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Economic sectors and globalization channels to gender economic inclusion in Sub-Saharan Africa

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Economic sectors and globalization channels to gender economic inclusion in Sub-Saharan Africa**Simplice A. Asongu & Nicholas M. Odhiambo****Abstract**

This study complements the extant literature by assessing economic sector and globalization channels for gender economic inclusion. The study is focused on 35 countries in sub-Saharan Africa for the period 1995-2019 and the empirical evidence is based on fixed effects regressions. The following findings are established. First, economic and political globalization positively affect female employment in agriculture and the positive effect of economic globalization is driven by the trade globalization dynamic while social globalization negatively affects female employment in agriculture and the negative effect of social globalization is driven by cultural and informational globalization dynamics. Second, aggregate globalization and sub-components (i.e. economic globalization, social globalization and political globalization) negatively affect gender employment in the industry and the negative effect is driven by the financial globalization sub-component of economic globalization and by the informational and cultural components of social globalization. Third, aggregate globalization and sub-components positively affect gender employment in the service sector and the corresponding positive effect is driven by the trade globalization sub-component of economic globalization and by all sub-components (i.e. interpersonal, informational and cultural dimensions) of social globalization. In the terms of policy implications, policy makers should focus on promoting dimensions of globalization that are established to positively influence female employment as well as put in place measures that are designed to reverse the negative incidence of globalization dynamics that have been established to affect female employment. Moreover, policy makers should also be aware of the fact that when formulating the corresponding policies, the effect of globalization is contingent on globalization dynamics as well as on various economic sectors.

Keywords: Globalization; female; gender; labour force participation; sub-Saharan Africa

JEL Classification : E60 ; F40 ; F59 ; D60 ; O55

1. Introduction

Four main elements of motivation underpin the positioning of a study on economic sectors and globalization channels to gender economic inclusion within the remit of sub-Saharan Africa, notably: (i) the fact that the involvement of women in the formal economic sector is substantially low compared to the presence of men in the corresponding sector (Ellis *et al.*, 2007; Ramani *et al.*, 2013; Tandon & Wegerif, 2013; Osinubi & Asongu, 2021)¹; (ii) the relevance of providing a human face to globalization, especially as it pertains to the involvement of more women in the formal economic sector (Jorgenson & Clark, 2010, 2012a, 2012b; Nchofoung & Asongu, 2022); (iii) the policy imperative of gender economic inclusion in reaching some of the United Nations (UN) sustainable development goals (SDGs) (Oostendorp, 2009; Osabuohien *et al.*, 2019; Ngono, 2021) and (iv) gaps in the corresponding literature that have to be filled (Asongu *et al.*, 2020a; Tifuh, 2022). The four underpinnings are expanded in the paragraphs that follow.

First, consistent with Osinubi and Asongu (2021), women are relatively less represented in the formal economic and political circles and such a tendency according to Asongu *et al.* (2020a) is more apparent in sub-Saharan Africa (SSA) countries compared to other parts of the world. According to the narrative, most women in SSA are involved in informal jobs such as petty trading and agricultural activities that are for the most part destined for subsistence purposes (Food and Agricultural Organisation-FAO, 2011; Ellis *et al.*, 2007; Ramani *et al.*, 2013; Tandon & Wegerif, 2013; Asongu & Odhiambo, 2018, 2019; Uduji & Okolo-Obasi, 2019, 2020). In addition, there is a growing strand of literature sustaining the view that it is worthwhile to involve more women in economic and political spheres in order to optimize the use of resources destined for economic development purposes (Rice & Barth, 2017; Vancil-Leap, 2017; Marquez, 2017; Moras, 2017; Luo *et al.*, 2017; Uduji & Okolo-Obasi, 2018; Uduji *et al.*, 2019). According to the World Bank (2018), the cost of not involving women in the formal economic sector is about US\$160 trillion in lost income. This is essentially because 27% of women are less likely to be involved in the formal labor market (International Labor Organization, 2018; Tifuh, 2022).

Second, a growing stream of literature is consistent on the position that there is need for openness dynamics and by extension, globalization to be given a human face, not least, because globalization is associated with increased exclusive development or economic growth

¹ The terms “gender economic inclusion”, “gender employment”, “gender inclusion” and “economic progress of the female gender” are used interchangeably throughout the study to denote enhancement of female economic participation.

that does not benefit the poor (Jorgenson & Clark, 2010, 2012a, 2012b; Nchofoung & Asongu, 2022). Hence, assessing how globalization affects gender economic inclusion is particularly relevant for inclusive and sustainable development outcomes such as gender equality and female economic empowerment. This position is in accordance with the importance of achieving the United Nations' fifth sustainable development goal (i.e. SDG5) focusing on promoting gender equality.

Third, in the light of the above, the prospect of gender economic inclusion is apparent among SDGs because, among other things, with the growing levels of globalization, exclusive development is increasingly apparent in both developing and developed nations (United Nations-UN, 2013; Asongu *et al.*, 2020a). To put this in more perspective, economic progress of the female gender has been established to be particularly relevant in the era of globalization (Oostendorp, 2009), especially in the light of growing discrimination relating to women in poor countries (Osabuohien *et al.*, 2019; Ngono, 2021), which is partly traceable to the effects of globalization. Moreover, according to the World Bank (2018), approximately 160 Trillion USD of GDP has been lost at the global level owing to the gender gap between men and women.

