



ASPWORDA

WORKING PAPER N°2020/03

**Inclusive Education for Inclusive
Economic Participation: the Financial
Access Channel**

*Simplice A. Asongu,
Joseph Nnanna
&
Paul N. Acha-Anyi*

Inclusive Education for Inclusive Economic Participation: the Financial Access Channel*

Simplice A. Asongu

African Governance and Development Institute,
P. O. Box 8413, Yaoundé, Cameroon
E-mails: asongus@afridev.org / asongusimplice@yahoo.com

Joseph Nnanna

The Development Bank of Nigeria, The Clan Place, Plot 1386A
Tigris Crescent, Maitama, Abuja, Nigeria
E-mail: jnnanna@devbankng.com

Paul N. Acha-Anyi

Department of Tourism, Hospitality and Sports Management
Buffalo City, College street campus, Walter Sisulu University
Eastern Cape Province, South Africa
E-mails: pacha-anyi@wsu.ac.za / achasinstitute@gmail.com

January 2020

Abstract

Purpose – The study assesses how inclusive education affects inclusive economic participation through the financial access channel.

Design/methodology/approach – The focus is on 42 sub-Saharan African countries with data for the period 2004-2014. The empirical evidence is based on the Generalised Method of Moments.

Findings – The following findings are established. First, inclusive secondary education moderates financial access to exert a positive net effect on female labour force participation. Second, inclusive “primary and secondary school education” and inclusive tertiary education modulate financial access for a negative net effect on female unemployment. Third, inclusive secondary education and inclusive tertiary education both moderate financial access for an overall positive net effect on female employment. In order to provide more gender macroeconomic management policy options, inclusive education thresholds for complementary policies are provided and discussed.

Originality/value – Policy implications are discussed in the light of challenges of economic development in the sub-region and Sustainable Development Goals.

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

Keywords: Africa; Gender; Inclusive development

* The views expressed in this working paper are those of the authors and do not necessarily represent those of the ASPROWDA, its Executive Board, or its management.

Introduction

It is a general truism that financial access is important in the enhancement of the participation of women in the formal economic sector and financial access is also an important channel through which gender inclusive education policies can influence the participation of the female gender in the formal economic sector [1]. The foregoing assertion epitomises the purpose of this study which is to assess how inclusive education affects economic inclusion through financial access. Hence, the research question motivating this research is the following: how does inclusive education affect inclusive economic participation through financial access? [2]

The above question and positioning of the problem statement are challenging to policy makers. In essence, the involvement of women in formal economic activities depends on whether they have funds with which to finance their education. There is an assumption that all education is privately funded because of data availability constraints at the time of the study. Moreover, assessing how gender economic participation is ultimately affected by these “inclusive finance”-driven education policies is a relevant policy concern. Therefore, in the light of the research question, the policy variable is inclusive education; the policy channel is financial access while the targeted outcome is gender economic participation in the formal sector. In addition to the background narrative, the positioning of this study is motivated by three main factors: (i) the relevance of gender economic participation and inclusive education in post-2015 or Sustainable Development Goals (SDGs) targets; (ii) the importance of financial access in driving this inclusive socio-economic development and (iii) gaps in the scholarly literature. These highlights are expanded in the following passages for in-depth perspectives on the motivational elements.

First, the concern of inequality is fundamental in the development of Sub-Saharan Africa (SSA) in the SDG era because according to contemporary literature, in this sub-region, the participation of women in formal economic activities is least in the world (Efobi, Tanankem & Asongu, 2018). Accordingly, no economy can sustainably develop (politically, economically and socially) if majority of its population is relegated to the informal economic sector. The corresponding literature is consistent on the position that women in SSA are largely consigned to petty trading, agricultural activities and unpaid domestic chores (Ellis, Blackden, Cutura, MacCulloch & Seebens, 2007; FAO, 2011; Tandon & Wegerif, 2013). Moreover, the World Bank (2015) and the International Labour Organisation maintain that compared to men, the low engagement of women in formal economic activities obviously has

negative externalities in improving general welfare and boosting socio-economic prosperity. It is important to also recall that according to Hazel (2010), the highest poverty rate among females in the world is in SSA. The attendant literature also argues that the improvement of gender inclusion will reduce existing poverty levels, consolidate structural distribution in the labour market and enhance female welfare (Efobi *et al.*, 2018). An established mechanism through which female economic participation can be enhanced is by empowering women financially to enable them *inter alia*: engage in more formal entrepreneurial activities (Asongu & Odhiambo, 2018a) and formal education, which have been documented to improve inclusive human development (Asongu & Odhiambo, 2019a; Tchamyou, 2020; Asongu & Nwachukwu, 2018). It is also important to note that social change or awareness also needs to occur in order for more women to be accepted in formal entrepreneurial activities.

Second, as substantiated in the second section, the bulk of theoretical and empirical literature is consistent on the relevance of financial development in promoting investment opportunities for corporations and households. Such avenues of economic activity engender positive socio-economic development externalities such as improvements in living standards, general welfare and creation of jobs (Odhiambo, 2010, 2013, 2014; Daniel, 2017; Wale & Makina, 2017; Chikalipah, 2017; Osah & Kyobe, 2017; Bocher, Alemu, & Kelbore, 2017; Oben & Sakyi, 2017; Ofori-Sasu, Abor & Osei, 2017; Boadi, Dana, Mertens, & Mensah, 2017; Chapoto & Aboagye, 2017; Iyke & Odhiambo, 2017; Tchamyou, 2019, 2020; Tchamyou, Erreygers, Cassimon, 2019a). It follows that financial access is an important channel via which the formal economic participation of women can be improved, especially when such an improvement is contingent on ex-ante inclusive education policies. This research is concerned with the inclusive education framework because of an apparent gap in the contemporary literature on economic inclusion in Africa.

