	**(0.033)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**
FinEff	-5.447***	-0.362	**-4.684** **	**-8.669*** **	**-6.728*** **	**-4.474*** **	**11.206*** **	**12.604*** **	**8.093*** **	**12.344*** **	**16.731*** **	**14.602*** **
	(0.000)	(0.888)	**(0.030)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.004)**	**(0.000)**	**(0.000)**	**(0.000)**
Inflation	**0.0006*** **	0.001	0.0007	**0.0005** **	0.0003	**0.002*** **	**-0.001*** **	**-0.003*** **	**-0.001***	-0.0008	-0.0009	-0.001
	(0.000)	(0.192)	(0.282)	**(0.036)**	(0.241)	**(0.000)**	**(0.000)**	**(0.001)**	**(0.062)**	(0.115)	(0.113)	(0.129)
Foreign aid	0.0008	**0.148*** **	0.057	**-0.052*** **	**-0.077*** **	**-0.092*** **	**0.073*** **	**0.155*** **	0.036	0.037	**0.066***	-0.054
	(0.955)	**(0.001)**	(0.112)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.002)**	(0.435)	(0.194)	**(0.054)**	(0.385)
Gov. Exp.	0.006	0.020	-0.004	-0.001	0.003	**0.040*** **	**0.043** **	0.033	**0.037***	**0.055*** **	**0.109*** **	0.007
	(0.169)	(0.268)	(0.794)	(0.781)	(0.570)	**(0.000)**	**(0.011)**	(0.114)	**(0.062)**	**(0.000)**	**(0.000)**	(0.779)
GDPg	**0.089*** **	0.114	**0.139***	**0.090*** **	0.042	-0.034	**0.235*** **	0.067	**0.198** **	**0.196*** **	**0.315*** **	**0.368*** **
	(0.005)	(0.207)	**(0.067)**	**(0.001)**	(0.213)	(0.462)	**(0.000)**	(0.518)	**(0.047)**	**(0.001)**	**(0.000)**	**(0.006)**
FDI	**0.105*** **	0.016	-0.007	**0.069*** **	**0.056** **	-0.040	**0.199*** **	0.099	**0.157***	**0.140*** **	**0.431*** **	**0.396*** **
	(0.006)	(0.830)	(0.904)	**(0.003)**	**(0.048)**	(0.305)	**(0.000)**	(0.261)	**(0.061)**	**(0.007)**	**(0.000)**	**(0.000)**
Remit	**-0.037*** **	-0.001	-0.015	**-0.034*** **	**-0.045*** **	**-0.063*** **	**-0.104*** **	**-0.064** **	**-0.106*** **	**-0.112*** **	**-0.111*** **	**-0.126*** **
	(0.000)	(0.947)	(0.518)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.043)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.002)**
Trade	**0.036*** **	**0.035** **	**0.036*** **	**0.023*** **	**0.035*** **	**0.055*** **	**0.019** **	**0.057*** **	-0.006	0.011	0.008	0.001
	(0.000)	**(0.023)**	**(0.005)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.048)**	**(0.002)**	(0.706)	(0.284)	(0.484)	(0.959)
Net Effects	na	-0.098	-0.075	na	na	na	na	-0.142	na	-0.308	na	na
Thresholds	na	0.362	0.395	na	na	na	na	nsa	na	1.213	na	na
R^2/Pseudo R^2	0.090	0.121	0.060	0.068	0.080	0.126	0.344	0.151	0.159	0.257	0.252	0.211
Fisher	**18.60*** **						**87.93*** **					
Observations	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680

*,**,***: denote respectively, significance levels of 10%, 5% and 1%. OLS shows Ordinary Least Squares. R^2 is consistent with OLS and Pseudo R^2 is in line with quantile regressions. Lower quantiles (e.g., Q 0.1) represent countries in which there are least women involved in business and politics. FinDep: Financial inclusion Depth. Gini: Income Inequality Index. FinAcc: Financial inclusion Access. Gov. Exp: Government Expenditure. FinEff: Financial inclusion Efficiency. GDPg: Gross Domestic Product growth. Remit: remittances. FDI: Foreign Direct Investment. The mean value of Financial inclusion Depth is 0.097. na: not applicable because at least one estimated coefficient needed for the computation of the net effect and/or threshold is not significant. nsa: not specifically applicable because a negative synergy is apparent.

