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**Working Paper**

## Not all that glitters is gold: Financial access, microfinance and female unemployment in Sub-Saharan Africa

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# A G D I Working Paper

WP/24/036

## **Not all that glitters is gold: financial access, microfinance and female unemployment in Sub-Saharan Africa**

Forthcoming: World Affairs

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**Not all that glitters is gold: financial access, microfinance and female unemployment in Sub-Saharan Africa**

**Simplice A. Asongu, Therese E. Zogo, Mariette C. N. Mete & Barbara Deladem Mensah**

**Abstract**

The present study assesses the relevance of microfinance institutions (MFIs) in the effect of financial access on gender economic inclusion in 44 countries in Sub-Saharan Africa (SSA) for the period 2004 to 2018. The adopted empirical strategy is interactive quantile regressions that are tailored to account for both simultaneity and unobserved heterogeneity. Two MFIs dynamics are employed: MFIs per 1000km<sup>2</sup> and MFIs per 100 000 adults. Financial access is measured in terms of female ownership of bank accounts while gender inclusion is in terms of reducing female unemployment. MFIs per 1000 km<sup>2</sup> must reach thresholds of between 2.328 and 2.490 at the 90th quantile of the female unemployment distribution in order for female ownership of bank account to reduce female unemployment. The partial validity of the tested hypothesis is clarified and policy implications are discussed.

*Keywords:* Africa; Microfinance; Gender; Inclusive development

*JEL Classification:* G20; I10; I32; O40; O55

## 1. Introduction

The main research question in this study is focused on assessing how microfinance institutions moderate the effect of female bank account ownership on female unemployment in sub-Saharan Africa. The foundational elements of the present research are based on three underlying motivations, notably: (i) the importance of increasing the involvement of the female gender in the formal economic sector; (ii) the relevance of microfinance institutions (MFIs) in driving gender inclusive development outcomes and (iii) corresponding gaps in the gender inclusion literature.

First, in accordance with the scholarly and policy literature (Woldemichael, 2020; Ngono, 2021), female labour force participation in Sub-Saharan Africa (SSA) is substantially low compared to other regions and continents in the world. According to the narrative, policies designed to improve female labour participation should be tailored towards prioritizing the participation of the female gender in the labour market. *Inter alia*, women participate in taking care of the elderly and children, which are constraints that reduce their participation in the labor market and hence, they become less relevant and represented in the formal economic sector.

Second, MFIs have been established to provide enabling conditions for female economic integration, especially within the remit of providing women with the relevant financial opportunities for self-employment by means of doing business as well as through other avenues by which females could be more integrated into the formal economic sector (Maldonado & González-Vega, 2008; Kendall et al., 2012; Swapna, 2017; Fox & Van Droogenbroeck, 2017; Tariq, 2019; Obadha et al., 2019; Gasperin et al., 2019; Assairh et al., 2020; Ngono, 2021; Asongu, 2024). Furthermore, in accordance with the attendant scholarly and policy literature (Tchamyu et al., 2019a; UNCDF, 2022), beyond the remit of gender equality, financial access has been documented to be fundamental in the achievement of other poverty- and inequality-oriented sustainable development goals (SDGs). On the bases of the underlying insights, it is thus, not surprising that MFIs are considered within in this study as moderating variables in the nexus between financial access (i.e., in terms of female bank account ownership) and female unemployment. The positioning of the study is also premised as filling a gap in the literature.

Third, to the best of knowledge, the literature on enhanced female economic participation has fundamentally been oriented towards, *inter alia*, boosting inclusive education possibilities for females (Elu, 2018; ~~Asongu et al., 2019~~); engaging more females in both formal and informal economic prospects that are relevant for promoting gender inclusion (~~Uduji et al.,~~

2019; Uduji & Okolo-Obasi, 2018, 2019, 2020); connecting underpinnings of mobile money, female doing of business and microfinance (Ngono, 2021); understanding the nexus between gender inclusion and political inclusion (Bezinna et al., 2021); gender considerations in environmental sustainability (Asongu et al., 2022); how mobile phone externalities provide financial access avenues for entrepreneurial and household improvements (Kim, 2022) and linkages between funding opportunities for females, mobile phones and information technology as posited by Osabuohien and Karakara (2018), and Mndolwa and Alhassan (2020).

The remainder of the research is organized in the following manner. The theoretical underpinnings and hypothesis development are covered in Section 2 while Section 3 discusses the data and methodology. Section 4 presents the empirical findings while the study is concluded in Section 5 with implications and future research directions.

## **2. Theoretical underpinnings and hypothesis development**

This section is meant to provide the theoretical underpinnings on the nexus between the main channel (i.e., female bank account ownership) and female unemployment on the one hand and on the other, provide an intuition for the relevance of MFIs in moderating the effect female of bank account ownership on female unemployment. The section is covered in three main strands in order to articulate: (i) the theoretical underpinnings on the nexus between financial access and gender inclusive development outcomes; (ii) contextualization of the theoretical underpinnings to be consistent with the problem statement and (iii) the testable hypothesis. The attendant strands are expatiated in the same chronology as highlighted.

First, the theoretical nexus between financial access and inclusive development outcomes is fundamentally based on the relevance of financial access in providing opportunities by which those that are excluded in society are availed with the resources with which to engage in activities that improve their transition from one social stratum to another; generally, a social transition from poverty to favorable living conditions. This study borrows from the literature on the linkage between financial access and inclusive development for the underlying theoretical underpinnings (Tchamyou et al., 2019a). It is important to note that while Tchamyou et al. (2019a) focus on the nexus between financial access and inclusive development within the remit of reducing income inequality, the focus of the present study is on how financial dynamics (i.e., bank account ownership and microfinance institutions) interact to influence female unemployment which is a dimension of inclusive development. Hence, while the study borrows from Tchamyou et al. (2019a) in terms of theoretical underpinnings, the

contextualization is different. According to Tchamyou *et al.* (2019a), the nexus between financial access and inclusive development can be understood in terms of the intensive and extensive margin theories which are discussed to elaborate detail in what follows.

The extensive margin theory is apparent when financial access is offered beyond the remit of traditional beneficiaries of the underlying financial access opportunity, such that those that did not previously have access to this service are provided with more avenues with which to improve socio-economic activities. This is the case when a fraction of the population that is excluded from financial services such as women (Ngono, 2021). Hence, the use of female ownership of bank accounts as the main channel by which female unemployment concerns can be addressed, as conceived within the remit of this study, is consistent with this stream of the theoretical underpinnings or the extensive margin theory. Moreover, such is also in accordance with the literature on the relevance of financial access in socio-economic and inclusive development outcomes (Beck *et al.*, 2007; Tchamyou & Asongu, 2017a).

The intensive margin theory on the other hand, pertains to the perspective that existing beneficiaries of the financial access opportunities are offered more avenues through which to fund projects that can enable them improve their standards of living. It follows that the intensive margin theory exclusively focuses on those that are already financial-included. In other words, this stream of theory speaks to those whose existing financial inclusion standards are being enhanced. This stream of studies is also supported by the literature on the nexus between financial access and socio-economic development outcomes (Bae *et al.*, 2012; Chipote *et al.*, 2014; Odhiambo, 2014 ; Batabyal & Chowdhury, 2015; Chiwira *et al.*, 2016; Tchamyou, 2020). Regardless of theoretical stream, both theoretical perspectives agree with the intuition that MFIs are instruments by which female financial access can be promoted, especially through the mechanism of bank account ownership by females. This takes us to the second strand on contextualization.