Third, recent development literature focusing on Africa has largely been oriented towards, among others: investigating the nexus between external flows and inequality (Kaulihowa & Adjasi, 2018); linkages between the wealth of the poorest elements of society, income and consumption (De Magalhães & Santaaulàlia-Llopis, 2018); the understanding of how environmental degradation affects inclusive human development (Asongu & Odhiambo, 2019b) and the association between inequality and corruption (Sulemana & Kpienbaareh, 2018). A stream of research has focused on the importance of reinventing development assistance for inclusive development (Page & Söderbom, 2015; Jones & Tarp, 2015; Asongu,

2016) while another stream has been concerned with linkages between information sharing, education, finance and income redistribution (Asongu & Meniago, 2018; Tchamyoun, 2019, 2020).

From the perspective of gender inclusion, it has been argued by Elu (2018) that engaging women in science studies is fundamental for sustainable development in SSA while Mannah-Blankson (2018) has assessed the nexus between access to microfinance and gender inequality. A model for the analysis of gender has been provided by Bayraktar and Fofack (2018) for the informal and financial sectors whereas Bongomin, Ntayi, Munene and Malinga (2018) have investigated the nexus between financial access and mobile money when contingencies of gender and social networks are at play. The importance corporate social responsibility, information technology and involvement of women in agricultural schemes that are driven by modern technologies in rural areas are provided by Uduji and Okolo-Obasi (2018a, 2018b, 2018c, 2020) and Uduji, Okolo-Obasi and Asongu (2019a, 2019b, 2019c, 2019d, 2020). Efobi *et al.* (2018) which is closest to the present research have investigated how information and communication technology (ICT) improve gender economic inclusion and concluded on a positive relationship. This research therefore departs from Efobi *et al.* (2018) by considering the financial access channel and inclusive education (i.e. instead of ICT) as the independent variables of interest. The justification for engaging the inclusive education and financial access indicators has been clarified in the first paragraph of this introduction, notably: in order for more women to be involved in the formal economic sector, more girls have to be involved in formal education and finance is needed to fund the attendant education [3]. The study also departs from Asongu, Nnanna and Acha-Anyi (2020a) which has focused on how financial access can be leveraged to modulate the incidence of income inequality on gender economic participation.

The suitability of the study in gender management at the macroeconomic level is largely treacable to the fact that the involvement of more women in formal economic activities obviously increases the involvement of women in the management of economic activities in sampled countries from a macroeconomic standpoint. It follows that by focusing on the financial mechanism through which inclusive education can enhance gender economic participation, the study is also assessing how policies designed at the macroeconomic level to favour gender inclusion have benefited the involvement of more women in formal economic activities, contingent on the financial access mechanism. Moreover, in order to provide more gender macroeconomic management policy options, inclusive education thresholds for

complementary policies are provided and discussed. Such a positioning departs from contemporary gender management literature which has focused on, *inter alia*: nexuses between women, work and management (Ottsen, 2019; Hallward & Bekdash-Muellers, 2019; Issa & Fang, 2019; Al-Ismail, Carmichael & Duberley, 2019; Asongu & Odhiambo, 2020a) and gender in entrepreneurship (Kittilaksanawong & Zhao, 2018; Khandelwal & Sehgal, 2018; Kumar, Jauhari, Ladha & Shekhar, 2018; Jabeen & Faisal, 2018).

The rest of the study is organised as follows. The theoretical underpinnings are discussed in the second section, which is followed by a third section covering the data and methodology. The empirical results and corresponding discussion of results are provided in the fourth section. The fifth section concludes with implications and future research directions.

Theoretical underpinnings

In accordance with recent financial development literature, there are two main contending theories surrounding the impact of financial access on inclusive development (Tchamyou *et al.*, 2019a). While a strand maintains that financial development is fundamental in promoting economic prosperity and mitigating inequality, another strand of literature is of the position that collateral requirements, transaction costs and asymmetric information can substantially curtail financial access to the poor factions of the population (Asongu & Odhiambo, 2018b). According to the former strand which motivates the positioning of this research, inequalities can be reduced through enhanced financial efficiency in capital allocation, which facilitates access to finance by the poor who have profitable investment projects (Galor & Zeira, 1993; Galor & Moav, 2004; Aghion & Bolton, 2005). The fact that women are among the poorest in Africa implies that women are likely to also benefit from financial access, especially when financial access is driven by ex-ante gender inclusive education policies, as it is the case in this study.

The latter strand however argues that the rewards of financial development are largely skewed to improve the financial and socio-economic standings of the rich to the detriment of the poor factions of the population (Asongu, Nwachukwu & Tchamyou, 2016). Hence, the poor are constrained to rely on the informal financial sector and remittances, as financial channels by which their household and petty business activities are funded (Beck, Demirgüç-Kunt & Levine, 2007).

A stream of the literature which reconciles the two strands above maintains that the nexus between financial development and inclusive development is non-monotonic or non-linear (Greenwood & Jovanovic, 1990; Asongu & Tchamyou, 2014). Such non-linear analytical frameworks usually involve interactive regressions as it is the case with this study.

