A G D I Working Paper

WP/19/027

Inequality and the Economic Participation of Women in Sub-Saharan Africa: An Empirical Investigation

Forthcoming: African Journal of Economic and Management Studies

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Inequality and the Economic Participation of Women in Sub-Saharan Africa: An Empirical Investigation

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January 2019

Abstract

This study investigates the effect of inequality on female employment in 42 countries in sub-Saharan Africa for the period 2004-2014. Three inequality indicators are used, namely, the: Gini coefficient, Atkinson index and Palma ratio. Two indicators of gender inclusion are also employed, namely: female employment and female unemployment rates. The empirical analysis is based on the Generalised Method of Moments (GMM).The following main findings are established. First, inequality increases female unemployment in regressions based on the Palma ratio. Second, from the robustness checks, inequality reduces female employment within the frameworks of the Gini coefficient and Palma ratio.

JEL Classification: G20; I10; I32; O40; O55
Keywords: Africa; Gender; Inclusive development

1. Introduction

The relationship between inequality and gender inclusion is motivated by three fundamental factors in the scholarly and policy literature, notably: (i) the importance of involving women in the formal economic sector;(ii) the relevance of inclusive development in the global agenda of sustainable development goals (SDGs) and (iii) gaps in the attendant literature. These factors are successively explained as follows.

First, as documented in recentliterature (Abney & Laya, 2018; Asongu & Odhiambo, 2018), there is a global policy issue of fewer women in the formal economic sector. This issue is unfavourable to human and economic prosperity because the non-involvement of women in the formal economic sector will bear a cost on the global annual gross domestic product

(GDP) of about 28 trillion USD by the year 2025. There is a consensus in the narrative that, involving more women in economic activities will induce a plethora of socio-economic benefits to society at large. Some of these externalities include: poverty mitigation;innovation; the enhanced choice for consumers; and sustainability of the environment. From a comparative standpoint, the attendant literature also maintains that compared to other continents of the world, Africa is characterised with the highest level of gender exclusion. This is essentially because women record the lowest contribution to formal economic activities (Efobi, Tanankem & Asongu, 2018). The positioning of this study on the nexus between inequality and female employment in Africa is, therefore, partly motivated by these narratives on gender exclusion[1].

It is important to put the issue of gender exclusion in Africa into greater perspective in order to consolidate the motivation of this study. As recently documented by Efobi *et al.* (2018), Asongu and Odhiambo (2018, 2019a), women in Africa are largely relegated to the peripheral sectors of the economy. Some of the articulated activities are small farming corporations, petty trading and domestic chores that are not associated with any financial rewards. This perspective of gender exclusion in the continent is consistent with less contemporary literature on the involvement of women in formal economic activities (Ellis, Blackden, Cutura, MacCulloch & Seebens, 2007; FAO, 2011; Tandon & Wegerif, 2013; Asongu, Efobi, Tanankem & Osabuohien, 2019; Osabuohien, Efobi, Herrmann & Gitau, 2019). Furthermore, according to the World Bank and International Labour Organisation (ILO), the low welfare experience of developing countries is partly due to gender exclusion which dampens the negative responsiveness of poverty to economic growth (World Bank, 2015; ILO, 2013). According to Hazel (2010), the highest rate of poverty among women in the world is in Africa. Efobi *et al.* (2018) posit that the involvement of women in formal the economic sector improves socio-economic progress from a plethora of perspectives, notably: alleviate poverty, improve structural transformation in the labour market and consolidate female welfare. The positioning of this study on gender inclusion is also framed in the light of challenges to SDGs.

Second, in the post-2015 development agenda, broad-based and/or inclusive development is relevant for two main reasons. (i) Less exclusive development enhances the negative effect of economic growth on extreme poverty. (ii) Despite experiencing over 20

[1] The terms "female economic participation", "female employment", "gender inclusion" and "gender economic participation" are used interchangeably throughout the study.