Fourth, the positioning of this study is also motivated by the importance of filling an extant gap in the literature on the effect of globalization on macroeconomic outcomes such as inclusive development. The closest studies in the literature to the present research are Asongu *et al.* (2020a) and Tifuh (2022). The former does not consider sector analysis while the latter does not engage transmission channels. The present research complements both studies by assessing how globalization affects gender economic inclusion, contingent on economic sectors and globalization mechanisms. Hence, the main objective of the study is to examine economic sector and globalization channels for gender economic inclusion in sub-Saharan Africa.

The remainder of the study is organized in the following manner. This introduction is followed with a discourse of theoretical underpinnings. Section 3 discusses the data and corresponding methodology while Section 4 presents and discusses the empirical results. Section 5 concludes with implications and future research directions.

2. Theoretical underpinnings

Consistent with the extant literature on the importance of globalization in inclusive development outcomes (Asongu, 2013; Osinubi & Asongu, 2021), there are two main schools

of thought that can explain the nexus between globalization and economic development outcomes, namely: (i) the neoliberal school and (ii) the hegemonic school.

First, with respect to the neoliberal school, globalization does not only have negative prospects because it can be assimilated to a process of “creative destruction” in which, after negative externalities from globalization, there are also apparent positive externalities in terms of investment possibilities, production efficiency, enhanced trade and technological improvements (Tsai, 2006; Osinubi & Asongu, 2021). In essence, according to the narrative, with the advent of globalization, workers are constrained to enhance their skills as well as adapt to changing conditions of work due to a number of factors, such as reduced wages and possibilities of old jobs being replaced with new ones. It follows that within the remit of attendant conditions, women can be trained on how to improve opportunities of employment from the corresponding globalization process. Hence, globalization can offer opportunities for female economic employment as considered in the present research. The promising externality of female economic participation in more formal economic activities as a result of globalization is in accordance with Grennes (2003) who has argued that the benefits of globalization are also apparent in the labour market, especially as it concerns variations in the supply and labour owing to the process. Variations which are contingent on economic sectors and globalization channels (i.e. as considered in this study) can engender more positive economic outcomes in terms of inclusive female participation in the formal economic sector.

To put the above into greater perspective, in responding to challenges, opportunities and constraints from globalization, domestic policies can be tailored such that women are trained in the relevant economic sectors for employment avenues. The prospect of globalization in promoting employment possibilities is consistent with (i) Rodrik et al. (2004) on the premise that globalization enhances institutional standards which are important in boosting economic development outcomes like gender economic participation and (ii) Firebaugh (2004) who posited that industrialization can be promoted in developing countries by means of globalization dynamics, with an outcome of gender economic inclusion given the employment possibilities linked to industrialization.

Second, with respect to the alternative school of thought, the hegemonic view is based on a premise that the globalization phenomenon is a disguised agenda which is focused on boosting the wealth of the rich while diminishing the corresponding wealth prospects of the poor (Osinubi & Asongu, 2021). According to Petras and Veltmeyer (2001) with respect to this second school of thought, globalization is an agenda that aims to promote free market competition and the accumulation of capital with the help of multilateral development

institutions and technically-advanced countries. According to the narrative, globalization has the possibility of producing a global crisis of living standards, not least, because of unfavorable ramifications that have influenced the working class and the labour market. As posited by the authors: “*technological change and economic reconversion endemic to capitalist development has generated an enormous growing pool of surplus labor, an industrial reserve army...with incomes at or below the level of subsistence*” (Petras & Veltmeyer, 2001, p. 24). Asongu (2013) maintains that the prospect of social democracy has been considerably influenced by globalization, especially as it pertains to a social revolution surrounding labor laws which have transformed market capitalism into a model of social capitalism in the light of concerns surrounding the importance of giving globalization a human face. Other positions in the attendant literature broadly supporting this second strand include: (i) researchers such as Tsai (2006) and Smart (2003) who have shown that globalization influences that “market ethos” which completely disregards the welfare of citizens; (ii) Scholte (2000) on the rewards of globalization that are tailored to be more beneficial to the rich fraction of society and (iii) Sirgy *et al.* (2004) with respect to the unfavorable externalities of globalization

3. Data and methodology

3.1 Data

The study is focused on 35 countries in sub-Saharan Africa for the period 1995-2019. The corresponding data are obtained from three principal sources. As apparent in Appendix 1, the three main sources of the data are the World Development Indicators (WDI) of the World Bank, the International Labour Organization (ILO) and the KOF Swiss Economic Institute. Three outcome variables are manually calculated from the ILO, notably: (i) the ratio of female to male employment in the agriculture sector, (ii) the ratio of female to male employment in the industry and (iii) the ratio of female to male employment in the service sector. The choice of the three economic sectors in order to provide more space for a robust analysis and policy implications is consistent with contemporary African-centric literature (Asongu *et al.*, 2022; Asongu & Odhiambo, 2022). The globalization variables are consistent with Dreher *et al.* (2008) and Asongu *et al.* (2020a) notably in terms of the political, economic and social dimensions. Accordingly, a composite index of globalization is used which entails political (i.e. the number of foreign embassies, memberships in international organizations, and the number of international treaties concluded by the country), social (i.e. personal contacts,

information flow and cultural proximity) and economic (i.e. trade and investment flows, as well as restrictions on these flows) dimensions.