The positions for, against and the conditional importance of financial access in reducing inequality can be further articulated in the extensive and intensive margin theories on the relationship between financial development and inequality (Tchamyou *et al.*, 2019a). First, from the intensive margin theory, financial access affects inequality both through: direct and indirect mechanisms and the enhancement of services provided to agents who are already engaged in the financial system (Chipote, Mgxekwa & Godza, 2014). Second, the extensive margin theory postulates that financial access also produces externalities in the margin by improving access to finance to the population or agents that were previously excluded from accessing formal financial services (Odhiambo, 2014; Orji, Aguegboh & Anthony-Orji, 2015; Chiwira, Bakwena, Mupimpila & Tlhalefang, 2016). Accordingly, this strand of literature broadly supports the view that financial access is a channel by which the intergenerational persistence of inequality can be mitigated through the improvement of economic avenues for poorer and excluded factions of society such as women (Evans & Jovanovic, 1989; Holtz-Eakin, Joulfaian & Rosen, 1994; Black & Lynch, 1996; & Chowdhury, 2015; Bae, Han & Sohn, 2012).

The positioning of this research is consistent with both the intensive and extensive margin theories. First, the study builds on the intensive margin theory because financial access affects gender economic participation both directly and indirectly. In this research, financial access affects gender economic participation because it is the channel by which the modeling exercise is tailored to influence female employment. From an indirect scope, financial development affects gender economic participation indirectly because the effect of financial access on gender economic participation is contingent on inclusive education. In other words, financial access is the mechanism by which inclusive education policies lead to inclusive economic participation. In an interactive regression, the unconditional effect of financial access is the direct effect whereas the conditional effect is the interactive effect from financial access and inclusive education. In computing net effects (i.e. entailing unconditional and conditional effects), the mechanism is naturally the variable reflecting the unconditional effect (Asongu, Orim & Nting, 2019). Second, the extensive margin theory is also relevant in this research because of the word “inclusive” which characterizes two of the three main

variables of interest: inclusive education and inclusive economic participation. It follows that those previously excluded from formal education can use formal financial services during their education programs and eventually become more involved in the formal economic sector. As Tchamyou *et al.* (2019a) have argued, when financial interactions entail a population that was previously unbanked, the extensive margin theory becomes apparent in the nexuses.

Data and methodology

Data

This study focuses on 42 countries in SSA with data of annual periodicity spanning from 2004 to 2014. The 42 countries include: “Angola, Benin, Botswana, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo Democratic Republic, Congo Republic, Côte d’Ivoire, Djibouti, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda and Zambia”. The temporal and geographical scopes of the research build on the motivation of the study outlined in the introduction as well as data availability constraints at the time of the study. Particularly, there were constraints in obtaining data on gender economic participation at the time of the study. Four main sources are used for the selection of variables. First, following Efobi *et al.* (2018) which is partially motivating this study, the gender economic participation indicators are obtained from the International Labour Organisation. These indicators are: female labour force participation; female unemployment and female employment. Second, a control variable (i.e. political stability) is sourced from World Governance Indicators of the World Bank. Third, the gender-parity inclusive education indicators (i.e. “primary and secondary school education”, secondary school education and tertiary school education) and another control variable (i.e. remittances) are from the World Development Indicators of the World Bank. Fourth, the financial access channel (or private domestic credit) is obtained from the Financial Development and Structure Database of the World Bank.

This study prefers the credit channel of financial access instead of the deposit channel because the notion of financial access is logically and intuitively more associated with access to credit than deposits. This is essentially because deposits have to be transformed into credit before financial access is guaranteed.

The choice of the two control variables is motivated by both recent inclusive development literature and the need to avoid misspecification concerns related to instrument proliferation (Anyanwu, 2011; Meniago & Asongu, 2018; Tchamyou, 2019, 2020; Asongu & Odhiambo, 2019c). These motivations are put into greater perspective. First, the attendant literature (Anyanwu, 2011; Meniago & Asongu, 2018) is supportive of the perspective that remittances do not promote inclusive development in Africa because immigrants to developed countries are largely from wealthier households and by extension when funds are remitted back from abroad, these underlying funds ultimately consolidate the financial standings of wealthier households. This narrative has been verified by Asongu and Odhiambo (2018a) within the framework of gender economic inclusion. Political stability obviously provides a conducive environment for investment and promotion of private sector activities which engender employment and by extension involvement of the female gender in the reaping of associated employment avenues.

Second, the adoption of two control variables for the empirical analysis is consistent with GMM-centric literature. Accordingly, elements in the conditioning information set (i.e. control variables) can be limited in order to avoid concerns associated with instrument proliferation which can substantially bias the estimated coefficients and models (Tchamyou, Asongu & Odhiambo, 2019b). Hence, in order to pass post-estimation diagnostic tests, GMM-centric literature entails studies which have limited control variables to two as in this research (Bruno, De Bonis & Silvestrini, 2012). Moreover, some studies do not include any control variable at all (Osabuohien & Efobi, 2013; Asongu & Nwachukwu, 2017). The definitions and sources of variables are provided in Appendix 1 whereas the summary statistics is disclosed in Appendix 2. The correlation matrix is covered by Appendix 3.