Second, in terms of contextualizing the attendant theoretical underpinnings, as we have already highlighted, MFIs constitute instruments by which financial inclusion can be promoted, especially through financial access in terms of ownership of bank accounts. This is the case when women are promoted to benefit from financial access by with the help of MFIs. In this strand, we support this contextualization with the relevant references in order to further articulate how the theoretical underpinnings are consistent with the positioning of this study as is discussed in the subsequent paragraph. It follows from this emphasis that the employment

of MFIs as instruments by which financial access is promoted, is both consistent with the intensive and extensive margin theories (Gasperin et al., 2019; Ngono, 2021). Accordingly, it has been established by Assairh et al. (2020) that MFIs promote the involvement of women in economic activities, notably, by providing the relevant funding for the starting and doing of business as well as engagement in other activities that are conducive for the empowerment of the female gender in the economic sector. According to Maldonado and González-Vega (2008), female economic empowerment can be enhanced by MFIs, notably via, mechanisms such as, *inter alia*, the management of risks, income effect and the household impact. Moreover, as shown by Swapna (2017), female economic empowerment such as employment is promoted by MFIs, a position that is consistent with Tariq (2019). Beyond these considerations of mechanisms, the attendant literature is consistent on the position that various financial access dynamics are linked to MFI, *inter alia*, microcredit and micro insurance services (Ackerly, 1995; Goetz & Gupta, 1996; Morduch, 1999; Basu, 2006; Kendall et al., 2012; Brana, 2013; Fox & Van Droogenbroeck, 2017; Obadha et al., 2019).

Third, with respect to the positioning of the present exposition, in accordance with the considered empirical and theoretical literature engaged in the previous paragraphs, it is not surprising that MFIs can be considered as an instrument by which financial access can be promoted for female employment. The translation of this positioning is seen as MFIs moderating the effect of financial access on female unemployment. Put in more contexts, the narrative in this section can be summarized in the following argument: MFIs can moderate the effect of financial access on female unemployment. This engenders the following testable hypothesis.

*Hypothesis 1: Microfinance institutions moderate financial access in terms of female ownership of bank accounts for inclusive economic participation by reducing female unemployment.*

In the light of the above, the claim on which the research question articulated in the first paragraph of the introduction is based, is encapsulated in the testable hypothesis. In the testable hypothesis, ownership of bank account is considered as a channel by which female unemployment can be reduced while microfinance institutions are understood as a moderating variable. It is also relevant to note that, the theoretical underpinnings in this section have been contextualized to the positioning of the study. Hence, whether the corresponding testable

hypothesis building from the contextualized theoretical underpinning withstands empirical scrutiny, it a matter of empirical validity.

### **3. Data and methodology**

#### **3.1 Data**

This study is focused on 44 nations in SSA with data spanning from 2014 to 2018. The data is shared by Ngonu (2021), a study that is closest to the present exposition and hence, three main data sources are relevant to the inquiry, namely: (i) World Development Indicators of the World Bank (2020a), (ii) the Financial Access Survey (IMF, 2020) and (iii) the Gender and Parity Statistics for Men and Women of the World Bank (2020b). It is important to clarify that while all the variables are from Ngonu (2021), to enhance readability and flow, it is relevant to also mention the original sources of the data apparent in Ngonu (2021).

Before delving more into the specifics of the variables employed, it is worthwhile to articulate that the same justifications on data availability constraints pertaining to Ngonu (2021) also apply to the present study which clearly departs from the underlying study in terms of positioning. Accordingly, while Ngonu (2021) has focused on how three main mechanisms (i.e. MFIs, mobile money innovations and banking access) influence female-employment, the present exposition considers how MFIs moderate the effect of financial access on female unemployment. It follows that the outcome variable of the underlying study is used in the present exposition only as a control variable, while the mechanism of bank accounts which is used a control variable in Ngonu (2021) is employed in this study as one of the independent variables of interest or the main channel. Moreover, another distinctive feature is apparent in the perspective that the underlying study is based on a linear additive model focusing on the generalized method of moments while the present exposition is engaged within an interactive quantile regressions framework.

In the light of the above and in accordance with the motivation in the introduction and theoretical exposition in Section 2, the outcome variable is the female unemployment rate while the two main independent variables of interest are: (i) MFIs dynamics which are employed as the policy or moderating variables (i.e. MFIs per 1000 km<sup>2</sup> and MFIs per 100 000 adults) and (ii) female ownership of bank accounts. The choice of these variables is consistent with the financial access and MFIs literature discussed in Section 2.

In an effort to take on board concerns related to variable omission bias, some variables are involved in the conditioning information set or set of control variables, notably: trade



openness, female fertility rate, female self-employment, the time for a woman to set up a business, the cost it takes for a woman to set up a business and the procedures a woman has to go through to start a business. The choice of elements in the conditioning information set accords with studies on gender inclusion and inclusive economic development, notably: Duflo (2012), Tchamyou et al. (2019b), Ofori et al. (2021), Ngono (2021), Tchamyou (2021), and Asongu (2024).

With respect to signs that are anticipated from the control variables, trade openness and female self-employment are expected to reduce female unemployment while female fertility rate in the light of Ngono (2021) should have the opposite effect. Moreover, given that the three remaining control variables are female starting and doing business constraints; these are expected to positively influence the outcome variable. These underlying expected signs are valid under the condition that, concerns pertaining to multicollinearity are not apparent, not least, because when variables that are highly correlated are entered into the same specification, only some of them can emerge from the regression output with the expected signs. It is thus, because the underlying concern of multicollinearity is overlooked in interactive regressions that net effects and/or thresholds (i.e., involving both the unconditional and conditional effects of the main channel) are computed in order to assess the overall or total effect of the main channel, contingent on the moderating variable (Tchamyou, 2019).

Appendix 1 discloses the definitions of variables and their corresponding sources while the summary statistics is provided in Appendix 2. Accordingly, the summary statistics is used to compute net effects, especially as it pertains to assessing if the assessed hypothesis withstands empirical scrutiny. It is important to note that, in order to avoid concerns underlying interactive regressions as documented in Brambor *et al.* (2006), net effects should be computed in order to fully appreciate the relevance of MFIs in complementing the effect of female bank account ownership on female unemployment. To this end, the mean values and corresponding ranges of the variables disclosed in the summary statistics are worthwhile for the computation of such net effects. The appendix section is completed with insights into paired correlations that are provided in Appendix 3.

### **3.2 Methodology**

The present exposition departs from the literature which has examined nexuses based on mean values of female economic inclusion (Ngono, 2021) and hence, adopts an estimation technique that assesses the considered nexuses throughout the conditional distribution of the female

economic inclusion outcome variable. The motivation for examining the attendant linkages throughout the conditional distribution of the outcome variable is to provide room for more policy implications. Accordingly, it is argued in this study that contrary to the underlying female economic inclusion studies in which common policy implications emerge from the findings based on an estimation technique premised on mean values of the outcome variables, in the present study, initial, intermediate and high initial levels of the outcome variable are taken in account in order to avail room for more policy implications. In essence, the corresponding argument is that common policies based on estimations that are founded on the mean value of the outcome variable are unlikely to succeed unless these are based on initial values of the outcome variable and tailored differently across countries with differing initial levels of the outcome variable. Given the underlying insights, the present exposition is consistent with studies that are focused on assessing the linkages throughout the conditional distribution of the outcome variable by adopting the Quantile regressions (QR) strategy (Billger & Goel, 2009; Asongu, 2024).