For the transmission channels, it is relevant to note that the KOF index of globalization entails a plethora of factors which include capital flows and trade openness. These also encompass citizens' communications across nations as well as how governments interact between one another (Tifuh, 2022). According to the corresponding narrative, the index is relevant because it enables a flexible compounding of various features and dimensions of globalization, hence, reflecting the annual level of globalization for respective countries. It is relevant to note that the aggregate globalization as well as corresponding component entails sub-components of the globalization dynamics which are employed in this study as potential transmissions channels (Wacker *et al.*, 2017; Osinubi & Asongu, 2021). The sub-components of economic globalization are financial and trade globalization while the sub-components of social globalization are cultural, information and interpersonal globalization dynamics. However, the sub-dimensions of political globalization are not available owing to data availability constraints at the time of this study. In summary, the present study uses the composite globalization index which contains the three main aspects of globalization as well as sub-components of the economic and social globalization dynamics in order to assess the transmission channels.

Consistent with contemporary inclusive development literature, five main control variables are employed in order to account for variable omission bias, namely: population growth, GDP growth, inclusive education, mobile phones and private domestic credit (Wacker *et al.*, 2017; Efobi *et al.*, 2018; Asongu *et al.*, 2020b; Osinubi & Asongu, 2021; Tifuh, 2022). These selected control variables are discussed to elaborate detail in the subsequent paragraphs.

First, the incidence of population growth is anticipated to be negative because when the population grows, the population employed in a specific economic sector is expected to diminish the engagement of more women in the corresponding economic activities, especially if job creation does not increase more proportionately than population growth (Osinubi & Asongu, 2021).

Second, the effect of GDP growth cannot be established with certainty because it is contingent on how on the one hand, the fruits of economic prosperity are evenly distributed and on the other, on how various economic sectors participate in the corresponding GDP growth. For instance, a perspective that an increase in GDP can provide more opportunities for the involvement of women in the formal economic sector is not consistent with some

results in contemporary literature (Wacker *et al.*, 2017; Asongu *et al.*, 2020a). Given the evidence that the recent economic growth resurgence in SSA has not been leveraged upon to improve inclusive development outcomes (Bicaba *et al.*, 2017; Tchamyou, 2020; Tchamyou *et al.*, 2019), it is anticipated that economic growth is negatively linked to the considered outcome variables in this study.

Third, whereas gender inclusive education is expected to boost the involvement of more women in the formal economic sector (Steinberg & Nakane, 2012; Wacker *et al.*, 2017; Asongu *et al.*, 2020a), such a positive nexus is contingent on among other things, the quality of education provided as well as the types of economic sectors and globalization dynamics involved. It follows that the expected sign cannot be established with certainty.

Fourth, whereas information technology is relevant in driving African business as well as other externalities associated with such improvement of business opportunities such as employment prospects (Tchamyou, 2017), it has also been established in the literature that mobile technology does not necessarily engender improved prospects for female economic inclusion owing to among other things, information technology being used for the wrong purposes and low levels of information technology penetration (Ejemeyovwi & Osabuohien, 2020).

Fifth, while private domestic credit has been established to be relevant in improving female economic participation (Morsy, 2020; Asongu *et al.*, 2020c), the effect remains contingent on financial access in Africa such as information asymmetry which has led to surplus liquidity and less transformation of mobilized resources to credit by financial institutions (Tchamyou, 2019). The variables are defined in this section in Appendix 1 while the summary statistics is provided in Appendix 2. The corresponding correlation matrix is apparent in Appendix 3.

3.2 Methodology

Following Tifuh (2022), the nexus between globalization and relative participation of women in the formal economic sector involving fixed effects can be captured in the following Equation (1) below which does not include control variables:

$$y_{it} = \beta_0 + \beta_1 x_{it} + u_{it} \quad (1)$$

with $i = 1 \dots N$, $t = 1 \dots T$ where β_0 reflects a constant parameter and β_1 is the parameter linked to x_{it} observations of globalization for country i in period t ., u_{it} denotes the error term which entails individual heterogeneity: $u_{it} = c_i + v_{it}$. According to the narrative, this

equation reflects a baseline ordinary least squares (OLS) model. In Equation (1), y_{it} denotes the dependent variable of interest while x_{it} reflects the set of the main independent variables of interest, notably: composite political, social and economic globalization indexes as well the corresponding sub-components for the political and social globalization indexes.

In models underlying fixed effects (FE) that are specific to countries, it is assumed that the corresponding estimated models are different with respect to the constant term. It follows that Equation (1) can be transformed to Equation (2) as clarified below:

$$y_{it} = \beta_i + \beta_1 x_{it} + u_{it} \quad (2)$$

In the light of the above, Equation (2) is similar to Equation (1) with a fundamental exception, notably that the constant term is apparently characterized by a subscript i instead of the initial subscript 0. It follows that whereas countries in the panel reflect varying intercepts, it is supposed nonetheless in Equation (2) that the attendant countries have slopes that are equal (i.e. β_1). From the underlying FE is a procedure of investigating differences that could be apparent within a given variable, such that in event when such FE is visible for countries, it is possible to compare the sampled countries across time.