Methodology

GMM: Specification, identification and exclusion restrictions

The specification is consistent with studies on the importance of adapting the estimation technique to data behaviour (Kou et al., 2012, 2014, 2016, 2019a, 2019b; Li et al., 2014, 2016; Zhang et al., 2019). The estimation approach of this research follows the justifications for engaging two control variables in the conditioning information set (i.e. set of control variables), discussed in the previous section. This estimation strategy is also considered because of the associated requirements and advantages of employing the approach, which are four in number (Tchamyou, 2019, 2020; Asongu, Nnanna & Acha-Anyi, 2020b). First, the N

(42) > T (2004-2014) condition which is essential for the choice of the technique is met because the number of cross sections (i.e. N) is higher than the corresponding number of years or periods in each cross section (i.e. T). In other words, the sampled countries which are 42 are higher than the number of years in each country, which are 11. Second, the indicators of female gender inclusion used as outcome or dependent variables are persistent. This persistence is essentially because the correlations between the first difference and level series' are higher than 0.800 which is the established rule of thumb for establishing persistence (Tchamyou *et al.*, 2019b). Third, the concern of endogeneity is tackled from two standpoints. On the one hand, reverse causality or simultaneity is addressed with the use of internal instruments. On the other, time invariant omitted variables are employed to account for the unobserved heterogeneity. Fourth, given that the data structure in this study is panel; cross-country variations are involved in the regression exercises.

Following Asongu and Nwachukwu (2016a), Boateng, Asongu, Akamavi and Tchamyou (2018), the GMM approach adopted in this study is the Roodman (2009a, 2009b) improvement of Arellano and Bover (1995). The approach is adopted because it produces estimates that are more efficient and avoids the instrument proliferation by collapsing instruments in the estimation exercise.

The following equations in level (1) and first difference (2) summarise the standard *system* GMM estimation procedure.

$$FE_{i,t} = \sigma_0 + \sigma_1 FE_{i,t-\tau} + \sigma_2 E_{i,t} + \sigma_3 FA_{i,t} + \sigma_4 EFA_{i,t} + \sum_{h=1}^2 \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (1)$$

$$FE_{i,t} - FE_{i,t-\tau} = \sigma_1 (FE_{i,t-\tau} - FE_{i,t-2\tau}) + \sigma_2 (E_{i,t} - E_{i,t-\tau}) + \sigma_3 (FA_{i,t} - FA_{i,t-\tau}) + \sigma_4 (EFA_{i,t} - EFA_{i,t-\tau}) + \sum_{h=1}^2 \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \quad (2)$$

where, $FE_{i,t}$ is the female economic inclusion measurement (i.e. female labor force participation, female unemployment and female employment) of country i in period t , σ_0 is a constant, E entails inclusive education (“primary and secondary school education”, secondary school education and tertiary school education), FA denotes a financial access proxy (or private domestic credit), EFA is the interaction between education indicators and financial access (“primary and secondary school education” × “private domestic credit”, “secondary school education” × “private domestic credit”, “tertiary school education” × “private domestic credit”), W is a vector of control variables (political stability and

remittances), τ represents the coefficient of auto-regression which is one within the context of this research because a year lag is enough to capture past information, ξ_t is the time-specific constant, η_i is the country-specific effect and $\varepsilon_{i,t}$ the error term. A one year lag is more appropriate in capturing past information because a lag of one year captures more persistence compared to a two year lag.

Identification and exclusion restrictions

Following contemporary GMM-centric literature, this research discusses properties of identification as well as corresponding exclusion restrictions because these are relevant for a robust GMM specification. Identification is the process of choosing dependent variables, independent variables that are endogenous and independent variables that are strictly exogenous. The attendant literature include: Asongu and Nwachukwu (2016b), Tchamyou and Asongu, (2017), Boateng *et al.* (2018) and Tchamyou *et al.* (2019a). Building on this literature, the years are identified as strictly exogenous variables whereas the endogenous explaining variables are independent variables of interest (i.e. education and financial access variables) and elements in the conditioning information set (i.e. political stability and remittances) are acknowledged as predetermined or endogenous explaining variables. The identification strategy and corresponding exclusion restriction narrative is supported by Roodman (2009b) who has argued that in a first difference series, years cannot be endogenous. Hence, the procedure for treating ivstyle (years) is ‘iv (years, eq(diff))’ whereas the gmmstyle is employed for predetermined variables.

In traditional instrumental variables (IV), the validity of instruments is assessed with the Sargan/Hansen overidentifying restrictions test, such that, the null hypothesis of the attendant test should not be rejected in order for the instruments to exhibit strict exogeneity (Demirgüç-Kunt & Levine, 2003; Asongu & Nwachukwu, 2016c). However, with the GMM approach based on forward orthogonal deviations, the Difference in Hansen Test (DHT) is used to assess the validity of the null hypothesis. Hence, in the findings that are reported in the next section, the alternative hypothesis of the DHT should be rejected in order for the instruments to elucidate inclusive economic participation exclusively via the exogenous components of the predetermined variables.

Empirical results

Presentation of results

The empirical results are disclosed in this section in Tables 1-3. Table 1 focuses on inclusive education, financial access and female labour force participation, Table 2 is concerned with nexuses between inclusive education, financial access and female unemployment whereas in Table 3, the focus is on linkages between inclusive education, financial access and female employment. Each table is divided into three categories of specifications pertaining to each of the inclusive education indicators. Moreover, for each education-specific modeling, two sub-specifications are apparent: one without a conditioning information set and the other with a conditioning information set. In all the specifications, four main information criteria are used to examine the validity of estimated coefficients [4]. In the light of these criteria, the estimated models are overwhelmingly valid.

The overall incidence of inclusive education in the effect of financial access on gender economic inclusion is assessed by computing the net effect based on unconditional effects of financial access and conditional effects from the interaction between financial access and inclusive education. This process of computing net effects is consistent with recent financial development and interactive regressions literature (Tchamyou & Asongu, 2017). For example, in the fifth column of Table 1, the net effect from secondary school education in modulating financial access for female labour force participation is $0.002([-0.047 \times 0.867] + [0.043])$. In the calculation, the mean value of secondary school education is 0.867; the unconditional effect of financial access is 0.043 while the conditional effect based on the interaction between financial access and secondary education is -0.047.