years of a resurgence in economic growth, close to half of the countries in Africa failed to attain the Millennium Development Goal (MDG) extreme poverty target. Examples of studies supporting the dual perspective above include: Asongu and Kodila-Tedika (2017); Asongu and le Roux (2019); Tchamyou (2019a, 2019b); Asongu and Odhiambo (2019b); and Tchamyou, Erreygers and Cassimon (2019). The two perspectives are connected within the framework that, growing levels of inequality decrease the response of poverty reduction toeconomic growth (Fosu, 2015;Asongu & Kodila-Tedika, 2018). Given that gender exclusion is an aspect of inequality, gender inclusion will go a long way to contributing to the achievement of SDGs relatedto extreme poverty reduction. According to the attendant literature, the target of reducing extreme poverty to a critical mass of below 3% cannot be achieved if inequality is not substantially reduced across the continent (Asongu & Odhiambo, 2019). These positions are better articulated by: (i) Ncube, Anyanwu and Hausken (2014) in the Middle East and North African region and (ii) Bicaba, Brixiova and Ncube (2017) in sub-Saharan Africa (SSA): "*This paper examines its feasibility for Sub-Saharan Africa (SSA), the world's poorest but growing region. It finds that under plausible assumptions extreme poverty will not be eradicated in SSA by 2030, but it can be reduced to low levels through high growth and income redistribution towards the poor segments of the society*" (p. 93). In light of the underlying narratives, this research contributes to the engaged strand of literature by assessing how inequality affects gender inclusion. Such positioning is partially motivated by an apparent gap in the literature.

Third, as far as we haveperused the relevant contemporary literature, studies on gender inclusion have mainly been oriented towards, *inter alia*: the connections between mobile money and financial inclusion in SSA with some modulation from social and gender networks (Bongomin, Ntayi, Munene & Malinga, 2018) and financial inclusion and gender gap (Kairiza, Kiprono & Magadzire, 2017). Uduji and Okolo-Obasi (2018, 2019a, 2019b) and Uduji, Okolo-Obasi and Asongu (2019) are concerned with the involvement of women in rural areas in "information technology"-driven programs designed to promote agricultural expansion, Elu (2018) has focused on the relevance of gender in science studies while Bayraktar and Fofack (2018) provide a for assessing gender within financial and informal sectors of production. Other studies in this strand have been concerned with: the relationship between financial access and gender exclusion within a microfinance framework (Mannah-Blankson, 2018); the relevance gender inclusion in agricultural production that is sustainable

(Theriault, Smale & Haider, 2017) and the importance of information technology in female economic empowerment (Efobi *et al.*, 2018).

The study closest to the positioning of this research in the literature is Efobi *et al.* (2018), which has examined the importance of information technology in female economic participation. The underlying research has used: (i) three main information technology proxies (i.e. mobile phone penetration, internet penetration and fixed broadband subscriptions), (ii) three measures of gender inclusion (female labour force participation, female employment and female unemployment); (iii) ordinary least squares, fixed effects and generalized method of moments regressions and (iv) data for the period 1990-2014. The attendant research has concluded that information technology significantly improves the involvement of the female gender in the formal economic sector. The positive relevance of information technology in gender inclusion is based on the following increasing order of magnitude: mobile phone penetration, internet penetration and fixed broadband subscriptions.

The present exposition uses the gender inclusion indicators employed by Efobi *et al.* (2018) to assess the effect of inequality on gender inclusion in 42 African countries for the period 2004-2014. It is worthwhile to establish such a relationship because a positive nexus between inequality and gender exclusion in the formal economic sector will provide the basis for complementing gender inclusion and inequality reduction policies in the common agenda of achieving shared prosperity and reducing extreme poverty in Africa in the post-2015 era. Moreover, gender inclusion is also central in SDGs, notably: SDG 5 of achieving gender equality and empowering all girls and women. In the light of the discussed literature, the main research question motivating the study is the following: how does inequality affect female employment in SSA? The corresponding hypothesis being investigated is that: inequality increases female unemployment and decreases female employment.