As documented in Asongu (2017) and in non-contemporary literature (Koenker & Bassett, 1978; Keonker & Hallock, 2001), relative to ordinary least squares (OLS) regressions in which it is supposed that error terms are distributed normally, such an assumption is not relevant to the QR approach, not least, because the nexuses are investigated throughout the conditional distribution of the female economic inclusion variables. Still in line with the corresponding literature, in the QR approach, the  $\theta^{\text{th}}$  quantile estimator linked to female unemployment is derived by engaging the optimisation disclosed in Equation (1), which is presented in the absence of subscripts in order to enhance readability.

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

where  $\theta \in (0,1)$ . Compared to the OLS technique that is essentially based on reducing the total sum of squared residuals, in relation to the QR analytical strategy, the estimation process is consistent with the maximisation of the corresponding absolute deviations. The attendant process involves maximising the related absolute deviations of the corresponding quantiles. For the sake of illustration, the 75<sup>th</sup> quantile (i.e., related to  $\theta = 0.75$ ) is obtained by weighing the residuals approximately. The attendant quantile of female unemployment or  $y_i$  given  $x_i$  is:

$$Q_y(\theta / x_i) = x_i' \beta_\theta \quad (2)$$

where the comparative  $\theta^{\text{th}}$  quantile parameters that are connected to unique slopes are assessed within the remit of the conditional distribution of female unemployment. The corresponding estimation is orthogonal to  $E(y/x) = x_i'\beta$  in the OLS slope that is characterised by an evaluation of parameters exclusively at the conditional mean of the outcome variable or female unemployment. Relative to the process of estimation in Equation (2), the dependent variable  $y_i$  is the female unemployment rate while  $x_i$  contains a constant term, *women ownership of bank accounts like men, MFIs, trade openness, female self-employment, female fertility rate, the cost it takes for a woman to set up a business, the procedures a woman has to go through to start a business and the time for women to set up a business.*

It is important to note that the relevance of the quantile regressions approach is apparent from the heterogeneous effects in the linkages that are examined. Hence, if the estimated linkages are only significant in some quantiles, it justifies the choice of the quantile regression estimation technique as analytical strategy, not least, because the responsiveness of female unemployment to the channel (i.e., bank account) and corresponding moderators (i.e., microfinance institutions dynamics) is contingent on initial levels of female unemployment. Hence, when the heterogeneous effects are apparent from the perspective that the investigated nexuses are only significant for some quantiles, net effects and attendant thresholds are only computed for the relevant or corresponding quantiles.

## **4. Empirical analysis**

### **4.1 Presentation of results**

The empirical results are presented in this section in Table 1. The attendant table entails two main panels, notably: the left hand-side showing regressions related to MFIs per 1000 km<sup>2</sup> and the right hand-side reflecting estimations focused on MFIs per 100 000 adults. Building on the narrative in the methodology section, especially as it relates to the choice of the estimation approach, the choice of the QR strategy is justified in the light of the perspective that compared to the corresponding OLS estimates, the QR estimates are distinct in terms of both significance and magnitude of significance, especially in the light of the independent variables of interest.

From the two panels, the findings in relation to the tested hypothesis are exclusively valid in the top or 90<sup>th</sup> quantiles of the conditional distribution of the outcome variable. It follows that the tested hypothesis is only partially valid, especially in the light of corresponding MFIs at which the overall effect of bank account ownership by females on female unemployment is

negative. The partial validity of the tested hypothesis is discussed in more depth in subsequent paragraphs, especially in the light of computed net effects and thresholds as well as the corresponding discussion with respect to literature in Section 4.2.

In order to examine the testable/investigated hypothesis and hence, the importance of MFIs in complementing financial access in terms of female ownership of bank accounts for inclusive economic participation, the study is consistent with the literature in computing the net effect of bank accounts ownership on female unemployment, contingent on MFIs (Asongu, 2020; Diop et al., 2021). To illustrate this computational perspective, in the last column of the 90<sup>th</sup> quantile of the left hand-side of Table 1, the corresponding net effect of bank accounts or financial access on female unemployment is  $9.512 = ([-13.758 \times 1.799] + [34.263])$ . In the attendant computation, 34.263 is the unconditional impact of bank account ownership or financial access on female unemployment, 1.799 is the mean or average value of MFIs per 1000 km<sup>2</sup> while -13.758 is the interactive or conditional effect of financial access or bank account ownership on female unemployment<sup>1</sup>.

In the same vein, in the 90<sup>th</sup> quantile of the right-hand side, the net effect of financial access on female unemployment, contingent on MFIs per 100 000 adults is  $0.488 = ([1.871 \times 4.189] + [-7.349])$ . In the corresponding computation, -7.349 is the unconditional impact of bank account ownership or financial access on female unemployment, 4.189 is the mean or average value of MFIs per 100 000 adults while 1.871 is the interactive or conditional effect of financial access or bank account ownership on female unemployment.

Given the considered hypothesis, it is thus apparent that on the premise of significant estimated coefficients, the tested hypothesis is exclusively invalid in the 90<sup>th</sup> quantile where the significant positive net effects are established on the one hand and on the other hand, the tested hypothesis is neither validated nor invalidated for the remaining quantiles in the which at least one estimated coefficient is not significant to the require the computation of net effects. It follows that, when corresponding thresholds are not computed, the information criteria for the validity of the tested hypothesis are that: (i) the estimated coefficients corresponding to the independent variables of interest should be significant to engender the computation of net effects and (ii) when such significance is apparent, the corresponding net effects should be negative.

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<sup>1</sup> The unconditional impact is the impact not involving the interactive term. The impact involving the interactive terms is the conditional or interactive impact.

Most of the significant control variables have the expected signs, in the accordance with the narrative on expected signs disclosed in the data section. Moreover, in interactive regressions, the concern about multicollinearity is overlooked and hence, only thresholds and net effects can be interpreted with confidence because they involve both unconditional and conditional effects of the interacted variables (Brambor et al., 2016). Other variables included in the conditioning information set or control variables are not expected to have the anticipated signs because the concern of multicollinearity which can affect the expected signs is not only taken into account in the computation of net effects. Accordingly, interpreting control variables distinctly would amount to interpreting the control variables as in linear additive models.

Concerning the heterogeneous effect of microfinance institutions in the 10<sup>th</sup> quantile on the right hand-side of Table 1, it is relevant to note that, the microfinance institutions are playing the role of moderating variables in the estimation exercise and thus, when the partial derivative of female unemployment on the main channel or bank account is taken, the unconditional effect of microfinance institutions become zero. Hence, the unconditional effect of microfinance institutions is not taken into account in the computation of corresponding net effects and thresholds. This is consistent with documented insights on interactive regressions (Brambor et al., 2006).