The following findings can be established from Tables 1-3. Secondary school education moderates financial access to exert a positive net effect on female labour force participation. “Primary and secondary school education” and tertiary education modulate financial access for a negative net effect on female unemployment. Secondary education and tertiary education both moderate financial access for an overall positive net effect on female employment. Most of the significant control variables have the expected signs.

“Insert Table 1 here”

“Insert Table 2 here”

“Insert Table 3 here”

Gender in macroeconomic management: thresholds for complementary policies

In order to provide more policy implications, inclusive education thresholds for complementary policies are computed in this section. The thresholds are specific critical masses that policy makers should act upon at the macroeconomic level in order to maintain the favorable incidence of inclusive education on female economic participation through the financial access mechanism.

The premise for computing complementary thresholds that are consistent with contemporary threshold literature (Asongu & Odhiambo, 2020b, 2020c) builds on the fact that, for the most part, conditional or interactive estimates associated with positive female economic participation outcomes are negative (i.e. Table 1 and Table 3) while the conditional or interactive estimates associated with negative female economic participation outcomes are positive (i.e. Table 2). It follows that at certain thresholds of inclusive education, the financial access channel becomes a necessary but not a sufficient mechanism for the promotion of female economic participation. This is essentially because beyond the established thresholds, the signs of the net effects change. Hence, at the thresholds, other inclusive policies should be designed to complement the financial access mechanism in order to increase female economic participation. In addition, in line with the attendant threshold literature, in order for the established thresholds to be policy-relevant and make economic sense, they should be within the statistical limits or ranges (i.e. minimum to maximum values) provided in the summary statistics.

Looking at the tables, the corresponding thresholds are provided just below the net effects. For example, in Table 1, in the fifth column, the secondary school enrolment threshold is 0.914 (0.043/ 0.047). In the same vein, in the last column of Table 2, the tertiary school enrolment threshold is 2.085 (0.244/0.117). It follows that when the secondary school enrolment gender parity index exceeds 0.914, the net effect on female labour force participation becomes negative and hence, the financial access channels should be complemented with other policies. In the same vein, when the tertiary school enrolment gender parity index exceeds 2.085, the net effect on female unemployment becomes positive and hence, complementary policies are required.

Given that thresholds in which specifications involve the conditioning information set or control variables are more robust because they control for variable omission bias, the other attendant thresholds are: (i) 0.947 for the nexus between “primary & secondary school enrolment” gender parity index and female unemployment; (ii) 0.964 for the relationship

between “secondary school enrolment” gender parity index and female employment and (iii) 1.456 for the nexus between “tertiary school enrolment” gender parity index and female employment. The computed thresholds make economic sense because they are within the corresponding ranges of “primary & secondary school enrolment” (0.600 to 1.105), secondary school enrolment (0.333 to 1.422) and tertiary school enrolment (0.064 to 3.295) disclosed in the summary statistics. The complementary policies at the established thresholds are discussed in the following section.

Concluding implications and future research directions

The study assesses how inclusive education affects inclusive economic participation through the financial access channel. The focus is on 42 sub-Saharan African countries with data for the period 2004-2014. The empirical evidence is based on Generalised Method of Moments. Financial access is measured with private domestic credit and three gender economic inclusion indicators are used for the analysis, namely: female labour force participation, female unemployment and female employment. Three gender parity education measures are also used to proxy for inclusive education, notably: “primary and secondary education”, secondary education and tertiary education.

The following findings are established: First, inclusive secondary education moderates financial access to exert a positive net effect on female labour force participation. Second, inclusive “primary and secondary school education” and inclusive tertiary education modulate financial access for a negative net effect on female unemployment. Third, inclusive secondary education and inclusive tertiary education both moderate financial access for an overall positive net effect on female employment. In what follows, policy implications are discussed in the light of challenges of economic development in the sub-region and Sustainable Development Goals.

In order to provide more gender macroeconomic management policy options, inclusive education thresholds for complementary policies are provided. At these thresholds, financial access is a necessary but not a sufficient channel for the promotion of female economic participation. The suitability of these thresholds in gender management at the macroeconomic level is largely treacable to the fact that these are actionable critical masses of gender inclusive education that policy makers can act upon to improve the involment of more women in formal economic activities. Such complementary policies to financial access can consist of improvements in the mechanisms of financial access that are consistent with

financial inclusion. Complementary measures that can be used to enhance private domestic credit (i.e. the financial access) entail the consolidation of both demand- and supply-side measures of financial inclusion. In the light of contemporary financial inclusion literature, the demand-side financial inclusion policies include, *inter alia*: universal access to bank accounts and more automated teller machines (ATMs) penetration (Lashitew, van Tulder & Liasse, 2019; Asongu & Odhiambo, 2019d). Moreover, the supply-side financial inclusion measures entail, among others: mobile subscription rate, mobile connectivity coverage and mobile connectivity performance. Hence, these disclosed demand- and supply-side measures should be used to improve private domestic credit at the established thresholds.