The theoretical underpinnings of the study which are consistent with Klasen and Lamanna (2009) on the effect of gender inequality on employment rest on the position that income inequality distorts the economy and enhances other negative externalities such as limited opportunities for women that engender higher female unemployment. For instance, a gender gap in education can decrease the pool of talents upon which the economy can draw upon, hence, decrease the average workforce ability of the female gender (Esteve-Volart, 2004). The underlying distortions not only influence the dependents that are employed but also affect the self-employed in various economic sectors in which, unequal access to crucial inputs, resources and technology can substantially decrease average productivity in these

sectors and by extension, reduce economic prosperity (Blackden, Canagarajah, Klasen & Lawson, 2007). For lack of space and wordconstraint, these theoretical insights which articulate how income inequality can exacerbate gender exclusion and gender unemployment are well documented in Klasen and Lamanna (2009). The attendant theoretical insights are broadly consistent with the literature on nexuses between unemployment, income inequality and economic prosperity (Witte & Witt, 2001; Brush, 2007; Odedokun & Round, 2001; Perugini & Martino, 2008; van der Hoeven, 2010; Østergaard, 2013).

The rest of this study is organised in the following structure. Section2 covers the data and methodology, while the empirical analysis is engaged in section 3. Section 4 concludes with future research directions.

2. Data and methodology

2.1 Data

The focus of the research is on 42 countries in Sub-Saharan Africa with data for the periods 2004-2014[2]. The geographical and temporal scopes of the study are motivated by data availability constraints at the time of the study. The data come from four main sources, notably: (i) the Global Consumption and Income Project (GCIP) for the three inequality variables (i.e. the Gini coefficient, the Atkinson index and the Palma ratio); (ii) the International Labor Organization for the two indicators used to proxy for gender inclusion(i.e. female unemployment andfemale employment); (iii) the World Governance Indicators of the World Bank for a control variable (i.e. political stability) and (iv) the Financial Development and Structure Database of the World Bank for two additional control variables (i.e. remittances and financial stability). Tchamyou (2019a, 2019b) and Asongu and Odhiambo (2019) have used the three indicators to proxy for inequality while Efobi *et al.* (2018) and Asongu and Odhiambo (2018a) have employed the adopted indicators for gender inclusion.

The Gini coefficient is appreciated on a 0 to 1 scale. On this scale, 0 reflects perfect income equality (i.e. a society where everyone is endowed to the same income level) whereas 1 denotes perfect inequality (i.e. is consistent with a society in which a single individual

[2]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".

receives all the income). Hence, while the Gini coefficient, to a certain extent, appreciates income distribution, it is difficult to show the welfare of high- and low-income groups (Zhang & Naceur, 2019). Hence, in order to account for extreme values of income distribution, additional income inequality variables are used, namely: the Atkinson index and the Palma ratio (Cobham& Sumner, 2013a, 2013b; Cobham, Schlogl, & Sumner, 2015). According to the narrative, the Atkinson index is a widely used indicator of income inequality which appreciates the percentage of total income that a particular society has to forego in order to improve citizens' share of income. The Palma ratio, however, represents the ratio of national income shares of the top 10 per cent of households relative to the bottom 40 per cent. In summary, the above motivations for complementing the Gini coefficient with the Atkinson index and the Palma ratio are consistent with contemporary inequality literature (Meniago & Asongu, 2018; Tchamyou *et al*., 2019).

The three control variables are also consistent with the contemporary inclusive development literature, notably: Meniago and Asongu (2018), Tchamyou *et al*. (2019) and Meniago and Asongu (2018). The adoption of three control variables is not uncommon in the scholarly literature employing the chosen estimation technique of this study, notably: the generalised method of moments (GMM). Accordingly, the motivation for using a few control variables is to avoid concerns of instrument proliferation that can severely bias estimated coefficients. In the attendant literature, some studies have used no control variable (Osabuohien & Efobi, 2013; Asongu & Nwachukwu, 2017) while others have used less than three control variables (Bruno, De Bonis & Silvestrini, 2012). In the following passages, we discuss the expected signs of the adopted variables in the conditioning information set.

Political stability provides enabling conditions for investment purposes and by extension, economic growth and opportunities of social mobility and unemployment reduction. Such socio-economic opportunities avail avenues of female economic participation. However, this variable is both positively and negatively skewed. Hence, if it is negatively skewed as it is the case in SSA; political stability could have a counter effect on employment and unemployment. As recently documented by Meniago and Asongu (2018), remittances are likely to increase inequality because the majority of those migrating abroad are from wealthier segments of society, so that when the money is remitted, such funds averagely end up consolidating the income of the wealthier segments of society. The influence of financial stability on gender inclusion is contingent on market dynamics, and hence, the expected sign cannot be established with certainty. 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 in Appendix 3.