**Table 1: Female unemployment, microfinance institutions and bank accounts**

	Dependent variable: Female Unemployment											
	Microfinance institutions per 1000 km2						Microfinance institutions per 100 000 adults					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	<b>37.121***</b> (0.000)	<b>13.230**</b> (0.027)	14.932 (0.220)	23.763 (0.405)	35.250 (0.146)	<b>23.072***</b> (0.004)	<b>28.031***</b> (0.000)	-1.097 (0.718)	0.328 (0.962)	2.889 (0.926)	<b>75.014***</b> (0.000)	<b>71.782***</b> (0.000)
Nmfi1	0.304 (0.789)	-3.596 (0.159)	-0.913 (0.861)	0.342 (0.978)	11.773 (0.259)	<b>12.762***</b> (0.000)	---	---	---	---	---	---
Nmfi2	---	---	---	---	---	---	0.065 (0.911)	<b>0.929**</b> (0.020)	0.936 (0.291)	0.517 (0.897)	-2.229 (0.369)	<b>-2.230***</b> (0.001)
BkAcct	<b>7.309***</b> (0.001)	-7.159 (0.159)	-0.550 (0.961)	5.267 (0.841)	31.741 (0.156)	<b>34.263***</b> (0.000)	1.843 (0.611)	4.428 (0.113)	5.258 (0.401)	5.285 (0.852)	-8.329 (0.634)	<b>-7.349*</b> (0.096)
BkAcct×Nmfi1	-1.741 (0.111)	3.294 (0.197)	0.266 (0.959)	-1.628 (0.894)	-12.656 (0.225)	- (0.000)	---	---	---	---	---	---
BkAcct×Nmfi2	---	---	---	---	---	---	0.308 (0.593)	<b>-0.739*</b> (0.063)	-0.792 (0.373)	-0.641 (0.873)	1.976 (0.427)	<b>1.871***</b> (0.003)
FSEmpl	<b>-0.536***</b> (0.000)	<b>-0.150***</b> (0.000)	<b>-0.156*</b> (0.060)	<b>-0.330*</b> (0.089)	<b>-0.629***</b> (0.000)	<b>-0.543***</b> (0.000)	<b>-0.730***</b> (0.000)	<b>-0.208***</b> (0.000)	<b>-0.203***</b> (0.000)	-0.194 (0.419)	<b>-0.748***</b> (0.000)	<b>-0.708***</b> (0.000)
Fertility	<b>3.087**</b> (0.033)	<b>2.351***</b> (0.000)	1.377 (0.132)	2.342 (0.274)	0.934 (0.606)	<b>1.439**</b> (0.016)	<b>7.314***</b> (0.000)	<b>3.333***</b> (0.000)	<b>3.042***</b> (0.000)	3.219 (0.185)	<b>2.517*</b> (0.094)	<b>2.482***</b> (0.000)
Trade	-0.041 (0.109)	<b>0.032***</b> (0.001)	0.020 (0.304)	0.0001 (0.997)	-0.050 (0.203)	<b>-0.059***</b> (0.000)	0.004 (0.863)	<b>0.039***</b> (0.000)	<b>0.037***</b> (0.002)	0.021 (0.676)	-0.012 (0.697)	<b>-0.019**</b> (0.019)
CostBusiness	-0.022 (0.125)	-0.007 (0.112)	-0.008 (0.383)	-0.005 (0.974)	<b>-0.033*</b> (0.088)	<b>-0.054***</b> (0.000)	<b>-0.049***</b> (0.001)	<b>-0.019***</b> (0.000)	<b>-0.016***</b> (0.005)	-0.026 (0.306)	<b>-0.034**</b> (0.031)	<b>-0.038***</b> (0.000)
TimeBusiness	-0.029 (0.398)	<b>0.035***</b> (0.006)	<b>0.054**</b> (0.040)	0.007 (0.908)	0.027 (0.598)	<b>0.058***</b> (0.001)	-0.023 (0.531)	<b>0.053***</b> (0.000)	<b>0.068***</b> (0.000)	0.080 (0.279)	0.047 (0.299)	<b>0.041***</b> (0.000)
Startupprocd	0.193 (0.451)	<b>-0.457***</b> (0.000)	<b>-0.596***</b> (0.001)	-0.443 (0.255)	0.106 (0.747)	<b>0.277**</b> (0.011)	<b>0.810**</b> (0.013)	<b>-0.275***</b> (0.000)	<b>-0.394***</b> (0.000)	-0.393 (0.394)	0.078 (0.782)	<b>0.152**</b> (0.035)
Net Effects	na	na	na	na	na	9.512	na	na	na	na	na	0.488
Nmf Threshold	na	na	na	na	na	2.490	na	na	na	na	na	nsa
R <sup>2</sup> /Pseudo R <sup>2</sup>	0.688	0.364	0.360	0.357	0.524	0.713	0.622	0.353	0.325	0.279	0.490	0.702
Fisher Observations	<b>11.54***</b> 88	88	88	88	88	88	<b>9.55***</b> 88	88	88	88	88	88

\*, \*\*, \*\*\*: significance levels of 10%, 5% and 1% respectively. OLS: Ordinary Least Squares. R<sup>2</sup> for OLS and Pseudo R<sup>2</sup> for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where female unemployment is least. FSEmpl: Female Self-Employment. Nmfi1: microfinance institutions per 1000 km2. Nmfi2: microfinance institutions per 100 000 adults. SES: Secondary female high school enrollment rate. Trade: trade openness. CostBusiness: The cost it takes for a woman to set up a business. TimeBusiness: The time of women to set up a business. Startupprocd: The procedures a woman has to go through to start a business. Bankaccount: dummy variable which takes the value of 1 if women can open bank accounts like men, 0 otherwise. The mean value of Nmfi1 is 1.799 while the mean value of Nmfi2 is 4.189. na: not applicable because at least one estimated coefficient needed for the computation of net effect is not significant. nsa: not specifically applicable because a positive threshold is apparent. The range of MFIs per 1000 km2 (Nmfi1) is 0.020 to 9.282 while the range of MFIs per 100 000 adults (Nmfi2) is 0.244 to 11.532.

In order to improve policy implications, an extended analysis is performed such that microfinance institutions thresholds at which the positive unconditional effect of bank account on female unemployment changes to negative are provided. In the left hand-side of Table 1, the corresponding microfinance institutions threshold is 2.490 (34.263/13.758). Hence, when MFIs per 1000 km2 exceed a threshold of 2.490 per 1000 km2, the total effect of female ownership of bank account on female unemployment changes from positive to negative. The corresponding threshold has policy relevance because it is situated within the statistical policy range of 0.020 to 9.282 apparent in the summary statistics. The corresponding threshold is not computed in the 90<sup>th</sup> quantile of the right hand-side of Table 1 because a positive threshold is apparent instead.

#### **4.2 Robustness checks: accounting for simultaneity and the unobserved heterogeneity**

In order to further assess if the findings in Table 1 withstand empirical scrutiny, a robustness analysis is performed controlling for more dimensions of endogeneity, notably: (i) simultaneity or reverse causality by lagging the independent variables of interest by one year (Mlachila et al., 2017); (ii) the unobserved heterogeneity in terms of time fixed effects (Tchamyou, 2021) and (iii) variable omission bias by controlling for the education variable which was omitted in the initial regression exercise (Asongu, 2024). Accordingly, the procedure for accounting for endogeneity is adopted because other quantile regressions approaches based on fixed effects and on generalized quantile regression adopted by Byaro et al. (2023a, 2023b, 2023b) do not yield significant estimated coefficients. Moreover, the adopted approach is consistent with a strand of literature focusing on improving traditional quantile regressions to further account for simultaneity and the unobserved heterogeneity by means of accounting for lagged independent variables and time fixed effects, respectively (Asongu & Eita, 2024).

Following the same elements of style in the reporting of findings in Table 1, the following findings can be established from Table 2: (i) the net effect is positive in the 90<sup>th</sup> quantile of the left hand-side and negative in the 10<sup>th</sup> quantile of the right hand-side while the corresponding thresholds are 2.328 MFIs per 1000 km<sup>2</sup> and 1.147 MFIs per 100 000 adults, respectively. It follows that 2.328 MFIs per 1000 km<sup>2</sup> is needed at the 90<sup>th</sup> quantile for female ownership of bank accounts to reduce female unemployment while 1.147 MFIs per 100 000 adults is equally essential for bank account ownership by females to reduce female unemployment. Both thresholds are within the statistical ranges of the moderating variables in the summary statistics and thus are policy-relevant. However, when the findings in Table 1 are compared with those of Table 2, it becomes apparent that only the results on the left hand- side of both tables in the 90<sup>th</sup> quantile withstands empirical scrutiny. It follows that the main conclusion from the findings is that MFIs per 1000 km<sup>2</sup> must reach thresholds of between 2.328 (i.e., Table 9) and 2.490 (i.e., Table 1) at the 90<sup>th</sup> quantile of the female unemployment distribution in order for female ownership of bank account to reduce female unemployment. The main policy implications of the study will build on this main finding.