It is important to recall that this study directly touches on two SDGs: notably: (i) SDG 5 (i.e. “*achieve gender equality and empower all women and girls*”) and (ii) SDG 8 (i.e. “*promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*”). Hence, in the light of the two SDGs, this research has shown that financial access is an important channel through which gender inclusive education policies can be translated into inclusive female gender involvement in the formal economic sector. There is also a dimension of inequality that the findings in this study articulate. Accordingly, given that close to half of countries in the sub-region did not achieve the MDG extreme poverty target, in spite of enjoying more than two decades of economic growth resurgence (Asongu & le Roux, 2019), it is apparent that growing exclusive development is the result of inequitable distribution of the fruits of economic growth. This is essentially because, compared to high inequality levels, extreme poverty responds more negatively to economic growth when existing levels of inequality are low (Ncube, Anyanwu & Hausken, 2014; Fosu, 2015; Asongu & Kodila-Tedika, 2017). Hence, in order to achieve the targeted extreme poverty level of below 3%, reducing inequality is indispensable as concluded by Bicaba, Brixiova and Ncube (2017). It follows from these underpinnings that the findings of this study have a dual effect of reducing inequality and by extension of promoting the negative responsiveness of extreme poverty to economic growth. As a policy implication, in policies designed to reduce income inequality, particular emphasis should be placed on poor factions of the population such as women whose inclusion in formal economic activities would benefit the society both in terms of enhanced economic growth and more even distribution of fruits from economic growth. This loss in economic growth is consistent with a recent report from the World Bank which has concluded that gender exclusion from the

formal economic sector in SSA represents about 2.5 trillion USD loss (Nkurunziza, 2018; World Bank, 2018).

In order to achieve sustainable development contingent on the established findings, inclusive education policies will have to be sustained in the future. This will ensure that the positive ramifications of such policies on female economic participation are also sustained. Accordingly, notions of sustainable development and inclusion are closely connected within the framework of Amavilah, Asongu and Andrés (2017) and Asongu (2018) who maintain that in order to inclusive development (entailing inclusive education and inclusive economic participation) to be sustainable, it must be sustained and for sustained development to be sustainable, it should be inclusive.

These findings have also confirmed the main theoretical postulation that financial access promotes inclusive development. As a suggestion for future research, the findings can be extended by examining other mechanisms by which inclusive education can lead to inclusive opportunities in the formal economic sector. Another worthwhile future research direction is to engage country-specific effects for more targeted policy implications. This recommendation is motivated by the fact that the GMM technique is designed to eliminate country-specific effects in order to avoid concerns of endogeneity arising from the correlation between the lagged dependent variable and country-specific effects. Another extension of the paper could be to reconsider the problem statement in the light of microeconomic specific data and/or case studies in order to provide microeconomic management or organisational implications.

Notes

1. The terms “gender inclusion”, “gender economic participation”, “female labour force participation”, “female employment”, “female economic participation” and “gender economic inclusion” are used interchangeably throughout the study. While the term gender can be broadly applied to represent a plethora of identities that do not necessarily correspond to entrenched ideas about female and male, the concept of gender in this study is binary in terms of female and male, in accordance with contemporary gender issues literature (Asongu, Efobi, Tanankem & Osabuohien, 2020).
2. Inclusive education refers to the involvement of more girls in education while inclusive economic participation refers to the involvement of more women in the formal economic sector. Inclusive development and gender economic participation are used interchangeably while inclusive education and gender education are also used interchangeably throughout the study. Moreover, inclusive financial development and financial access are also used interchangeably.
3. The positioning of this study is also motivated by contemporary African financial development literature which has not engaged the linkages between financial access, inclusive education and gender inclusion (Gevorkyan & Kvangraven, 2016; Boamah, 2017; Asongu, Nwachukwu & Tchamyou, 2017; Danquah, Quartey & Iddrisu, 2017; Kusi, Agbloyor, Ansah-Adu & Gyeke-Dako, 2017; Amponsah, 2017; Bayraktar & Fofack, 2018; Kusi & Opoku-Mensah, 2018; Boateng, Asongu, Akamavi & Tchamyou, 2018; Asongu, Batuo, Nwachukwu & Tchamyou, 2018a; Senga, Cassimon & Essers, 2018; Senga & Cassimon, 2018 ; Asongu, Raheem & Tchamyou, 2018b; Gyeke-Dako, Agbloyor, Turkson & Baffour, 2018; Dafe, Essers & Volz, 2018; Bokpin, Ackah & Kunawotor, 2018).
4. “First, the null hypothesis of the second-order Arellano and Bond autocorrelation test (AR (2)) in difference for the absence of autocorrelation in the residuals should not be rejected. Second the Sargan and Hansen over-identification restrictions (OIR) tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, while the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the Difference in Hansen Test (DHT) for exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Fourth, a Fisher test for the joint validity of estimated coefficients is also provided” (Asongu & De Moor, 2017, p.200).

Table 1: Inclusive education, financial access and female labour force participation