The following findings can be established from Tables 1-3. First, *Hypothesis* 1 is valid because with a few exceptions (i.e., the left-hand side of Table 1), income inequality reduces the number women in politics and women in business. Second, *Hypothesis* 2 is also valid because financial inclusion mitigates the negative incidence of income inequality on women in business and women in politics. However, the underlying validity is contingent on initial levels of gender inclusion, notably: (i) in the bottom (top) quantiles of in the left-hand side of Table 1(2); (ii) throughout the conditional distribution in the right-hand side of Tables 2-3 (with the exception of the 10th quantile of Table 2) where the effect is not significant; (iii) favorable (unfavorable) significance in the median (10th quantile) of the right-hand side of Table 1 and unfavorable significance in the 10th , median and 75th quantiles of Table 3. It is relevant to state that the unfavorable significance builds on the premise that instead of the financial inclusion dynamics moderating income inequality to promote gender inclusion, the opposite effect is instead apparent, not least because the corresponding interactive estimates are negative. Third, most of

the control variables are significant. However, as already discussed in the data section, the expected signs cannot be established with certainty owing to the concerns discussed in the light of Brambor *et al*. (2006).

Table 2: Financial access, inequality and women in politics and business

	Women in Politics						Women in Business					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	**59.990*** **	**44.201*** **	**57.201*** **	**63.653*** **	**66.734*** **	**67.820*** **	**57.698*** **	**31.178*** **	**52.539*** **	**61.484*** **	**63.577*** **	**74.455*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Gini	**-0.060*** **	-0.028	**-0.082*** **	**-0.057*** **	**-0.072*** **	**-0.069*** **	**-0.288*** **	**-0.150*** **	**-0.268*** **	**-0.351*** **	**-0.321*** **	**-0.284*** **
	(0.000)	(0.372)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
FinAcc	-	-	-7.779	**-4.762** **	-	-	6.232	**25.363** **	**12.358***	-3.058	3.919	-3.409
	11.817* **	**23.393*** **			**10.189*** **	**11.586*** **						
	(0.001)	**(0.007)**	(0.230)	**(0.041)**	**(0.001)**	**(0.003)**	(0.126)	**(0.011)**	**(0.092)**	(0.570)	(0.356)	(0.761)
Gini ×FinAcc	0.003	**-0.847*** **	0.124	**0.093** **	**0.133** **	**0.146** **	**0.415*** **	0.141	**0.421*** **	**0.533*** **	**0.319** **	**0.522** **
	(0.964)	**(0.000)**	(0.315)	**(0.034)**	**(0.024)**	**(0.047)**	**(0.000)**	(0.452)	**(0.003)**	**(0.000)**	**(0.013)**	**(0.014)**
FinDep	**3.667** **	**16.712*** **	4.065	**5.603*** **	**3.862*** **	-0.025	**17.283*** **	0.350	**27.390*** **	**24.746*** **	**19.937*** **	**9.513***
	(0.010)	**(0.000)**	(0.172)	**(0.000)**	**(0.007)**	(0.989)	**(0.000)**	(0.938)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.064)**
FinEff	**-5.447*** **	0.189	**-5.253** **	**-8.579*** **	**-7.038*** **	**-3.594*** **	**10.928*** **	**12.503*** **	**7.588*** **	**11.766*** **	**17.061*** **	**17.360*** **
	(0.000)	(0.946)	**(0.012)**	**(0.000)**	**(0.000)**	**(0.004)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**
Inflation	**0.0006*** **	0.0009	0.0007	**0.0004** **	0.0003	**0.002*** **	**-0.001*** **	**-0.002*** **	**-0.001** **	-0.0008	-0.0009	-0.001
	(0.000)	(0.248)	(0.270)	**(0.029)**	(0.250)	**(0.000)**	**(0.000)**	**(0.004)**	**(0.026)**	(0.109)	(0.142)	(0.113)
Foreign aid	-0.0006	**0.137*** **	0.042	**-0.051*** **	**-0.078*** **	**-0.090*** **	**0.073*** **	**0.159*** **	0.037	0.031	**0.070***	-0.089
	(0.967)	**(0.003)**	(0.217)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.003)**	(0.342)	(0.274)	**(0.052)**	(0.138)
Gov. Exp.	0.006	0.021	-0.003	-0.003	0.001	**0.037*** **	**0.042** **	0.037	**0.037** **	**0.050*** **	**0.115*** **	0.021
	(0.214)	(0.275)	(0.831)	(0.484)	(0.784)	**(0.000)**	**(0.011)**	(0.100)	**(0.025)**	**(0.000)**	**(0.000)**	(0.398)
GDPg	**0.091*** **	0.113	**0.129***	**0.082*** **	0.056	-0.038	**0.232*** **	0.068	**0.203** **	**0.196*** **	**0.319*** **	**0.296** **
	(0.004)	(0.252)	**(0.080)**	**(0.002)**	(0.111)	(0.389)	**(0.000)**	(0.546)	**(0.015)**	**(0.001)**	**(0.000)**	**(0.020)**
FDI	**0.106*** **	0.015	-0.002	**0.053*** **	**0.054***	-0.039	**0.188*** **	0.022	**0.145** **	**0.145*** **	**0.423*** **	**0.252** **
	(0.006)	(0.855)	(0.968)	**(0.018)**	**(0.070)**	(0.290)	**(0.000)**	(0.810)	**(0.039)**	**(0.005)**	**(0.000)**	**(0.019)**
Remit	**-0.036*** **	-0.008	-0.010	**-0.030*** **	**-0.044*** **	**-0.061*** **	**-0.102*** **	**-0.071** **	**-0.107*** **	**-0.105*** **	**-0.106*** **	**-0.087** **
	(0.000)	(0.787)	(0.642)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.038)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.025)**
Trade	**0.036*** **	**0.061*** **	**0.032** **	**0.020*** **	**0.036*** **	**0.056*** **	**0.019***	**0.063*** **	-0.0006	0.010	0.010	-0.0001
	(0.000)	**(0.000)**	**(0.011)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.051)**	**(0.001)**	(0.962)	(0.336)	(0.419)	(0.994)
Net Effects	na	na	na	-0.049	-0.061	-0.057	-0.256	na	-0.235	-0.309	-0.296	-0.243
Thresholds	na	na	na	0.612	0.514	0.472	0.693	na	0.636	0.658	1.006	0.544
R^2/Pseudo R^2	0.088	0.118	0.059	0.070	0.081	0.129	0.351	0.148	0.167	0.262	0.256	0.221
Fisher	**18.66*** **						**102.13*** **					
Observations	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680