**Table 2: Female unemployment, microfinance institutions and bank accounts (IVQR with year fixed effects plus education variable)**

Dependent variable: Female Unemployment												
Microfinance institutions per 1000 km2						Microfinance institutions per 100 000 adults						
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	<b>-1975.4**</b> (0.031)	<b>-518.985</b> (0.196)	-817.59 (0.414)	-1251.43 (0.141)	- <b>1343.28**</b> (0.026)	-486.46 (0.248)	<b>-994.23</b> (0.333)	563.30 (0.198)	1098.39 (0.341)	-925.15 (0.307)	<b>-1170.0**</b> (0.045)	- <b>1634.3***</b> (0.009)
Nmfi1 (-1)	-0.7503 (0.888)	-2.264 (0.565)	-0.322 (0.974)	-1.268 (0.879)	4.150 (0.473)	<b>20.718***</b> (0.000)	---	---	---	---	---	---
Nmfi2 (-1)	---	---	---	---	---	---	2.211 (0.368)	<b>2.437*</b> (0.060)	2.479 (0.461)	0.207 (0.937)	-0.020 (0.990)	-0.970 (0.579)
BkAcct (-1)	2.896 (0.810)	-3.735 (0.657)	2.071 (0.922)	5.322 (0.764)	12.556 (0.311)	<b>50.994***</b> (0.000)	10.500 (0.428)	<b>15.184*</b> (0.071)	14.155 (0.517)	2.065 (0.904)	2.557 (0.813)	-3.549 (0.755)
BkAcct×Nmfi1 (-1)	0.074 (0.989)	1.952 (0.623)	-0.208 (0.983)	0.388 (0.963)	-4.218 (0.470)	- <b>21.897***</b> (0.000)	---	---	---	---	---	---
BkAcct×Nmfi2 (-1)	---	---	---	---	---	---	-1.090 (0.572)	<b>-2.123*</b> (0.089)	-1.693 (0.602)	0.321 (0.899)	0.270 (0.866)	1.142 (0.500)
SES(-1)	-0.049 (0.747)	0.026 (0.640)	0.031 (0.826)	0.127 (0.287)	0.041 (0.619)	0.226*** (0.000)	-0.226 (0.173)	0.025 (0.654)	0.044 (0.766)	-0.024 (0.836)	-0.012 (0.868)	<b>-0.032</b> (0.676)
FSEmpl(-1)	<b>-0.625**</b> (0.013)	-0.053 (0.528)	-0.340 (0.113)	<b>-0.914***</b> (0.000)	<b>-1.014***</b> (0.000)	<b>-0.689***</b> (0.000)	<b>-1.006***</b> (0.001)	<b>-0.307***</b> (0.003)	<b>-1.038***</b> (0.000)	-1.136*** (0.000)	<b>-1.099***</b> (0.000)	<b>-1.036***</b> (0.000)
Fertility(-1)	<b>7.917**</b> (0.010)	<b>3.049**</b> (0.029)	4.230 (0.217)	<b>11.309***</b> (0.000)	11.476*** (0.000)	<b>4.784***</b> (0.000)	6.359 (0.119)	<b>2.749*</b> (0.054)	<b>8.037**</b> (0.034)	9.654*** (0.002)	<b>11.811***</b> (0.000)	<b>11.232***</b> (0.000)
Trade (-1)	-0.078 (0.298)	0.005 (0.813)	0.023 (0.704)	-0.013 (0.799)	0.001 (0.977)	-0.023 (0.375)	-0.009 (0.878)	<b>0.074***</b> (0.009)	0.099 (0.174)	0.032 (0.572)	0.0004 (0.991)	-0.013 (0.717)
CostBusiness (-1)	-0.007 (0.493)	-0.001 (0.867)	0.011 (0.508)	0.002 (0.886)	-0.001 (0.884)	-0.006 (0.345)	<b>-0.023**</b> (0.049)	<b>-0.005</b> (0.486)	-0.029 (0.125)	-0.0008 (0.957)	-0.005 (0.590)	-0.004 (0.661)
TimeBusiness (-1)	0.086 (0.597)	0.009 (0.881)	0.178 (0.262)	0.076 (0.566)	0.134 (0.148)	<b>0.182***</b> (0.008)	<b>0.218*</b> (0.097)	<b>0.161**</b> (0.021)	0.219 (0.222)	0.208 (0.141)	0.095 (0.284)	0.110 (0.237)
Startupprocd (-1)	0.502 (0.500)	-0.248 (0.380)	-0.848 (0.234)	0.104 (0.860)	0.181 (0.660)	<b>-0.510*</b> (0.091)	0.511 (0.337)	<b>-0.804***</b> (0.006)	-0.290 (0.696)	-0.041 (0.944)	0.377 (0.309)	0.343 (0.378)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Net Effects	na	na	na	na	na	na	11.601	na	-6.456	na	na	na
Thresholds	na	na	na	na	na	na	2.328	na	1.147	na	na	na
R <sup>2</sup> /Pseudo R <sup>2</sup>	0.862	0.4327	0.496	0.628	0.792	0.873	0.888	0.403	0.453	0.626	0.806	0.872
Fisher	<b>18.57***</b>						<b>32.06***</b>					
Observations	50	50	50	50	50	50	50	50	50	50	50	50

\*, \*\*, \*\*\*: significance levels of 10%, 5% and 1% respectively. OLS: Ordinary Least Squares. R<sup>2</sup> for OLS and Pseudo R<sup>2</sup> for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where female unemployment is least. FSEmpl: Female Self-Employment. Nmfi1: microfinance institutions per 1000 km2. Nmfi2: microfinance institutions per 100 000 adults. SES: Secondary female high school enrollment rate. Trade: trade openness. CostBusiness: The cost it takes for a woman to set up a business. TimeBusiness: The time of women to set up a business. Startupprocd: The procedures a woman has to go through to start a business. Bankaccount: dummy variable which takes the value of 1 if women can open bank accounts like men, 0 otherwise. The mean value of Nmfi1 is 1.799 while the mean value of Nmfi2 is 4.189. na: not applicable because at least one estimated coefficient needed for the computation of net effect is not significant. The range of MFIs per 1000 km2 (Nmfi1) is 0.020 to 9.282 while the range of MFIs per 100 000 adults (Nmfi2) is 0.244 to 11.532.

It is also apparent in Table 2 that at the 90th quantiles, the coefficient size of the bank account variable is quite large. This is not a major issue because, in interactive regressions, the size of coefficients from the interactive constituents does not matter, because the estimated coefficients are not interpreted as in linear additive models. When the thresholds are computed, irrespective of the magnitude of the corresponding unconditional and conditional effects, the thresholds have to be within statistical range in order to make economic sense and have policy implications. In other words, irrespective of magnitude of estimated coefficients, when the threshold is computed by dividing the unconditional impact by the conditional effect, the effect



of coefficient size disappears (Odhiambo, 2020, 2022). This is why the threshold is situated between the minimum and the maximum values of the moderating variable apparent in the summary statistics.

### **4.3 Clarifying the partial validity hypothesis and nexus with the literature**

This section is discussed in two main strands, notably: clarification of the partial validity of the tested hypothesis in the light of intuition and stylized facts on the one hand and on the other, the use of gender inclusion literature to complement the attendant clarification. These strands are expanded in what follows in the same chronological order as highlighted.