	Dependent variable: Female Labour Force Participation (FLEPart)					
	Primary & Secondary School Enrolment (PSSE)		Secondary School Enrolment (SSE)		Tertiary School Enrolment (TSE)	
FLEPart (-1)	0.927*** (0.000)	0.964*** (0.000)	0.934*** (0.000)	0.943*** (0.000)	0.961*** (0.000)	0.952*** (0.000)
Domesstic Credit (Credit)	0.038 (0.587)	0.069 (0.161)	0.004 (0.903)	0.043** (0.069)	0.008 (0.784)	-0.017 (0.295)
Primary & Secondary School Enrolment (PSSE)	-4.541** (0.017)	-3.182*** (0.009)	---	---	---	---
Secondary School Enrolment (SSE)	---	---	-4.529*** (0.007)	-1.636*** (0.008)	---	---
Tertiary School Enrolment (TSE)	---	---	---	---	-0.668 (0.104)	-0.300 (0.430)
Credit × PSSE	-0.030 (0.657)	-0.068 (0.161)	---	---	---	---
Credit × SSE	---	---	0.013 (0.601)	-0.047* (0.058)	---	---
Credit × TSE	---	---	---	---	-0.006 (0.754)	0.004 (0.657)
Political Stability	---	0.463*** (0.000)	---	0.596*** (0.000)	---	0.143* (0.062)
Remittances	---	-0.037*** (0.000)	---	-0.033*** (0.000)	---	-0.044*** (0.000)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Net Effects	na	na	na	0.002	na	na
Negative threshold(s)	na	na	na	0.914	na	na
AR(1)	(0.051)	(0.069)	(0.048)	(0.054)	(0.080)	(0.078)
AR(2)	(0.315)	(0.258)	(0.185)	(0.188)	(0.230)	(0.293)
Sargan OIR	(0.032)	(0.000)	(0.154)	(0.004)	(0.012)	(0.092)
Hansen OIR	(0.244)	(0.485)	(0.504)	(0.445)	(0.472)	(0.762)
DHT for instruments						
(a) Instruments in levels						
H excluding group	(0.027)	(0.077)	(0.063)	(0.100)	(0.096)	(0.263)
Dif(null, H=exogenous)	(0.606)	(0.777)	(0.796)	(0.730)	(0.679)	(0.872)
(b) IV (years, eq(diff))						
H excluding group	---	(0.113)	---	(0.109)	---	(0.734)
Dif(null, H=exogenous)	---	(0.866)	---	(0.830)	---	(0.614)
Fisher	32419***	649023***	933.30***	58943.88***	44959.74***	1.97e+06***
Instruments	24	32	24	32	24	32
Countries	39	36	36	35	36	33
Observations	250	238	233	221	194	179

***, **, *: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. The mean value of primary and secondary school enrolment is 0.919. The mean value of secondary school enrolment is 0.867. The mean value of tertiary school enrolment is 0.731. na: not applicable because at least one estimated coefficient needed for the computation of net effects is not significant. Constants are included in all regressions.

Table 2: Inclusive education, financial access and female unemployment

	Dependent variable: Female Unemployment (FU)					
	Primary & Secondary School Enrolment (PSSE)		Secondary School Enrolment (SSE)		Tertiary School Enrolment (TSE)	
FU(-1)	1.000*** (0.000)	0.973*** (0.000)	0.970*** (0.000)	0.920*** (0.000)	1.007*** (0.000)	0.910*** (0.000)
Domesctic Credit (Credit)	-0.050** (0.037)	-0.054*** (0.000)	-0.011 (0.374)	-0.011 (0.263)	-0.261*** (0.000)	-0.244*** (0.003)
Primary & Secondary School Enrolment (PSSE)	-2.670* (0.088)	-1.743 (0.106)	---	---	---	---
Secondary School Enrolment (SSE)	---	---	0.580 (0.522)	3.047*** (0.001)	---	---
Tertiary School Enrolment (TSE)	---	---	---	---	3.473*** (0.000)	6.902*** (0.002)
Credit × PSE	0.057** (0.030)	0.057*** (0.000)	---	---	---	---
Credit × SSE	---	---	0.012 (0.368)	0.001 (0.853)	---	---
Credit × TSE	---	---	---	---	0.153*** (0.000)	0.117** (0.025)
Political Stability	---	0.175* (0.067)	---	0.264* (0.054)	---	-0.118 (0.826)
Remittances	---	-0.014** (0.021)	---	-0.039*** (0.000)	---	0.112*** (0.001)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Net Effects	0.002	-0.001	na	na	-0.149	-0.158
Positive threshold(s)	nsa	0.947	na	na	1.705	2.085
AR(1)	(0.023)	(0.024)	(0.040)	(0.044)	(0.200)	(0.180)
AR(2)	(0.844)	(0.738)	(0.802)	(0.873)	(0.741)	(0.603)
Sargan OIR	(0.267)	(0.392)	(0.432)	(0.673)	(0.000)	(0.000)
Hansen OIR	(0.106)	(0.302)	(0.269)	(0.117)	(0.146)	(0.742)
DHT for instruments						
(a) Instruments in levels						
H excluding group	(0.166)	(0.227)	(0.253)	(0.493)	(0.071)	(0.328)
Dif(null, H=exogenous)	(0.128)	(0.374)	(0.279)	(0.080)	(0.264)	(0.813)
(b) IV (years, eq(diff))						
H excluding group	---	(0.058)	---	(0.044)	---	(0.538)
Dif(null, H=exogenous)	---	(0.788)	---	(0.433)	---	(0.721)
Fisher	6347.42***	97681.73***	17164.76***	912661.34***	179.28***	1578.66***
Instruments	24	32	24	32	24	32
Countries	37	34	36	33	34	31
Observations	233	221	216	204	183	168

***, **, *: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. The mean value of primary and secondary school enrolment is 0.919. The mean value of secondary school enrolment is 0.867. The mean value of tertiary school enrolment is 0.731. na: not applicable because at least one estimated coefficient needed for the computation of net effects is not significant. nsa: not specifically applicable because the computed net effect does not have the expected signs. Constants are included in all regressions.