2.2 Methodology

2.2.1 GMM: Specification, identification and exclusion restrictions

Borrowing from recent studies based on data structures that are characterised by cross sections being more than time periods, this research uses the GMM as its empirical estimation method. Some recent studies justifying this estimation approach include: Asongu and Nwachukwu (2016a); Tchamyou (2019a, 2019b); and Asongu and Odhiambo (2019c). In accordance with the attendant literature, four main motivations justify the adoption of the underlying estimation technique. First, as apparent in the previous section, the number of countries (i.e. 42) is higher than the corresponding number of periods in each country (i.e. 11 years or 2004-2014). Second, the gender inclusion proxies are also characterised by stochasticity because the correlation between their level and first lag values are higher than 0.800 which is the rule of thumb for establishing stochasticity in a variable (Tchamyou, 2019b)[3]. Third, cross-country differences are taken on board in the estimation process because the data structure is panel. Fourth, endogeneity is addressed on two main fronts: (i) simultaneity or reverse causality is controlled by the help of an instrumentation process and (ii) time-invariant omitted variables are employed to account for the unobserved heterogeneity. Following recent GMM literature (Asongu & Nwachukwu, 2016b; Boateng *et al*., 2018; Efobi, Asongu, Okafor, Tchamyou & Tanankem, 2019), the extension of Arellano and Bover (1995) by Roodman (2009a,2009b) is adopted mainly because it produces more efficient estimates.

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

$$F_{i,t} = \sigma_0 + \sigma_1 F_{i,t-\tau} + \sigma_2 I_{i,t} + \sum_{h=1}^{3} \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (1)$$

$$F_{i,t} - F_{i,t-\tau} = \sigma_1 (F_{i,t-\tau} - F_{i,t-2\tau}) + \sigma_2 (I_{i,t} - I_{i,t-\tau}) + \sum_{h=1}^{3} \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \quad (2)$$

[3]"Stochasticity" is the condition of being stochastic and stochastic is where past observations are correlated with future observations.

where, $I_{i,t}$ is an inequalityindicator (i.e. the Gini coefficient, the Atkinson index and the Palma ratio) of country i in period t, σ_0 is a constant, F entails gender inclusion (female unemployment and female employment), W is the vector of control variables (political stability, remittances and financial stability), τ represents the coefficient of auto-regression which is one within the framework of this study 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.

2.2.2 Identification and exclusion restrictions

It is worthwhile to devote some space to clarifying the identification strategy and corresponding exclusion restrictions that are relevant for a robust estimation. In the light of the attendant literature (Asongu & Nwachukwu, 2016c; Tchamyou & Asongu, 2017; Boateng *et al*., 2018; Tchamyou *et al*., 2019), "years" are considered as strictly exogenous while all explanatory variables are acknowledged to be predetermined or endogenous explaining. Hence, there is an underpinning assumption that the outcome variable (or gender inclusion) is affected by the identified strictly exogenous variables exclusively through the proposed endogenous explaining mechanisms. Roodman (2009b) argues in favour of this approach by positing that it is not likely for the identified strictly exogenous variables to be endogenous after a first difference[4].

The criterion used to assess the validity of the exclusion restriction is the Difference in Hansen Test (DHT) for instrument exogeneity. The null hypothesis of this test is the position that the instruments are valid and that these instruments affect the outcome variable exclusively through the predetermined or endogenous explaining variables. Hence, in order for the exclusion restriction assumption underlying the identification strategy to hold, in the findings that are presented in the next section, the alternative hypothesis corresponding to the DHT should be rejected. The exclusion restriction criterion is in line with the standard instrumental variable (IV) framework, which requires that the alternative hypothesis of the Sargan test should be rejected in order for the instruments to be valid. In other words, a rejection of the alternative hypothesis is an indication that the outcome variable is exclusively affected by the identified instruments through the proposed channels or endogenous

[4]Hence, the procedure for treating *ivstyle* (years) is 'iv (years, eq(diff))' whereas the *gmmstyle* is employed for predetermined variables.

explaining mechanisms (Beck,Demirgüç-Kunt& Levine, 2003; Asongu & Nwachukwu, 2016d).