On the first front, the partial validity of the tested hypothesis can be traceable to *inter alia*: (i) low penetration of female bank accounts, especially as it pertains to the ownership of bank accounts by males that are employed in the formal economic sector and (ii) reduced relevance of MFIs in being connected with formal banking establishments and promoting the involvement of women in the formal economic sector. This second point is worth emphasizing in more detail. As apparent in Appendix 4 from Asongu and Acha-Anyi (2017) on the formal, semi-formal and informal financial sectors, MFIs are contextualized as in the semi-formal financial sector. Hence, the absence of a significant nexus between the attendant semi-formal financial sector on the one hand and on the other, the lack of a substantial linkage between formal financial institutions such as banks and MFIs, can explain the insignificance of the findings.

Second, the partial validity of the tested hypothesis can also be clarified in the light of the existing literature, especially as it relates to the perspective that at times, financial inclusion policies such as female ownership of bank accounts and MFIs-driven gender inclusive measures can instead worsen the economic involvement of women in the formal economic sector (see Cheah et al., 2021; Chen et al., 2021). Accordingly, it has been established the attendant literature that women could be less socio-economically included (Molinier & Quan 2019), because, compared to men, they are more likely to adopt traditional modes of transactions (Cheah *et al.*, 2021), especially as it relates to more use of transitional financial modes of transactions that are more connected to the informal financial sector (Demirgüç-Kunt et al., 2018). Accordingly, as substantiated by Demirgüç-Kunt et al. (2018) and Kofman and Payne (2021), married women could be controlled by husbands who limit their access to less informal modes of transaction while unmarried women may simply prefer to remain in the informal financial status quo. Conversely, the invalidity of the tested hypothesis is not consistent with

the documented studies in Section 2 employed to formulate the testable hypothesis as well as studies on women using more contemporary and modern modes of transactions to improve their wellbeing, employment opportunities and socio-economic avenues (Suri & Jack, 2016; Sioson & Kim, 2019; Moufakkir & Mohammed, 2020; Sahay et al., 2020; Yeyouomo & Asongu, 2022; Loko & Yang, 2022).

## **5. Concluding implications and future research directions**

The present study assesses the relevance of microfinance institutions (MFIs) in the effect for financial access on gender economic inclusion in 44 countries in Sub-Saharan Africa (SSA) for the period 2004 to 2018. Financial access is measured in terms of female ownership of bank accounts while gender inclusion is in terms of reducing female unemployment. The hypothesis that financial access by means of female bank account ownership is moderated with MFIs in order to reduce female unemployment is consistently valid exclusively at the 90<sup>th</sup> quantile of the female unemployment distribution. MFIs per 1000 km<sup>2</sup> must reach thresholds of between 2.328 and 2.490 at the 90th quantile of female unemployment distribution in order for female ownership of bank account to reduce female unemployment. The partial validity of the tested hypothesis is clarified and policy implications are discussed.

The policy implications are fundamentally related to the clarified partial validity of the tested hypothesis, notably, that policy makers should tailor policies towards: (i) increasing the penetration of female bank account ownership so that more women looking for jobs in the formal economic sector should be in possession of bank accounts as their male counterparts and (ii) improving the connection between MFIs (which are in the semi-formal financial sector) and the banking sector (which is in the formal economic sector) as well as the nexus between MFIs and formal employment opportunities for females. A third policy implication which is relates to putting in place measures that fight the stigma against women in the formal economic sector, such that their involvement in mining, construction, factories, transportation, should be prioritized and coordinated by both financial access and MFIs policies focused on the promotion of more formal female economic participation. In summary, gender-sensitive programs should be promoted by policymakers. Moreover, policy makers should also enforce the implementation of labor laws on anti-discrimination.

Beyond the scope of implications that are related to the partial validity of the testable hypothesis, the perspective that MFIs policy thresholds are relevant in order for female ownership of bank account to reduce female unemployment at the 90<sup>th</sup> quantile of the conditional distribution of female unemployment leads to two main policy implications: (i) the relevance of MFIs per 1000 km in moderating female ownership of bank account to reduce female unemployment is most relevant as a policy instrument when existing levels of female unemployment are highest. It follows that policy makers who have been considering the policy relevance of MFIs in promoting female financial access to reduce female unemployment from a common perspective are getting their dynamics wrong. Hence, such policies should be contingent on existing levels of female unemployment and thus tailored differently across countries with low, intermediate and high initial levels of female unemployment. (ii) While policy makers should ensure that MFIs exceed the established thresholds in order for financial access by females to reduce female unemployment, established MFIs thresholds requires less policy resources. This is essentially because the established MFIs thresholds are closer to their minimum ranges in the summary statistics compared to their maximum ranges.

The findings in this study evidently provide space for future areas of research exploration especially as it relates to understanding why some of the nexuses are not significant in some of the considered quantiles. Moreover, it is also worthwhile to consider other sustainable development goals (SDGs), not least, because the present study largely focuses on the fifth sustainable development goal (i.e., SDG5).

## Appendices

### Appendix 1: Definitions and sources of variables

Variables	Definitions	Sources
Female Unemployment	Unemployment, female (% of female labor force)	WDI (World Bank)
Microfinance 1	Microfinance institutions per 1000 km2.	Financial Access Survey (2020)
Microfinance 2	Microfinance institutions per 100 000 adults	Financial Access Survey (2020)
Bank accounts	Dummy variable which takes the value 1 if women can open bank accounts like men, 0 otherwise.	Gender and parity statistics for men and women (2020)
Education	School enrollment, high, female (% gross)	WDI (World Bank)
Female Self-Employment	Self-employed, female (% of female employment)	WDI (World Bank)
Fertility	Fertility rate of women	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)
Cost to start business	The cost it takes for a woman to set up a business.	Gender and parity statistics for men and women (2020)
Time to start business	The time it takes for a woman to set up a business.	Gender and parity statistics for men and women (2020)
Start up procedure	The procedures a woman has to go through to start a business	Gender and parity statistics for men and women (2020)

WDI: World Development Indicators.

### Appendix 2: Summary Statistics

	Mean	S.D	Min	Max	Obs
Female Unemployment	9.206	8.512	0.218	38.265	645
Microfinance 1	1.799	1.877	0.020	9.282	97
Microfinance 2	4.189	3.092	0.244	11.532	97
Bank accounts	0.836	0.370	0.000	1.000	660
Education	43.377	26.076	6.542	112.824	391
Female Self-Employment	76.840	22.988	11.816	99.081	645
Fertility	4.812	1.220	1.36	7.63	616
Trade	74.769	34.486	19.100	225.023	604
Time to start business	40.416	39.625	4.000	261	635
Cost to start business	108.518	140.472	0.200	1229.100	635
Start up procedure	9.468	3.089	3.000	18.000	635

SD: Standard Deviation. Min: Minimum. Max: Maximum.

**Appendix 3: correlation matrix (uniform sample size: 50)**

	FUmpl	Nmfi1	Nmfi2	Account	SES	FSE	Fertility	Trade	Cost	Time	StartupP
FUmpl	1.000										
Nmfi1	-0.364	1.000									
Nmfi2	-0.155	0.238	1.000								
Account	0.112	0.015	-0.286	1.000							
SES	0.298	0.307	0.121	-0.367	1.000						
FSE	-0.649	-0.177	0.456	0.015	-0.628	1.000					
Fertility	-0.093	-0.483	0.371	0.065	-0.693	0.731	1.000				
Trade	-0.451	-0.200	0.179	0.117	-0.198	0.610	0.206	1.000			
Cost	-0.312	-0.196	0.067	-0.010	-0.448	0.505	0.391	0.159	1.000		
Time	0.391	-0.675	-0.214	-0.021	-0.182	0.073	0.376	0.049	0.475	1.000	
StartupP	0.105	-0.485	-0.411	-0.013	-0.068	0.021	-0.039	0.289	0.472	0.772	1.000

FUmpl: Female Unemployment. Nmfi1: microfinance institutions per 1000 km2. Nmfi2: microfinance institutions per 100 000 adults. Account: dummy variable who takes the value 1 if women can open bank accounts like men, 0 otherwise. SES: Education. FSE: Female Self Employment. Trade: trade openness. Cost: The cost it takes for a woman to set up a business. Time: The time of women to set up a business. StartupP: The procedures a woman has to go through to start a business.