Table 3: Inclusive education, financial access and female employment

	Dependent variable: Female Employment (FE)					
	Primary & Secondary School Enrolment (PSSE)		Secondary School Enrolment (SSE)		Tertiary School Enrolment (TSE)	
FE(-1)	0.991*** (0.000)	0.988*** (0.000)	0.994*** (0.000)	0.971*** (0.000)	1.003*** (0.000)	0.961*** (0.000)
Domesctic Credit (Credit)	0.037 (0.160)	0.062 (0.147)	0.018 (0.394)	0.054** (0.018)	0.072* (0.090)	0.169*** (0.000)
Primary & Secondary School Enrolment (PSSE)	2.502 (0.105)	0.178 (0.849)	---	---	---	---
Secondary School Enrolment (SSE)	---	---	1.513 (0.107)	-0.641 (0.339)	---	---
Tertiary School Enrolment (TSE)	---	---	---	---	-0.988 (0.374)	-0.637 (0.634)
Credit × PSE	-0.042 (0.132)	-0.063 (0.132)	---	---	---	---

Credit × SSE	---	---	-0.024 (0.287)	-0.056** (0.013)	---	---
Credit × TSE	---	---	---	---	-0.040 (0.260)	-0.116*** (0.001)
Political Stability	---	0.092 (0.275)	---	0.200* (0.091)	---	-0.064 (0.817)
Remittances	---	0.007 (0.125)	---	0.015*** (0.003)	---	-0.090*** (0.000)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Net Effects	na	na	na	0.005	na	0.084
Negative threshold(s)	na	na	na	0.964	na	1.456
AR(1)	(0.013)	(0.012)	(0.018)	(0.014)	(0.072)	(0.071)
AR(2)	(0.481)	(0.511)	(0.996)	(0.955)	(0.251)	(0.412)
Sargan OIR	(0.875)	(0.639)	(0.580)	(0.600)	(0.000)	(0.003)
Hansen OIR	(0.556)	(0.574)	(0.325)	(0.303)	(0.451)	(0.681)
DHT for instruments						
(a) Instruments in levels						
H excluding group	(0.053)	(0.170)	(0.197)	(0.413)	(0.096)	(0.399)
Dif(null, H=exogenous)	(0.877)	(0.768)	(0.375)	(0.274)	(0.653)	(0.703)
(b) IV (years, eq(diff))						
H excluding group	---	(0.704)	---	(0.354)	---	(0.349)
Dif(null, H=exogenous)	---	(0.399)	---	(0.301)	---	(0.790)
Fisher	2044.00***	231146.97***	255232.37***	212876.19***	71242.91***	1485.28***
Instruments	24	32	24	32	24	32
Countries	37	34	36	33	34	31
Observations	233	221	216	204	183	168

***, **, *: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. The mean value of primary and secondary school enrolment is 0.919. The mean value of secondary school enrolment is 0.867. The mean value of tertiary school enrolment is 0.731. na: not applicable because at least one estimated coefficient needed for the computation of net effects is not significant. Constants are included in all regressions.

Appendices

Appendix 1: Definitions of Variables

Variables	Signs	Definitions of variables (Measurements)	Sources
Female Economic Participation	FLFpart	Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate)	ILO
	FU	Unemployment, female (% of female labor force) (modeled ILO estimate)	ILO
	FE	Employment to population ratio, 15+, female (%) (modeled ILO estimate)	ILO
Financial Credit	Credit	Private Domestic Credits (% of GDP)	FDSD
Primary and Secondary School	PSSE	School enrolment, primary and secondary (gross), gender parity index (GPI)	WDI

Secondary School	SSE	School enrolment, secondary (gross), gender parity index (GPI)	WDI
Tertiary School	TSE	School enrolment, tertiary (gross), gender parity index (GPI)	WDI
Political Stability	PolS	“Political stability/no violence (estimate): measured as the perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional and violent means, including domestic violence and terrorism”	WGI
Remittances	Remit	Remittance inflows to GDP (%)	WDI

WDI: World Bank Development Indicators of the World Bank. FDSD: Financial Development and Structure Database of the World Bank. WGI: World Governance Indicators of the World Bank. ILO: International Labour Organisation.

Appendix 2: Summary statistics (2004-2014)

	Mean	SD	Minimum	Maximum	Obs
Female Labor Force participation	62.515	15.685	30.00	88.80	451
Female Unemployment, female	10.831	8.736	0.300	44.800	429
Female Employment	57.201	15.828	23.700	86.400	429
Private Domestic Credit	20.913	24.628	0.873	150.209	440
Primary & Secondary School Enrolment	0.919	0.111	0.600	1.105	307
Secondary School Enrolment	0.867	0.214	0.333	1.422	287
Tertiary School Enrolment	0.731	0.433	0.064	3.295	232
Political Stability	-0.471	0.905	-2.687	1.182	462
Remittances	4.313	6.817	0.00003	50.818	416

S.D: Standard Deviation.

Appendix 3: Correlation matrix (uniform sample size: 146)

FLFpart	FU	FE	Credit	PSSE	SSE	TSE	PolS	Remit	
1.000	-0.215	0.946	-0.388	0.072	-0.220	-0.416	0.030	-0.128	FLFpart
	1.000	-0.509	0.168	0.324	0.558	0.573	0.172	0.395	FU
		1.000	-0.402	-0.016	-0.355	-0.526	-0.055	-0.239	FE
			1.000	0.408	0.496	0.563	0.519	-0.002	Credit
				1.000	0.863	0.715	0.545	0.339	PSSE
					1.000	0.888	0.542	0.517	SSE
						1.000	0.375	0.403	TSE
							1.000	0.162	PolS
								1.000	Remit

FLFpart: Female Labour Force participation. FU: Female Unemployment. FE: Female Employment. Credit: Private Domestic Credit. PSSE: Primary and Secondary School Enrolment. SSE: Secondary School Enrolment. TSE: Tertiary School Enrolment. PolS: Political Stability. Remit: Remittances.

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