*,**,***: denote respectively, significance levels of 10%, 5% and 1%. OLS shows Ordinary Least Squares. R^2 is consistent with OLS and Pseudo R^2 is in line with quantile regressions. Lower quantiles (e.g., Q 0.1) represent countries in which there are least women involved in business and politics. FinDep: Financial inclusion Depth. Gini: Income Inequality Index. FinAcc: Financial inclusion Access. Gov. Exp: Government Expenditure. FinEff: Financial inclusion Efficiency. GDPg: Gross Domestic Product growth. Remit: remittances. FDI: Foreign Direct Investment. The mean value of Financial inclusion Access is 0.077. na: not applicable because at least one estimated coefficient needed for the computation of the net effect and/or threshold is not significant.

The previous narrative on the validity of *Hypotheses* 1-2 is informative, not least because the validity of attendant hypotheses is premised on an isolated interpretation of the estimated coefficients. However, in order to jointly examine the validity of both hypotheses, the net effects and overall impacts should be computed in accordance with contemporary interactive regressions literature (Nchofoung *et al*., 2022; Nchofoung & Asongu, 2022b). To this put computation into greater perspective, for the 90th quantile in the left-hand side of Table 2, the net effect from the role of financial inclusion access in moderating the effect of income inequality on women in politics is -0.057 = ([0.146 × 0.077] + [-0.069]). In the corresponding computation, 0.077 is the mean value of financial inclusion access, -0.069 is the unconditional estimate of income inequality on women in politics while 0.146 is the conditional or interactive value of income inequality on women in politics. Comparing the findings across tables and quantiles, it is apparent that the net effects are consistently negative. Such a contrast between

negative net effects and corresponding positive interactive effects implies that there are certain thresholds of financial inclusion dynamics (i.e., depth, access and efficiency) at which the unconditional negative incidence of income inequality on gender inclusion is completely mitigated or nullified. In the section that follows, the perspective on thresholds is discussed in detail.