Consistent with Tifuh (2022), the concern of multicollinearity is that is disclosed in the correlation matrix in Appendix 3 is taken into account in the estimation exercise, such that the variables from the conditioning information set are integrated into the specification which takes into account the underlying concerns of multicollinearity. Such is done by first integrating all the variables defined in the conditioning information set in the specification before subsequently involving only variables that do not reflect a correlation height above a threshold established by contemporary multicollinearity-centric literature. Borrowing from Asongu *et al.* (2020d, 2021), this research adopts a threshold of 0.600 because such a threshold is a reconciliation of two conflicting strands of the literature on the acceptable threshold for accessing evidence of multicollinearity.

To put the above in more perspective, according to the first strand of literature, an acceptable threshold of 0.700 is worthwhile for the establishment of multicollinearity (Kennedy, 2008). Conversely, there is another strand of literature positing that a threshold of 0.500 is appropriate (Wichers, 1975; Obrien, 2007). It follows that the adoption of the 0.600 threshold is consistent with an average from the two schools of thought. In essence, in accordance with Appendix 3, variables with a correlation threshold higher than 0.600 are not involved in the

second specification of findings reported in Section 4. In other words, each of the models considered in the empirical results section is characterized by two main specifications: the first involving all variables in the conditioning information set and the second, involving only variables for which multicollinearity is not apparent based on the 0.600 threshold.

There are four main causes of endogeneity: (i) the unobserved heterogeneity, (ii) variable omission bias; (iii) measurement error and (iv) simultaneity or reverse causality (Asongu & le Roux, 2019; Tchamyou *et al.*, 2019). Given that it is difficult for a single estimation approach to address all concerns of endogeneity, the adopted empirical strategy and analytical approach are tailored to address the first-three concerns. First, the fixed effects regressions by definition account for the unobserved heterogeneity because country-fixed effects are taken into account in the estimation exercise. Second, variable omission bias and measurement errors are tackled by employing a multitude of both dependent and independent variables of interest.

4. Empirical results

Consistent with the motivation of the study, the empirical findings are disclosed in three subsections, focusing respectively, on the agricultural sector, the manufacturing sector and the service sector. The corresponding sectors are engaged in the same chronology as highlighted. The elements of style in scholarly reporting in the attendant sections are tailored such that the main findings related to the nexus between the main economic sectors and aggregate globalization dynamics (i.e. globalization, economic globalization, social globalization and political globalization) are first reported, before subsequently, the corresponding reporting is provided on the economic and social globalization channels. Accordingly, economic globalization channels are mechanisms of trade openness and financial openness while social globalization channels are interpersonal, informational and cultural aspects of openness.

4.1 Analysis of the agriculture sector

Table 1 below shows findings on the nexus between globalization and the ratio of female to male employment in the agricultural sector. The attendant table is divided into four main specifications, each pertaining to the four considered globalization dynamics, respectively: aggregate globalization, economic globalization, social globalization and political globalization, in this order. Consistent with the narrative in Section 3, the specifications are

tailored such that the first set of specifications involves all elements in the conditioning information set while the second set of specifications for respective globalization dynamics only entails elements of the conditioning information set for which the concern of multicollinearity is not apparent, in the light of the discussed threshold of 0.600.

The following findings are apparent in Table 1: (i) aggregate globalization has an insignificant negative effect on the outcome variable or the ratio of female to male employment in the agriculture sector. It is important to articulate that only the second specification is taken into account in terms of robustness because the apparent issues of multicollinearity are taken into account in the specification. Moreover, the fact that the estimated aggregate globalization variable changes in sign and significance from the first to the second specification is evidence of the perspective that multicollinearity affects the signs and significance of the estimated globalization independent variables of interest. By extension, such also confirms the importance of accounting for multicollinearity in the estimation exercise. (ii) Economic and political globalization positively affects the ratio of female to male employment in agriculture, while the corresponding effect is negative for social globalization. This is an indication that trade in goods and services as well as financial flows (i.e. economic globalization) on the one hand and on the other, the number of foreign embassies, memberships in international organisations and number of international treaties (i.e. political globalization), contribute toward promoting the involvement of women in the agriculture economic sector. This can be through the implementation of projects in which the involvement of women is prioritized. Conversely, dynamics of social globalization such as personal contact, information flow and cultural proximity, tend to discourage women from being more involved in the agricultural sector. In other words, as more women become westernized and adopt urban cultural modes of living that are predominantly borrowed from the West, these women also become less involved in the agricultural sector. (iii) Most of the control variables are significant with expected signs that are consistent with the narrative in the data section.