**Appendix 4: Segments of the financial system by degree of formality in Paper's context**

Paper's context		Tiers	Definitions	Institutions	Principal Clients	
Formal financial system	IMF Definition of Financial System from International Financial Statistics (IFS)	Formal Financial sector (Deposit Banks)	Formal banks	Licensed by central bank	Commercial and development banks	Large businesses, Government
Semi-formal and informal financial systems		Semi-formal financial sector (Other Financial Institutions)	Specialized non-bank financial institutions		Rural banks, Post banks, Saving and Loan Companies, Deposit taking Micro Finance banks	Large rural enterprises, Salaried Workers, Small and medium enterprises
			Other non-bank financial institutions	Legally registered but not licensed as financial institution by central bank and government	Credit Unions, Micro Finance NGOs	Microenterprises, Entrepreneurial poor
Missing component in IFS definition	Informal financial sector	Informal banks	Not legally registered at national level (though may be linked to a registered association)	Savings collectors, Savings and credit associations, Money lenders	Self-employed poor	

Source: Asongu and Acha-Anyi (2018)

## References

- Ackerly, B. A. (1995). "Testing the tools of development: credit programmes, loan involvement, and women's empowerment". *IDS bulletin*, 26(3), pp. 56-68.
- Asongu, S. A., (2017). "Assessing marginal, threshold, and net effects of financial globalisation on financial development in Africa", *Journal of Multinational Financial Management*, 40(June), pp. 103-114.
- Asongu, S. A., (2020). "Technology, Education, Life and Non-Life Insurance in Africa". *International Journal of Public Administration*, 43(11), pp. 915-925.
- Asongu, S. (2024). "Fighting female unemployment: the role of female ownership of bank accounts in complementing female inclusive education". *Journal of Entrepreneurship and Public Policy*. DOI: <https://doi.org/10.1108/JEPP-04-2023-0044>
- Asongu, S. A. & Acha-Anyi, P. N., (2017). "ICT, conflicts in financial intermediation and financial access: evidence of synergy and threshold effects", *Netnomics*, 18(2-3), pp. 131–168.
- Asongu, S. A., & Eita, J. H. (2024). "Promoting Renewable Energy Consumption in Sub-Saharan Africa: How Capital Flight Crowds Out the Favorable Effect of Foreign Aid". *Journal of Applied Social Science*, 18(1), pp. 78-95.
- Asongu, S. A., Messo, O. O. & Guttemberg, K. T. J., (2022). "Women political empowerment and vulnerability to climate change: evidence from 169 countries". *Climatic Change*, 174, 30 <https://doi.org/10.1007/s10584-022-03451-7>
- Assairh, L., Kaicer, M., & Jerry, M. (2020). "La microfinance et l'empowerment des femmes: Revue de la littérature". *Revue du Contrôle, de la Comptabilité et de l'Audit*, 4(2), pp. 393–406.
- Bae, K., Han, D., & Sohn, H., (2012). "Importance of Access to Finance in Reducing Income Inequality and Poverty Level", *International Review of Public Administration*, 17(1), pp. 1-24.
- Basu, K. (2006). "Gender and say: A model of household behaviour with endogenously determined balance of power". *The Economic Journal*, 116(511), pp. 558-580.
- Batabyal, S., & Chowdhury, A., (2015). "Curbing Corruption, Financial Development and Income Inequality", *Progress in Development Studies*, 15(1), pp. 49-72.
- Beck, T., Demirgüç-Kunt, A., & Levine, R., (2007). "Finance, inequality and the poor." *Journal of Economic Growth*, 12(1), pp. 27-49.
- Bezina, F., Brown, M., & Marmarà, V-A. (2021). "Gender balance in national parliament: voters' perceptions towards the gender corrective mechanism in Malta", *Democratization*, DOI: 10.1080/13510347.2021.1995859.
- Billger, S. M., & Goel, R. K., (2009), "Do existing corruption levels matter in controlling corruption? Cross-country quantile regression estimates", *Journal of Development Economics*, 90(2), pp. 299-305.

Brambor, T., Clark, W. M., & Golder, M. (2006). "Understanding Interaction Models: Improving Empirical Analyses", *Political Analysis*, 14 (1), pp. 63-82.

Brana, S. (2013). "Microcredit: An answer to the gender problem in funding?" *Small Business Economics*, 40(1), pp. 87–100.

Byaro, M., Kinyondo, A., & Lemnge, D. A. (2023a). "Does sub-Saharan Africa's rapid population growth have positive or negative effects on aggregate domestic investment? A panel quantile regression". *World Affairs*, 186(3), pp. 806-824.

Byaro, M., Rwezaula, A., & Ngowi, N. (2023b). "Does internet use and adoption matter for better health outcomes in sub-Saharan African countries? New evidence from panel quantile regression". *Technological Forecasting and Social Change*, 191, 122445.

Byaro, M., Mafwolo, G., & Ngerenza, C. (2023c). "Does unemployment in sub-Saharan Africa have asymmetric effects on health? A panel quantile approach". *The Journal of Economic Asymmetries*, 28, e00316.

Cheah, W. C., Ammu G., & Xie, T., (2021). "Gender Divides in the ASEAN Payment Eco-System." SSRN Scholarly Paper. Rochester, NY. doi:10.2139/ssrn.3893670.

Chen, S., Doerr S., Frost, J., Gambacorta, L., & Shin, H. S. (2021). "The Fintech Gender Gap." SSRN Scholarly Paper. Rochester, NY.  
<https://papers.ssrn.com/abstract=3886740>.

Chipote, P., Mgxekwa, B., & Godza, P., (2014). "Impact of Financial Liberalization on Economic Growth: A Case Study of South Africa", *Mediterranean Journal of Social Sciences*, 5(23), pp. 1-8.

Chiwira, O., Bakwena, M., Mupimpila, C., & Tlhalefang, J. B., (2016). "Integration, Inclusion, Development in the Financial Sector and Economic Growth Nexus in SADC: Empirical Review", *British Journal of Economics, Management & Trade*, 11(4), pp. 1-15.

Demirguc-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2018). *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. World Bank Publications.

Diop, S., Asongu, S. A., & Tchamyou, V. S., (2021). "Mitigating the Macroeconomic Impact of Severe Natural Disasters in Africa: Policy Synergies", *European Xtramile Centre of African Studies WP/21/094*, Liège,

Duflo, E. (2012). "Women empowerment and economic development". *Journal of Economic Literature*, 50(4), pp. 1051–1079.

Elu, J., (2018). "Gender and Science Education in Sub-Saharan" Africa-Keynote address at the African Development Bank/African Finance and Economic Association Luncheon, Chicago, January 7, 2017, *Journal of African Development*, 20(2), 105-110.

Fox, M., & Van Droogenbroeck, N. (2017). "Les nouveaux modèles de mobile banking en Afrique: Un défi pour le système bancaire traditionnel?" *Gestion*, 2000(5), pp. 337–360.