Table 3: Financial efficiency, inequality and women in politics and business

	Women in Politics						Women in Business					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	**57.389*** **	**39.710*** **	**55.605*** **	**60.873*** **	**62.060*** **	**68.782*** **	**68.781*** **	**51.890*** **	**65.153*** **	**72.090*** **	**70.255*** **	**79.924*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Gini	-0.013	0.060	-0.050	-0.009	0.002	**-0.071****	-0.488	**-0.502*****	**-0.499*****	**-0.521*****	**-0.417*****	**-0.429*****
	(0.663)	(0.286)	(0.342)	(0.634)	(0.906)	**(0.026)**	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
FinEff	-0.583	**13.362****	-3.225	**-3.679***	-1.324	**-6.542***	-	-	-	-	0.448	-1.905
							14.498***	**24.798*****	**21.884*****	**14.212*****		
	(0.860)	**(0.025)**	(0.586)	**(0.076)**	(0.617)	**(0.051)**	**(0.001)**	**(0.003)**	**(0.000)**	**(0.003)**	(0.935)	(0.820)
Gini ×FinEff	-0.088	**-0.252****	-0.041	**-0.076****	**-0.090****	0.042	**0.466*****	**0.649*****	**0.525*****	**0.416*****	**0.286*****	**0.402*****
	(0.105)	**(0.012)**	(0.658)	**(0.028)**	**(0.043)**	(0.456)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.002)**	**(0.004)**
FinDep	**3.736*****	**20.503*****	4.339	**4.590*****	**3.201****	0.074	**17.655*****	-0.569	**27.922*****	**25.851*****	**21.768*****	**8.694***
	(0.008)	**(0.000)**	(0.146)	**(0.000)**	**(0.023)**	(0.966)	**(0.000)**	(0.899)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.051)**
FinAcc	-	-	-2.746	-1.826	**-3.425****	**-5.055****	**25.521*****	**33.124*****	**32.125*****	**26.179*****	**15.723*****	**22.638*****
	11.878***	**74.112*****										
	(0.000)	**(0.000)**	(0.447)	(0.172)	**(0.045)**	**(0.019)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Inflation	**0.0006*****	0.001	0.0007	**0.0004****	0.0003	**0.002*****	**-0.001*****	**-0.003*****	**-0.001****	-0.0008	-0.0009	**-0.001***
	(0.000)	(0.142)	(0.267)	**(0.041)**	(0.256)	**(0.000)**	**(0.000)**	**(0.001)**	**(0.046)**	(0.125)	(0.111)	**(0.067)**
Foreign aid	0.0009	**0.130*****	0.046	**-0.050*****	**-0.071*****	**-0.101*****	**0.064*****	**0.158*****	0.046	0.023	0.029	**-0.094***
	(0.947)	**(0.000)**	(0.184)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.003)**	**(0.003)**	(0.224)	(0.419)	(0.383)	**(0.070)**
Gov. Exp.	0.005	0.020	-0.0009	-0.003	0.001	**0.037*****	**0.043*****	0.035	**0.037****	**0.048*****	**0.118*****	0.027
	(0.225)	(0.193)	(0.950)	(0.485)	(0.861)	**(0.000)**	**(0.008)**	(0.111)	**(0.024)**	**(0.000)**	**(0.000)**	(0.218)
GDPg	**0.093*****	0.112	**0.142***	**0.078*****	**0.062***	-0.038	**0.224*****	0.069	**0.201****	**0.205*****	**0.304*****	**0.291*****
	(0.003)	(0.154)	**(0.055)**	**(0.004)**	**(0.074)**	(0.383)	**(0.000)**	(0.531)	**(0.014)**	**(0.001)**	**(0.000)**	**(0.009)**
FDI	**0.107*****	0.008	-0.006	**0.066*****	**0.061****	-0.031	**0.195*****	0.060	**0.187*****	**0.148*****	**0.372*****	**0.272*****
	(0.006)	(0.894)	(0.920)	**(0.004)**	**(0.038)**	(0.398)	**(0.000)**	(0.519)	**(0.007)**	**(0.005)**	**(0.000)**	**(0.004)**
Remit	**-0.037*****	-0.018	-0.015	**-0.030*****	**-0.046*****	**-0.061*****	**-0.101*****	**-0.065***	**-0.102*****	**-0.106*****	**-0.108*****	**-0.078****
	(0.000)	(0.436)	(0.494)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.053)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.021)**
Trade	**0.036*****	**0.062*****	**0.033*****	**0.020*****	**0.037*****	**0.052*****	**0.019****	**0.058*****	-0.0006	0.009	0.010	0.015
	(0.000)	**(0.000)**	**(0.009)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.041)**	**(0.002)**	(0.966)	(0.375)	(0.404)	(0.410)
Net Effects	na	na	na	na	na	na	na	-0.181	-0.239	-0.315	-0.275	-0.230
Thresholds	na	na	na	na	na	na	na	0.773	0.950	1.252	1.458	1.067
R^2/Pseudo R^2	0.090	0.120	0.058	0.070	0.081	0.126	0.360	0.157	0.175	0.261	0.259	0.226
Fisher	**21.57*****						**113.42*****					
Observations	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680	1680