Tables 2 and 3 show findings on the economic globalization and social globalization channels, respectively. It is the apparent from Table 2 that the positive effect of economic globalization on the outcome variable is significantly driven by trade globalization compared to financial globalization. This is essentially because women are more likely to be involved in trade activities compared to financial activities. Moreover, from Table 3, the negative effect of social globalization is driven by cultural and informational globalization given that the

corresponding effect from interpersonal globalization is positive. Accordingly, cultural factors from the West are likely to motivate for women to seek employment outside the traditional or agricultural sector while the advent of information and communication technology has also enabled women to rely to such technology for employment in sectors outside agriculture. Furthermore, most of the control variables in Tables 2-3 are significant with the corresponding signs discussed in the data section.

Table 1: Globalization and Ratio of female to male employment in Agriculture

	Dependent variable: Ratio of female to male employment in Agriculture							
	Globalization		Economic Globalization		Social Globalization		Political Globalization	
Constant	105.427*** (0.000)	136.850*** (0.000)	114.272*** (0.000)	115.807*** (0.000)	119.459*** (0.000)	122.849*** (0.000)	109.381*** (0.000)	---
Globalization	0.570*** (0.000)	-0.098 (0.222)	---	---	---	---	---	---
Economic Globalization	---	---	0.148** (0.027)	0.118** (0.046)	---	---	---	---
Social Globalization	---	---	---	---	0.298*** (0.004)	-0.424*** (0.000)	---	---
Political Globalization	---	---	---	---	---	---	0.325*** (0.000)	---
Population growth	0.707 (0.329)	-0.265 (0.725)	0.058 (0.937)	---	0.080 (0.912)	---	0.351 (0.621)	---
GDP growth	-0.119* (0.088)	-0.060 (0.397)	-0.100 (0.164)	-0.096 (0.160)	-0.087 (0.215)	-0.214*** (0.000)	-0.086 (0.210)	---
SEPSGDP	-31.191*** (0.000)	-0.265 (0.725)	-19.262*** (0.000)	-20.279*** (0.000)	-29.629*** (0.000)	---	-28.640*** (0.000)	---
Mobile Phones	-0.107*** (0.000)	---	-0.067*** (0.000)	-0.071*** (0.000)	-0.102*** (0.000)	---	-0.090*** (0.000)	---
Private Credit	-0.062 (0.429)	---	-0.037 (0.517)	---	-0.00004 (0.999)	---	0.007 (0.890)	---
R ² (Within)	0.267	0.182	0.232	0.256	0.238	0.214	0.267	---
Fisher	26.83***	25.57***	22.22***	39.36***	23.01***	114.28***	26.84***	---
Countries	35	35	35	35	35	35	35	---
Observations	481	497	481	495	481	875	481	---

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

Table 2: Economic globalization channels

	Dependent variable: Ratio of female to male employment in Agriculture			
	Trade Globalization		Financial Globalization	
Constant	115.138*** (0.000)	116.853*** (0.000)	118.725*** (0.000)	---
Trade Globalization	0.160*** (0.006)	0.120** (0.022)	---	---
Financial Globalization	---	---	0.032 (0.531)	---
Population growth	0.106 (0.884)	---	-0.187 (0.796)	---
GDP growth	-0.095 (0.178)	-0.093 (0.171)	-0.081 (0.256)	---
SEPSGDP	-20.43*** (0.000)	-21.172*** (0.000)	-19.012*** (0.000)	---
Mobile Phones	-0.068*** (0.000)	-0.073*** (0.000)	-0.064*** (0.000)	---
Private Credit	-0.039 (0.484)	---	-0.0005 (0.992)	---
R ² (Within)	0.237	0.258	0.224	---
Fisher	22.77***	11.98***	21.24***	---
Countries	35	35	35	---
Observations	481	495	481	---

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

Table 3: Social globalization channels

	Dependent variable: Ratio of female to male employment in Agriculture					
	Interpersonal globalization		Informational globalization		Cultural globalization	
Constant	115.167*** (0.000)	115.657*** (0.000)	122.460*** (0.000)	127.929*** (0.000)	121.512*** (0.000)	117.980*** (0.000)
Interpersonal globalization	0.288*** (0.002)	0.300*** (0.001)	---	---	---	---
Informational globalization	---	---	0.133** (0.014)	-0.084** (0.031)	---	---
Cultural globalization	---	---	---	---	0.035 (0.691)	-0.305*** (0.000)
Population growth	0.125 (0.863)	---	-0.130 (0.856)	-0.270 (0.715)	-.257 (0.721)	---
GDP growth	-0.082 (0.241)	-0.087 (0.198)	-0.077 (0.272)	-0.075 (0.300)	-0.073 (0.299)	-0.077 (0.134)
SEPSGDP	-24.932*** (0.000)	-25.696*** (0.000)	-27.216*** (0.000)	-24.410*** (0.000)	-21.877*** (0.000)	---
Mobile Phones	-0.102*** (0.000)	-0.104*** (0.000)	-0.092*** (0.000)	---	-0.063*** (0.000)	-0.062*** (0.000)
Private Credit	0.009 (0.854)	---	0.005 (0.914)	-0.084 (0.111)	0.012 (0.823)	---
R ² (Within)	0.240	0.267	0.234	0.179	0.232	0.241
Fisher	23.16***	41.73***	22.47***	19.32***	22.15***	85.07***
Countries	35	35	35	35	35	34
Observations	481	495	481	483	478	839