3. Empirical results

The results are presented in this section. While Table 1 shows findings on the nexus between inequality and female unemployment, Table 2 reveals results on the relationship between inequality and female employment. Each table shows three main categories of specifications pertaining respectively to, the: Gini coefficient, Atkinson index and Palma ratio. There are two sub-specifications in each specification category based on incremental variables in the conditioning information set.

Four information criteria are used to investigate the validity of the estimated models[5]. In the light of these criteria, estimations in the second column of Table 1 and the penultimate (or next to the last) column of Table 2 are invalid because the null hypotheses of the corresponding Hansen tests are rejected. Note should be taken of the fact that the Hansen test is preferred to the Sargan test because the former is robust (though affected by instrument proliferation) while the latter is not robust (though not influenced by the proliferation of instruments). A means by which to deal with the conflicting information criteria is to adopt the Hansen test and then control for the proliferation of instruments by ensuring that the number of cross sections in each specification is higher than the corresponding number of instruments.

The following findings can be established from Tables 1-2. First,in Table 1,inequality increases female unemployment in the regressions based on the Palma ratio. It is worthwhile to articulate that regressions related to the Gini coefficient and Atkinson index are either not significant or invalid in the light of the information criteria used to assess the validity of models. Second, in Table 2 on robustness checks, inequality reduces female employment within the frameworks of the Gini coefficient and Palma ratio. Accordingly, the estimated independent variable of interest related to the Atkinson index is not significant.

[5] "*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 Fischer test for the joint validity of estimated coefficients is also provided*" (Asongu& De Moor, 2017, p.200).

Table 1: Inequality and female unemployment

	Dependent variable: the female unemployment rate (FU)					
	The Gini coefficient		The Atkinson index		The Palma ratio	
Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**	**Column 7**
FU (-1)	**0.957*** **	**0.933*** **	**0.968*** **	**0.898*** **	**0.954*** **	**0.895*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Gini coefficient	0.315	2.394	---	---	---	---
	(0.703)	(0.491)				
The Atkinson index	---	---	2.256	2.400	---	---
			(0.210)	(0.158)		
The Palma ratio	---	---	---	---	**0.147***	**0.121** **
					(0.074)	**(0.032)**
Political Stability	0.287	**0.670** **	0.040	**0.682*** **	0.192	**0.673** **
	(0.297)	**(0.014)**	(0.884)	**(0.002)**	(0.525)	**(0.033)**
Remittances	---	0.013	---	**0.044*** **	---	**0.039*** **
		(0.187)		**(0.005)**		**(0.007)**
Financial Stability	---	-0.003	---	0.010	---	-0.006
		(0.822)		(0.522)		(0.614)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	**(0.190)**	**(0.193)**	**(0.189)**	**(0.193)**	**(0.189)**	**(0.194)**
AR(2)	**(0.392)**	**(0.197)**	**(0.403)**	**(0.229)**	**(0.381)**	**(0.219)**
Sargan OIR	(0.000)	(0.071)	(0.000)	(0.024)	(0.000)	(0.045)
Hansen OIR	**(0.271)**	**(0.505)**	**(0.218)**	**(0.353)**	**(0.154)**	**(0.395)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	---	(0.087)	---	(0.041)	---	**(0.118)**
Dif(null, H=exogenous)	**(0.406)**	**(0.797)**	**(0.313)**	**(0.766)**	**(0.204)**	**(0.604)**
(b) IV (years, eq(diff))						
H excluding group	---	**(0.133)**	---	**(0.220)**	---	**(0.123)**
Dif(null, H=exogenous)	---	**(0.715)**	---	**(0.426)**	---	**(0.596)**
Fisher	**980.43*** **	**3779.59*** **	**1184.35*** **	**573.61*** **	**1387.42*** **	**4336.58*** **
Instruments	20	28	20	28	20	28
Countries	39	36	39	36	39	36
Observations	389	307	389	307	389	307

***,**,*: 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.

Table 2: Inequality and female employment (Robustness checks)