*,**,***: denote respectively, significance levels of 10%, 5% and 1%. OLS shows Ordinary Least Squares. R^2 is consistent with OLS and Pseudo R^2 is in line with quantile regressions. Lower quantiles (e.g., Q 0.1) represent countries in which there are least women involved in business and politics. FinDep: Financial inclusion Depth. Gini: Income Inequality Index. FinAcc: Financial inclusion Access. Gov. Exp: Government Expenditure. FinEff: Financial inclusion Efficiency. GDPg: Gross Domestic Product growth. Remit: remittances. FDI: Foreign Direct Investment. The mean value of Financial inclusion Efficiency 0.494. na: not applicable because at least one estimated coefficient needed for the computation of the net effect and/or threshold is not significant.

4.2 Policy thresholds

The purpose of this section is to extend the established analysis in the previous section by clarifying a contrasting tendency between positive conditional effects and negative net effects. The justifications for computing policy thresholds with conditional and unconditional effects are consistent with contemporary interactive regressions literature (Nchofoung *et al.*, 2022; Nchofoung & Asongu, 2022a). Accordingly, the policy relevance of this computation is premised on the fact that policy makers are provided with actionable critical masses that they can act upon in order to influence the outcome variable in the anticipated direction, contingent on the channel or mechanism under consideration. Moreover, in accordance with the attendant

literature, in order for the computed thresholds to be policy-relevant and make economic sense, the corresponding thresholds should be defined in the summary statistics within the range (minimum to maximum values).

First, in Table 1 on nexuses between financial depth, inequality and gender inclusion, the financial inclusion depth threshold is 0.362 and 0.395 respectively, for the 10^{th} and 25^{th} quantiles of the women in politics distribution. Second, in Table 2 focusing on linkages between financial access, inequality and gender inclusion, the corresponding financial inclusion access thresholds are: (i) 0.612, 0.514 and 0.472 respectively, for the median, 75^{th} and 90^{th} quantiles of the women in politics distribution and (ii) 0.636, 0.658 and 0.544 respectively, for the 25^{th}, median and 90^{th} quantiles of the women in business distribution. It is important to note that, the corresponding threshold at the 75^{th} quantile in the right-hand side of Table 2 does not make economic sense and by extension, has no policy implication because it is not situated within the policy range of minimum to maximum values of financial inclusion access disclosed in the summary statistics or Appendix 2. Third, in Table 3, while thresholds are not apparent in the left-hand side because at least one estimated coefficient needed for the computation of attendant thresholds is not significant, on the right-hand side of Table 3, thresholds are apparent throughout the conditional distribution of women in business, while only thresholds in the bottom quantiles are within policy range. These are respectively, 0.773 and 0.950 of financial inclusion efficiency in the 10^{th} and 25^{th} quantiles of the women in business distribution.

4.3 Robustness checks

This section provides a robustness check with Tobit regressions which is relevant because they account for limited ranges in the outcome variables. The following findings are established in Table 4. *Hypothesis* 1 is consistently valid while *Hypothesis* 2 is valid exclusively in the nexus between financial inclusion access and women in business and the linkage between financial inclusion efficiency and women in business. The corresponding net effects are also consistently negative while only one of the corresponding two thresholds is within policy range: notably 0.693 of financial inclusion access in the impact of income inequality on women in business.