- Gasparin, C., Rotondi, V., & Stanca, L. (2019). "Mobile money and the labor market: Evidence from developing countries". *DEMS Working Paper*, 403, 1–20.
- Goetz, A. M., & Gupta, R. S. (1996). "Who takes the credit? Gender, power, and control over loan use in rural credit programs in Bangladesh". *World development*, 24(1), 45-63.
- IMF (2020). "IMF Releases the 2020 Financial Access Survey Results", International Monetary Fund, Press Release NO. 20/335, <https://www.imf.org/en/News/Articles/2020/11/06/pr20335-imf-releases-the-2020-financial-access-survey-results> (Accessed: 15/05/2022).
- Kendall, J., Maurer, B., Machoka, P., & Veniard, C. (2012). "An emerging platform: From money transfer system to mobile money ecosystem". *Innovations*, 6(4), pp. 49–64.
- Kim, K., (2022). "Assessing the impact of mobile money on improving the financial inclusion of Nairobi women", *Journal of Gender Studies*, 30(3), pp. 306-322.
- Koenker, R., & Bassett, Jr. G., (1978). "Regression quantiles", *Econometrica*, 46(1), pp. 33-50.
- Koenker, R., & Hallock, F.K., (2001), "Quantile regression", *Journal of Economic Perspectives*, 15(4), pp.143-156.
- Loko, B, & Yang, Y., (2022). *Fintech, Female Employment, and Gender Inequality*. International Monetary Fund.
- Maldonado, J., & González-Vega, C. (2008). "Impact of microfinance on schooling: Evidence from poor rural households in Bolivia". *World Development*, 36(11), pp. 2440–2445.
- Mlachila, M., Tapsoba, R., & Tapsoba, S. J. (2017). "A quality of growth index for developing countries: A proposal". *Social Indicators Research*, 134, pp. 675-710.
- Mndolwa, F. D., et alhassan A . L. (2020). "Gender disparities in financial inclusion: Insights from Tanzania", *African Development Review*, 32(4), pp. 578-590.
- Molinier, H., & Quan, A., (2019). *Leveraging Digital Finance for Gender Equality and Women's Empowerment*. UN Women. Working paper. <https://www.unwomen.org/en/digital-library>.
- Morduch, J. (1999). "The microfinance promise". *Journal of Economic Literature*, 37(4), pp. 1569-1614.
- Moufakkir, M., & Mohammed, Q. (2020). "The Nexus between FinTech Adoption and Financial Inclusion." In *Impact of Financial Technology (FinTech) on Islamic Finance and Financial Stability*, 193–209. IGI Global.
- Ngono, J. F. L., (2021). "Financing women's entrepreneurship in Sub-Saharan Africa: bank, microfinance and mobile money", *Labor History*, 62(1), pp. 59-73.



- Obadha, M., Colbourn, T., & Seal, A. (2019). "Mobile money use and social health insurance enrolment among rural dwellers outside the formal employment sector: Evidence from Kenya". *The International Journal of Health Planning and Management*, 35(1), pp. e66–e80.
- Odhiambo, N. M., (2014). "Financial Systems and Economic Growth in South Africa: A Dynamic Complementarity Test", *International Review of Applied Economics*, 28(1), pp. 83-101.
- Odhiambo, N. M. (2020). "Financial development, income inequality and carbon emissions in Sub-Saharan African countries: a panel data analysis". *Energy Exploration & Exploitation*, 38(5), 1914-1931.
- Odhiambo, N. M. (2022). "Information technology, income inequality and economic growth in sub-Saharan African countries". *Telecommunications Policy*, 46(6), 102309.
- Ofori, I. K., Armah, M. K., Taale, F., & Ofori, P. E., (2021). "Addressing the severity and intensity of poverty in Sub-Saharan Africa: how relevant is the ICT and financial development pathway?" *Heliyon*, 7(10), e08156.
- Osabuohien, E., & Karakara, A. A. (2018). "ICT Usage, Mobile Money and Financial Access of Women in Ghana". *Africagrowth Agenda Journal*, 15(1), pp. 14-18.
- Sahay, R., von Allmen, U. E., Lahreche, A., Khera, P., Ogawa, S., Bazarbash, M., & Beaton, K., (2020). *The Promise of Fintech: Financial Inclusion in the Post COVID-19 Era*. International Monetary Fund.
- Sioson, E.P., & Kim, C-J., (2019). "Closing the Gender Gap in Financial Inclusion through Fintech." Asian Development Bank.
- Suri, T., & Jack, W. (2016). "The Long-Run Poverty and Gender Impacts of Mobile Money." *Science* 354 (6317). American Association for the Advancement of Science, pp. 1288–1292.
- Swapna, K. (2017). "Impact of microfinance on women entrepreneurship". *International Journal of Business Administration and Management*, 7(1), pp. 229–241.
- Tariq, S. (2019). "Impact of microfinance on women entrepreneurship". *Arabian Journal of Business and Management Review*, 8(1), pp. 7–16.
- Tchamyou, V. S., (2019). "The Role of Information Sharing in Modulating the Effect of Financial Access on Inequality". *Journal of African Business*, 20(3), pp. 317-338.
- Tchamyou, V. S., (2020). "Education, Lifelong learning, Inequality and Financial access: Evidence from African countries". *Contemporary Social Science*, 15(1), pp. 7-25.
- Tchamyou, V. S., (2021). "Financial access, governance and the persistence of inequality in Africa: Mechanisms and policy instruments". *Journal of Public Affairs*, 21(2), e2201.

Tchamyou, V. S., Asongu, S. A., & Odhiambo, N. M., (2019b). “The role of ICT in modulating the effect of education and lifelong learning on income inequality and economic growth in Africa”, *African Development Review*, 31(3), pp. 261-274.

Tchamyou, V.S., Erreygers, G., & Cassimon, D., (2019a). “Inequality, ICT and Financial Access in Africa”, *Technological Forecasting and Social Change*, 139(February), pp. 169-184.

Uduji, J. I. & Okolo-Obasi, E. N., (2018). “Young rural women’s participation in the e-wallet programme and usage intensity of modern agricultural inputs in Nigeria.” *Gender, Technology and Development*, 22(1), pp. 59-81.

Uduji J. I, & Okolo-Obasi E. N. (2019). “Corporate social responsibility initiatives in Nigeria and rural women livestock keepers in oil host communities.” *Social Responsibility Journal*, 15(8), pp. 1008-1032.

Uduji J. I, & Okolo-Obasi E. N., (2020). “Does corporate social responsibility (CSR) impact on development of women in small-scale fisheries of sub-Saharan Africa? Evidence from coastal communities of Niger Delta in Nigeria”. *Marine Policy*. 118, August 2020.

UNCD (2022). “Financial Inclusion and SDGs”, *United Nations Capital Development Fund*. <https://www.unCDF.org/financial-inclusion-and-the-sdgs> (Accessed: 22/03/2022).

World Bank. (2020a). “World Development Indicators”. The World Bank. <https://databank.worldbank.org/source/world-developmentindicators> .

World Bank (2020b). “Gender and Gender Parity Statistics Database”. The World Bank. <https://data.worldbank.org/topic/17>

Woldemichael, A., (2020). “Closing the gender gap in African labor markets is good economics”, *Brookings*, <https://www.brookings.edu/blog/africa-in-focus/2020/01/23/closing-the-gender-gap-in-african-labor-markets-is-good-economics/> (Accessed: 08/11/2022).

Yeyouomo, A. K. & Asongu, S. A. (2022). “Fintechs and the financial inclusion gender gap in Sub-Saharan African countries”, *African Governance and Development Institute Working Paper No. 83* , Yaoundé.