	Dependent variable: the female employment rate (FE)					
	The Gini coefficient		The Atkinson index		The Palma ratio	
Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**	**Column 7**
FE (-1)	**0.998*** **	**0.984*** **	**0.986*** **	**0.981*** **	**0.983*** **	**0.988*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Gini coefficient	-3.618	**-6.317*** **	---	---	---	---
	(0.264)	**(0.000)**				
The Atkinson index	—	---	-1.721	-0.396	---	---
			(0.474)	(0.735)		
The Palma ratio	---	---	---	---	**-0.123***	**-0.069***
					(0.098)	**(0.092)**
Political Stability	-0.147	-0.215	-0.022	-0.125	-0.075	-0.058
	(0.591)	(0.264)	(0.942)	(0.553)	(0.800)	(0.739)
Remittances	---	-0.002	---	**-0.013***	---	**-0.021** **
		(0.769)		**(0.067)**		**(0.016)**
Financial Stability	---	-0.0005	---	-0.012	---	-0.004
		(0.796)		(0.479)		(0.785)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Net Effects						
AR(1)	**(0.145)**	**(0.146)**	**(0.143)**	**(0.141)**	**(0.144)**	**(0.144)**
AR(2)	**(0.289)**	**(0.169)**	**(0.311)**	**(0.190)**	**(0.296)**	**(0.193)**
Sargan OIR	(0.005)	**(0.118)**	(0.005)	**(0.151)**	(0.008)	**(0.119)**
Hansen OIR	**(0.258)**	**(0.200)**	**(0.141)**	**(0.292)**	(0.085)	**(0.351)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	---	(0.076)	---	(0.085)	---	(0.084)
Dif(null, H=exogenous)	**(0.458)**	**(0.394)**	**(0.236)**	**(0.524)**	**(0.184)**	**(0.613)**
(b) IV (years, eq(diff))						
H excluding group	---	(0.030)	---	**(0.211)**	---	**(0.242)**
Dif(null, H=exogenous)	---	**(0.576)**	---	**(0.358)**	---	**(0.407)**
Fisher	**37054.74*** **	**3841.96*** **	**584.84*** **	**59041.84*** **	**987.96*** **	**49237.22*** **
Instruments	20	28	20	28	20	28
Countries	39	36	39	36	39	36
Observations	389	307	389	307	389	307

***,**,*: 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.

Most of the significant control variables have the expected signs. First, the positive nexus between political stability and female unemployed may be traceable to the fact that the political stability indicator is negatively skewed. Accordingly, as shown in the summary statistics, the negative extremity of the variable is higher than its positive extremity. Moreover, the corresponding mean value is negative. Hence, because the variable has both positive and negative signs when it is negatively skewed, the indicator reflects more of political instability than of political stability. Therefore the positive effect of the variable on

female unemployment in Table 1 is expected while the negative effect (though insignificant) of the variable on female employment in Table 2 is also consistent with the underlying elucidation.

Second, as for remittances, the positive (negative) effect of the variable on female unemployment (employment) in Table 1 (Table 2) is consistent with the narrative provided in the data section. Note should be taken of the fact that in both tables, the significant signs of remittances are consistent with the significant signs of income inequality. In essence, remittances can be associated with income inequality in Africa because, in accordance with the attendant literature (Anyanwu, 2011; Meniago & Asongu, 2018), a considerable proportion of the population migrating abroad from Africa are from wealthier fractions of society. This implies that remittances end-up consolidating the wealth of the already wealthy fractions of society and by extension, increase income inequality and associated externalities such as unemployment of the poorer segment of society, which mainly include women.

The established positive (negative) effect of income inequality on female unemployment (employment) can be further substantiated from a straight forward perspective. As clarified in the introduction of the study, the female gender is among the poorest fractions of African society on the one hand and less represented in the formal economic sector on the other hand. Hence, it is understandable that income inequality would negatively influence the employment prospects of the female gender.