Table 4: Financial development, inequality and women (Tobit regressions)

	Financial depth		Financial access		Financial efficiency	
	Women in Politics	Women in Business	Women in Politics	Women in Business	Women in Politics	Women in Business
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Gini	**-0.072*** (0.000)**	**-0.248*** (0.000)**	**-0.060*** (0.000)**	**-0.287*** (0.000)**	-0.013 (0.662)	**-0.487*** (0.000)**
FinDep	-2.101 (0.664)	**14.981*** (0.001)**	**3.667*** (0.009)**	**17.235*** (0.000)**	**3.736*** (0.000)**	**17.601*** (0.000)**
FinAcc	**-11.366*** (0.000)**	**24.502*** (0.000)**	**-11.817*** (0.001)**	6.215 (0.124)	**-11.878*** (0.000)**	**25.443*** (0.000)**
FinEff	**-5.447*** (0.000)**	**11.164*** (0.000)**	**-5.447*** (0.000)**	**10.898*** (0.000)**	-0.583 (0.859)	**-14.454*** (0.001)**
Gini ×FinDep	0.103 (0.176)	0.052 (0.471)	---	---	---	---
Gini × FinAcc	---	---	0.003 (0.964)	**0.414*** (0.000)**	---	---
Gini × FinEff	---	---	---	---	-0.088 (0.104)	**0.465*** (0.00)**
Inflation	**0.0006*** (0.000)**	**-0.001*** (0.000)**	**0.0006*** (0.000)**	**-0.001*** (0.000)**	**0.0006*** (0.000)**	**-0.001*** (0.000)**
Foreign aid	0.0008 (0.955)	**0.073*** (0.001)**	-0.0006 (0.967)	**0.073*** (0.001)**	0.0009 (0.946)	**0.064*** (0.003)**
Gov. Exp.	0.006 (0.167)	**0.043** (0.010)**	0.006 (0.212)	**0.042** (0.011)**	0.005 (0.224)	**0.043*** (0.007)**
GDPg	**0.089*** (0.005)**	**0.234*** (0.000)**	**0.091*** (0.004)**	**0.231*** (0.000)**	**0.093*** (0.003)**	**0.224*** (0.000)**
FDI	**0.105*** (0.006)**	**0.198*** (0.000)**	**0.106*** (0.006)**	**0.187*** (0.000)**	**0.107*** (0.005)**	**0.195*** (0.000)**
Remit	**-0.037*** (0.000)**	**-0.104*** (0.000)**	**-0.036*** (0.000)**	**-0.102*** (0.000)**	**-0.037*** (0.000)**	**-0.101*** (0.000)**
Trade	**0.036*** (0.000)**	**0.019** (0.047)**	**0.036*** (0.000)**	**0.019* (0.050)**	**0.036*** (0.000)**	**0.019** (0.040)**
Net Effects	na	na	na	-0.255	na	-0.257
Thresholds	na	na	na	0.693	na	1.047
Observations	1680	1680	1680	1680	1680	1680

***,**,*: significance levels at 1%, 5% and 10% respectively. dy/dx: average marginal effects. The mean value of Financial inclusion Depth is 0.097, the mean value of Financial inclusion Access is 0.077 and the mean value of Financial inclusion Efficiency 0.494. na: not applicable because at least one estimated coefficient needed for the computation of the net effect and/or threshold is not significant.

On the connection of the findings with the extant literature, the findings are consistent with the Bicaba *et al*. (2017) on the premise that unless income inequality is addressed, most sustainable development goals in Africa will not be achieved by the year 2030. Accordingly, on the basis of the validity of *Hypothesis* 1, this study has confirmed the findings of Bicaba *et al*. (2017) within the remit of gender inclusion. Moreover, the financial inclusion in mitigating the incidence of income inequality on gender inclusion (i.e. validity of *Hypothesis* 2) is in line with the strands of literature on extensive and intensive margin theories discussed in Section 2.

Before concluding, it is worthwhile to clarify how the findings in this study are different from those of Ngono (2021) which is a study close to the present research in the literature. Accordingly, the author has used the GMM model on data from 44 sub-Saharan African

countries for the period 2004 to 2018 to conclude that the impact of women's access to banking services on their self-employment is negligible. The findings also show that mobile money and microfinance services are important substitutes for traditional means of funding self-employment. Contrarily, the findings in this study which are based on Quantile and Tobit regressions have shown that income inequality reduces gender inclusion while financial inclusion dynamics dampen the negative effect of income inequality on gender inclusion. The corresponding net effects are negative. Considering positive conditional or interactive effects and the negative net effects, financial institution thresholds at which income inequality no longer reduces gender inclusion are provided and discussed. The established findings are contingent on initial levels of gender inclusion, measurement of gender inclusion, estimation approach and proxy for financial inclusion. In order to avoid repetition, how the positioning of this study departs from Ngono (2021) is clarified in the introduction.