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

4.2 Analysis of the industry sector

This section replicates the estimation of the previous section focusing on the industry sector instead of the agriculture sector. Accordingly, while Table 4 reports finding on the nexus between more aggregated globalization dynamics and the outcome variables, Table 5 and Table 6, respectively focus on the economic and social globalization mechanisms. The following findings can be established from the corresponding tables. (i) Aggregate globalization and sub-components (i.e. economic globalization, social globalization and political globalization) negatively affect gender employment in the industry and the negative effect is driven by the financial globalization sub-component of economic globalization on the one hand and on the other, by the informational and cultural components of social globalization. This is broadly consistent with the extant studies documenting that globalization has pushed more women to be involved in the service sector, compared to other sectors (Dinkelman & Ngai, 2022; Islam & Muzi, 2022; Thaddeus *et al.*, 2022). (ii) Most of the significant control variables have signs that are consistent with the narrative in the data section.

Table 4: Globalization and Ratio of female to male employment in Industry

	Dependent variable: Ratio of female to male employment in Industry							
	Globalization		Economic Globalization	Globalization	Social Globalization		Political Globalization	
Constant	75.076*** (0.000)	104.623*** (0.000)	85.058*** (0.000)	88.048*** (0.000)	75.958*** (0.000)	78.086*** (0.000)	74.378*** (0.000)	---
Globalization	0.074 (0.625)	-0.742*** (0.000)	---	---	---	---	---	---
Economic Globalization	---	---	-0.201** (0.024)	-0.353*** (0.000)	---	---	---	---
Social Globalization	---	---	---	---	0.403*** (0.000)	-0.504*** (0.000)	---	---
Political Globalization	---	---	---	---	---	---	0.078 (0.364)	---
Population growth	0.654 (0.509)	0.287 (0.782)	0.122 (0.900)	---	0.969 (0.313)	---	0.674 (0.487)	---
GDP growth	-0.197** (0.040)	-0.045 (0.644)	-0.158* (0.098)	-0.068 (0.466)	-0.207** (0.028)	0.019 (0.608)	-0.194** (0.041)	---
SEPSGDP	-3.102 (0.685)	-6.203 (0.440)	-1.440 (0.835)	-3.540 (0.604)	-15.668* (0.061)	---	-3.827 (0.605)	---
Mobile Phones	-0.091*** (0.000)	---	-0.081*** (0.000)	-0.106*** (0.000)	-0.137*** (0.000)	---	-0.092*** (0.000)	---
Private Credit	-0.438*** (0.000)	---	-0.364*** (0.000)	---	-0.443*** (0.000)	---	-0.429*** (0.000)	---
R ² (Within)	0.309	0.193	0.317	0.281	0.322	0.197	0.310	---
Fisher	32.86***	27.45***	34.03***	44.67***	34.95***	102.82***	33.00***	---
Countries	35	35	35	35	35	35	35	---
Observations	481	497	481	495	481	875	481	---

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

Table 5: Economic globalization channels

	Dependent variable: Ratio of female to male employment in Industry			
	Trade Globalization		Financial Globalization	
Constant	74.924*** (0.000)	77.152*** (0.000)	90.116*** (0.000)	---
Trade Globalization	0.065 (0.404)	-0.080 (0.266)	---	---
Financial Globalization	---	---	-0.279*** (0.000)	---
Population growth	0.673 (0.489)	---	0.039 (0.967)	---
GDP growth	-0.199** (0.037)	-0.100 (0.290)	-0.138 (0.143)	---
SEPSGDP	-2.045 (0.769)	-3.779 (0.589)	-3.080 (0.652)	---
Mobile Phones	-0.087*** (0.000)	-0.120*** (0.000)	-0.082*** (0.000)	---
Private Credit	-0.449*** (0.000)	---	-0.335*** (0.000)	---
R ² (Within)	0.310	0.253	0.335	---
Fisher	32.97***	38.72***	37.01***	---
Countries	35	35	35	---
Observations	481	495	481	---

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

Table 6: Social globalization channels

	Dependent variable: Ratio of female to male employment in Industry					
	Interpersonal globalization		Informational globalization		Cultural globalization	
Constant	72.268*** (0.000)	71.820*** (0.000)	81.034*** (0.000)	84.697*** (0.000)	76.482*** (0.000)	70.429*** (0.000)
Interpersonal globalization	0.269** (0.034)	0.200 (0.113)	---	---	---	---
Informational globalization	---	---	0.240*** (0.001)	-0.235*** (0.000)	---	---
Cultural globalization	---	---	---	---	0.005 (0.961)	-0.241*** (0.000)
Population growth	0.876 (0.366)	---	-0.195** (0.038)	1.485 (0.154)	0.558 (0.556)	---
GDP growth	-0.198** (0.037)	-0.110 (0.244)	-0.195** (0.098)	-0.085 (0.400)	-0.193** (0.043)	-0.061 (0.326)
SEPSGDP	-6.908 (0.348)	-8.472 (0.250)	-16.059** (0.048)	-13.675 (0.122)	-0.988 (0.897)	---
Mobile Phones	-0.121*** (0.000)	-0.152*** (0.000)	-0.137*** (0.000)	---	-0.086*** (0.000)	-0.089*** (0.000)
Private Credit	-0.429*** (0.000)	---	-0.437*** (0.000)	---	-0.431*** (0.000)	---
R ² (Within)	0.316	0.255	0.326	0.153	0.309	0.238
Fisher	33.90***	39.14***	35.55***	20.83***	32.72***	83.88***
Countries	35	35	35	35	34	34
Observations	481	495	481	497	478	839