4. Conclusion and future research directions

The study investigates the relationship between inequality and female employment in 42 countries in sub-Saharan Africa for the period 2004-2014. Three inequality indicators are used, namely, the: Gini coefficient, Atkinson index and Palma ratio. Two indicators of gender inclusions are also employed, namely, the: female employment and female unemployment rates. In the light of the motivation underpinning the study, the following hypothesis is tested in the empirical analysis based on the Generalised Method of Moments: inequality increases female unemployment and decreases female employment. The following main findings are established. First, inequality increases female unemployment in the regressions based on the Palma ratio. Second, from the robustness checks, inequality reduces female employment within the frameworks of the Gini coefficient and Palma ratio. Hence, the tested hypothesis is valid both within the framework of female employment and female unemployment. As the main policy implication, reducing income inequality in Africa will favour gender inclusion

within the framework of female participation in the formal economic sector. The relevance of reducing income inequality for enhanced gender inclusion in the light of sustainable development goals has been covered in the introduction. Moreover, the findings are consistent with the theoretical underpinnings maintaining that inequality increases unemployment and decreases employment because it distorts the economy, provides limited opportunities for the female gender and by extension,restricts opportunities for the participation of the female gender in the workforce (Esteve-Volart, 2004; Klasen & Lamanna, 2009).

Future studies should explore mechanisms by which female economic participation can be enhanced across SSA. Moreover, engaging country-specific studies with the relevant estimation approaches is also worthwhile for country-specific findings. This recommendation is based on the caveat that country-specific cases are not involved in the estimation because such country-specific effects are eliminated in the GMM approach in order to avoid the concern of endogeneity related to the correlation between the lagged dependent variable and country-specific effects. It is also worthwhile for future studies to go beyond the use of internal instruments to control for simultaneity (i.e. as in this study) and specifically assess the impact of female (un)employment on income inequality as well as transmission mechanisms by which income inequality drives (un)employment outcomes.

Appendices

Appendix 1: Definitions of Variables

Variables	Signs	Definitions of variables (Measurements)	Sources
Income Inequality	Gini Index	"*The Gini index is a measurement of the income distribution of a country's residents*".	GCIP
	Atkinson Index	"*The Atkinson index measures inequality bydetermining which end of the distribution contributed most to the observed inequality*".	GCIP
	Palma Ratio	"*The Palma ratio is defined as the ratio of the richest 10% of the population's share of gross national income divided by the poorest 40%'s share*".	GCIP
Female Unemployment	FU	Unemployment, female (% of female labor force) (modeled ILO estimate)	ILO
Female Employment	FE	Employment to population ratio, 15+, female (%) (modeled ILO estimate)	ILO
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
Financial Stability	Z-score	Prediction of the likelihood that a bank might survive and not go bankrupt.	FDSD

WDI: World Bank Development Indicators of the World Bank. FDSD: Financial Development and Structure Database of the World Bank. WGI: World Governance Indicators. ILO: International Labour Organization. GCIP: Global Consumption and Income Project.

Appendix 2: Summary statistics (2004-2014)

	Mean	SD	Minimum	Maximum	Observations
Gini Index	0.586	0.034	0.488	0.851	461
Atkinson Index	0.705	0.058	0.509	0.834	461
Palma Ratio	6.457	1.477	3.015	14.434	461
Female Unemployment, female	58.273	44.334	1.000	152.00	462
Female Employment	113.19	69.850	1.000	256.00	462
Political Stability	-0.471	0.905	-2.687	1.182	462
Remittances	4.313	6.817	0.00003	50.818	416
Financial Stability	8.713	4.994	-12.024	25.736	404

S.D: Standard Deviation.

Appendix 3: Correlation matrix (uniform sample size: 364)

Inequality			Female participation		Control variables			
Gini	Atkinson	Palma	FU	FE	PolS	Remit	Z-score	
1.000	0.797	0.931	0.204	0.076	0.290	-0.014	0.135	Gini
	1.000	0.918	0.106	-0.012	0.315	0.216	-0.006	Atkinson
		1.000	0.159	0.018	0.357	0.115	0.091	Palma
			1.000	0.423	0.118	-0.076	0.117	FU
				1.000	-0.134	0.087	-0.090	FE
					1.000	0.061	0.108	PolS
						1.000	-0.099	Remit
							1.000	Z-score

Gini: the Gini Index. Atkinson: the Atkinson Index. Palma: the Palma Ratio. FU: Female Unemployment. FE: Female Employment. PolS: Political Stability. Remit: Remittances. Z-score: Financial Stability

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