5. Concluding implications and future research directions

This present study has examined the role of financial inclusion dynamics (depth, access and efficiency) in mitigating the incidence of income inequality on gender inclusion in terms of women in business and women in politics. The study focuses on 42 sub-Saharan African countries for the period 1980-2019. The empirical evidence is based on: (i) quantile regressions to control for initial levels of gender inclusion and (ii) Tobit estimations to account for the limited range in the outcome variables. The following main findings are established. Income inequality reduces gender inclusion while financial inclusion dynamics dampen the negative effect of income inequality on gender inclusion. The corresponding net effects are negative. Considering positive conditional or interactive effects and the negative net effects, financial institution thresholds at which income inequality no longer reduces gender inclusion are provided and discussed. The established findings are contingent on initial levels of gender inclusion, measurement of gender inclusion, estimation approach and proxy for financial inclusion. Policy implications are discussed in what follows.

The first policy implication directly speaks to the concern of income inequality that should be addressed in order to achieve most sustainable development goals (SDGs) by the year 2030 in SSA. The is evidenced on the premise that Bicaba *et al*. (2017) have shown that unless the concern of income inequality is addressed, extreme poverty and other related SDGs would not be achieved in the region. The findings pertaining to income inequality therefore inform policy makers that the concern of income inequality should be addressed in order for SDG5 related to

gender inclusion to be achieved within the targeted horizon. The policy concern evidently extends to extreme poverty in the light of the findings of Bicaba *et al*. (2017). It is important to note that it is owing to income inequality that poverty has substantially remained persistent in spite of the recent economic growth resurgence (Tchamyou *et al*., 2019b). In summary, policy makers should take the necessary measures in mitigating income inequality in order to provide the much need socio-economic environment for the achievement of other SDGs within the 2030 projected horizon.

Second, from the dampening incidence of financial inclusion on income inequality and the corresponding policy thresholds that are established at which financial inclusion completely nullify the negative incidence of income inequality on gender inclusion, it follows that policy makers should take measures towards enhancing the corresponding financial inclusion instruments in order to improve conditions for empowering more women to be involved in business and politics. Moreover, financial inclusion should be improved by policy makers because doing so is linked to both income inequality reduction and gender empowerment within the remit of this study. However, it is also worthwhile to note that the corresponding policy suggestion should be made with particular emphasis on the distinctive features of financial inclusion, not least, because dynamics of financial intermediary, depth, access and efficiency are different. Moreover, the established thresholds of financial inclusion dynamics should be considered along these lines. This is essentially because at the established thresholds, the financial inclusion dynamics become both necessary and sufficient conditions for the simultaneous mitigation of income inequality and promotion of gender inclusion.

Third, simultaneously enhancing financial inclusion and mitigating income inequality can generate more inclusive outcomes within the remit of female empowerment. Hence, above the perspective of acknowledging and implementing policies designed to improve financial inclusion dynamics, policy measures that simultaneously engage both the promotion of financial inclusion and reduction of income inequality should be considered.

Fourth, the importance of suggested policy options is contingent on three principal elements, namely: the measurement female empowerment (women in politics against women in business); initial levels of female empowerment (top quantiles against bottom quantiles of female empowerment) and the type of financial inclusion (depth, access and efficiency).

The findings in this study evidently leave space for further research. Accordingly, future studies can consider how other relevant economic measures (both positive and negative) can interact to influence sustainable development outcomes. A step in this direction could be reconsidering the gender inclusion outcome variables with other policy variables and mechanisms/channels. In considering the underlying future research insights, specific emphasis should be placed on countries and sub-regions in which concerns of exclusive development in the light of SDGs are most apparent. Microfinance institutions in which females are likely to have more access to financial resources should also be considered in the suggested future research directions.