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

4.3 Analysis of the service sector

This section further replicates the estimation of the previous two sections focusing on the service sector instead of the agriculture and manufacturing sectors. Accordingly while Table 7 reports finding on the nexus between the more aggregated globalization dynamics and the outcome variable, Table 8 and Table 9, respectively focus on the economic and social globalization mechanisms. The following findings can be established from the corresponding tables. (i) Aggregate globalization and sub-components (i.e. economic globalization, social globalization and political globalization) positively affect gender employment in the service sector and the corresponding positive effect is driven by the trade globalization sub-component of economic globalization on the one hand and on the other, by the interpersonal, informational and cultural components of social globalization. This is also in line with the extant literature that women are more involved in trading activities as well as the service sector at the advent of globalization (Islam & Muzi, 2022; Dinkelman & Ngai, 2022; Thaddeus *et al.*, 2022). (ii) Most of the significant control variables have signs that are consistent with the narrative in the data section.

Table 7: Globalization and Ratio of female to male employment in Services

	Dependent variable: Ratio of female to male employment in Services							
	Globalization		Economic Globalization		Social Globalization		Political Globalization	
Constant	54.076*** (0.000)	43.259*** (0.000)	68.912*** (0.000)	60.380*** (0.000)	66.987*** (0.000)	66.792*** (0.000)	57.899*** (0.000)	---
Globalization	0.547*** (0.000)	0.859*** (0.000)	---	---	---	---	---	---
Economic Globalization	---	---	-0.015 (0.836)	0.122* (0.081)	---	---	---	---
Social Globalization	---	---	---	---	0.496*** (0.000)	0.934*** (0.000)	---	---
Political Globalization	---	---	---	---	---	---	0.311*** (0.000)	---
Population growth	-1.697** (0.042)	-1.671** (0.042)	-2.642*** (0.002)	---	-2.069** (0.011)	---	-2.041** (0.013)	---
GDP growth	0.050 (0.526)	-0.014 (0.852)	0.095 (0.247)	0.019 (0.807)	0.072 (0.365)	0.117*** (0.001)	0.081 (0.304)	---
SEPSGDP	26.767*** (0.000)	28.415*** (0.000)	38.286*** (0.000)	38.689*** (0.000)	20.874*** (0.003)	---	29.240*** (0.000)	---
Mobile Phones	0.039** (0.013)	---	0.081*** (0.000)	0.098*** (0.000)	0.017 (0.365)	---	0.055*** (0.000)	---
Private Credit	0.164*** (0.008)	---	0.239*** (0.000)	---	0.217*** (0.000)	---	0.231*** (0.000)	---
R ² (Within)	0.471	0.454	0.448	0.422	0.471	0.504	0.470	---
Fisher	65.30***	95.40***	59.74***	83.28***	65.44***	425.91***	65.27***	---
Countries	35	35	35	35	35	35	35	---
Observations	481	497	481	495	481	875	481	---

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

Table 8: Economic globalization channels

	Dependent variable: Ratio of female to male employment in Services			
	Trade Globalization		Financial Globalization	
Constant	67.278*** (0.000)	61.696*** (0.000)	69.082*** (0.000)	---
Trade Globalization	0.031 (0.640)	0.115* (0.062)	---	---
Financial Globalization	---	---	-0.017 (0.769)	---
Population growth	-2.541*** (0.002)	---	0.095 (0.242)	---
GDP growth	0.088 (0.278)	0.023 (0.771)	-2.640*** (0.002)	---
SEPSGDP	38.035*** (0.000)	37.857*** (0.000)	38.184*** (0.000)	---
Mobile Phones	0.080*** (0.000)	0.097*** (0.000)	0.081*** (0.000)	---
Private Credit	0.224*** (0.001)	---	0.240*** (0.000)	---
R ² (Within)	0.449	0.422	0.449	---
Fisher	59.79***	83.47***	59.75***	---
Countries	35	35	35	---
Observations	481	495	481	---