Appendices

Appendix 1: Definitions and sources of variables

Variables	Definitions	Sources
Women in Politics	Proportion of seats held by women in national parliament (%)	WDI (World Bank)
Women in Business	Women businesses and law index score (scale 1 – 100)	WDI (World Bank)
Income Inequality (Gini)	"The Gini coefficient is a measurement of the income distribution of a country's residents".	WDI (World Bank)
Financial inclusion Depth Index	"*The Financial inclusion Depth (FID) Index, which compiles data on bank credit to the private sector, pension fund assets, mutual fund assets, and insurance premiums (life and non-life) as percentages of GDP*".	Findex (World Bank)
Financial inclusion Access Index	"*The Financial inclusion Access (FIA) Index, which compiles data on the number of bank branches and the number of automatic teller machines (ATMs) per 100,000 adults*"	Findex (World Bank)
Financial inclusion Efficiency Index	"*The Financial inclusion Efficiency (FIE) Index, which compiles data on the banking sector's net interest margin, the lending–deposits spread, the ratios of non-interest income to total income and overhead costs to total assets, and the returns on assets and equity*".	Findex (World Bank)
Inflation	Inflation, consumer prices (annual %)	WDI (World Bank)
Foreign Aid	Net Official Development Assistance received (% of GNI)	WDI (World Bank)
Government Expenditure	General government final consumption expenditure (% of GDP)	WDI (World Bank)
Economic growth	GDP growth (annual %)	WDI (World Bank)
Foreign Investment	Foreign direct investment, net inflows (% of GDP)	WDI (World Bank)
Remittances	Remittance inflows (%GDP)	WDI (World Bank)
Trade	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI (World Bank)

GDP: Gross Domestic Product. GNI: Gross National Income. WDI: World Development Indicators. IMF: International Monetary Fund. GFDD: Global Financial Development Database.

Appendix 2: Summary Statistics

	Mean	S.D	Min	Max	Obs
Women in Politics	56.527	8.310	25.000	73.100	1680
Women in Business	54.703	15.147	17.500	91.900	1680
Inequality (Gini)	53.250	19.829	0.000	86.832	1680
Financial inclusion Depth	0.097	0.147	0.000	0.880	1680
Financial inclusion Access	0.077	0.128	0.000	0.880	1680
Financial inclusion Efficiency	0.494	0.199	0.000	0.990	1680
Inflation	32.026	593.191	-13.056	23773.13	1680
Foreign Aid	11.345	11.527	-0.250	94.946	1680
Government Expenditure	5.353	25.868	-71.463	565.538	1680
GDP growth	3.635	5.173	-50.248	35.224	1680
Foreign Direct Investment	2.938	6.456	-28.624	103.337	1680
Remittances	4.385	17.842	0.000	235.924	1680
Trade Openness	67.240	35.588	6.320	311.354	1680

SD: Standard Deviation. Min: Minimum. Max: Maximum. The maximum value of government expenditure is because government's final consumption in Nigeria increase substantially in 2004. https://www.indexmundi.com/facts/nigeria/general-government-final-consumption-expenditure . Moreover, the maximum inflation value is because in 1994, the Democratic Republic of Congo (DRC) experienced a substantial surge in inflation https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=CD. The exclusion of this country does not significantly change the findings and conclusion, not least, because inflation is a control variable. Accordingly, it is neither an outcome variable nor an independent variable of interest.

Appendix 3: Correlation matrix (uniform sample size: 1680)

	WoPol	WoBiz	Gini	FID	FIA	FIE	Infl	NODA	Gov.	GDPg	FDI	Remit	Trade
WoPol	1.000												
WoBiz	0.098	1.000											
Gini	-0.127	-0.363	1.000										
FID	-0.014	0.299	0.001	1.000									
FIA	-0.092	0.406	-0.156	0.412	1.000								
FIE	-0.150	0.297	-0.034	0.312	0.305	1.000							
Infl	0.037	-0.072	0.012	-0.025	-0.022	0.001	1.000						
NODA	0.021	-0.098	0.097	-0.251	-0.164	-0.264	-0.013	1.000					
Gov.	0.018	0.095	0.017	0.036	0.018	0.073	-0.095	-0.092	1.000				
GDPg	0.055	0.114	0.005	0.001	0.029	0.069	-0.062	-0.017	0.146	1.000			
FDI	0.118	0.190	-0.094	0.058	0.196	-0.010	-0.017	0.069	0.031	0.081	1.000		
Remit	-0.016	-0.107	0.044	0.111	-0.013	-0.052	-0.009	0.034	0.088	0.031	0.014	1.000	
Trade	0.115	0.181	-0.040	0.255	0.380	0.005	-0.028	-0.056	0.083	0.059	0.308	0.305	1.000

WoPol: Women in Politics. WoBiz: Women in Business. Gini: the Gini Coefficient. Mobsen: Mobile phones used to send money. Mobpay: Mobile used to pay bills online. FID: Financial inclusion Depth. FIA: Financial inclusion Access. FIE: Financial inclusion Efficiency. Infl: Inflation. NODA: Foreign Aid. Gov: Government Expenditure. GDPg: Gross Domestic Product growth. FDI: Foreign Direct Investment. Remit: remittances.

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