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

Table 9: Social globalization channels

	Dependent variable: Ratio of female to male employment in Services					
	Interpersonal globalization		Informational globalization		Cultural globalization	
Constant	60.393*** (0.000)	56.932*** (0.000)	74.224*** (0.000)	76.668*** (0.000)	69.331*** (0.000)	82.645*** (0.000)
Interpersonal globalization	0.449*** (0.000)	0.526*** (0.000)	---	---	---	---
Informational globalization	---	---	0.355*** (0.000)	0.427*** (0.000)	---	---
Cultural globalization	---	---	---	---	-0.303*** (0.003)	0.437*** (0.000)
Population growth	-2.035** (0.013)	0.026 (0.738)	-2.306*** (0.004)	-2.746*** (0.000)	-2.940*** (0.000)	---
GDP growth	0.081 (0.307)	---	0.086 (0.267)	0.039 (0.603)	0.119 (0.140)	0.024 (0.699)
SEPSGDP	29.342*** (0.000)	28.952*** (0.000)	16.844** (0.013)	17.008** (0.011)	46.761*** (0.000)	---
Mobile Phones	0.021 (0.268)	0.035** (0.047)	0.004 (0.799)	---	0.089*** (0.000)	0.130*** (0.000)
Private Credit	0.233*** (0.000)	---	0.222*** (0.000)	---	0.258*** (0.000)	---
R ² (Within)	0.470	0.448	0.490	0.479	0.461	0.417
Fisher	65.08***	92.81***	70.53***	105.37***	62.46***	191.74***
Countries	35	35	35	35	34	34
Observations	481	495	481	497	478	839

***, **, *: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. SEPSGDP: School enrollment, primary and secondary (gross), gender parity index (GPI).

5. Concluding implications and future research directions

This study complements the extant literature by assessing economic sector and globalization channels for gender inclusion in sub-Saharan Africa. The study is focused on 35 countries in sub-Saharan Africa for the period 1995-2019 and the empirical evidence is based on fixed effects regressions. The following main findings are established. First, economic and political globalization positively affect the ratio of female to male employment in agriculture, while the corresponding effect is negative for social globalization and the positive effect of economic globalization on the outcome variable is significantly driven by trade globalization compared to financial globalization while the negative effect of social globalization is driven by cultural and informational globalization dynamics.

Second, aggregate globalization and sub-components (i.e. economic globalization, social globalization and political globalization) negatively affect gender employment in the industry and the negative effect is driven by the financial globalization sub-component of economic globalization on the one hand and on the other, by the informational and cultural components of social globalization. Third, aggregate globalization and sub-components (i.e. economic globalization, social globalization and political globalization) positively affect gender employment in the service sector and the corresponding positive effect is driven by the trade globalization sub-component of economic globalization on the one hand and on the other, by interpersonal, informational and cultural components of social globalization.

In the terms of policy implications, policy makers should focus on promoting dimensions of globalization that are established to positively influence female employment as well as put in place measures that are designed to reverse the negative incidence of globalization dynamics that have been established to affect female employment. Moreover, policy makers should also be aware of the fact that when formulating the corresponding policies, the effect of globalization is contingent on globalization dynamics as well as on various economic sectors. Some of the documented solutions to the persistent gender gap are apparent in the Global Gender Gap report of the World Economic Forum (2022) and the Women, Business and the Law report of the World Bank (2022).

This study obviously leaves room for future research directions, especially as it pertains to assessing how globalization and corresponding dynamics affect other dimensions of sustainable development goals (SDGs), given the relative focus of this study on the fifth sustainable development goal (i.e. SDG 5). Moreover, the findings could also be extended by assessing how engaged economic sectors affect various SDGs. Moreover, while the present

study has focused on channels of social and economic globalization, future studies can also consider alternative channels such as the gender inequality channel in the light of extant studies on the subject (Shepherd & Stone, 2017; Chen *et al.*, 2013; Bataka, 2020).

Appendices

Appendix 1: Definitions and sources of variables

Variables	Definitions	Sources
Female employment in Agriculture	Ratio of female to male employment in Agriculture. (%) (EAgF/ EAgM)	Manually calculated
Female employment in Manufacturing	Ratio of female to male employment in Industry . (%) (EIndF/ EIndM)	Manually calculated
Female employment in Services	Ratio of female to male employment in Services. (%) (ESerF/EserM)	Manually calculated
Globalization	This is the aggregation of the three dimensions of globalization (KOF) as displayed in the KOF globalization index.	KOF Swiss Economic Institute
Economic globalization	A measure of economic globalization, obtained by aggregation of variables such as trade and investment flows, as well as restrictions to these flows.	KOF Swiss Economic Institute
Social globalization	A measure of social globalization, obtained by aggregation of variables such as personal contact, information flow and cultural proximity	KOF Swiss Economic Institute
Political globalization	A measure of political globalization, obtained by aggregation of variables such as number of foreign embassies, memberships in international organisations and number of international treaties entered into by the country.	KOF Swiss Economic Institute
Trade globalization	A sub-dimension of the measure of economic globalization, obtained by aggregation of variables on exports and imports of goods and services, trade regulation, trade taxes, tariff rates and free trade agreements.	KOF Swiss Economic Institute
Financial globalization	A sub-dimension of the measure of economic globalization, obtained by aggregation of variables on foreign direct investments, portfolio investments, international debt, international reserves (excluding gold), Exchange Arrangements, investment restrictions and Exchange Restrictions	KOF Swiss Economic Institute
Interpersonal globalization	A sub-dimension of the measure of social globalization, obtained by aggregation of variables on migration, tourism, foreign students and number of airports hosting international flights	KOF Swiss Economic Institute
Informational globalization	A sub- dimension of the measure of social globalization, obtained by aggregation of variables on Internet bandwidth, international patents, high technology export, number of television sets per capita, internet access	KOF Swiss Economic Institute
Cultural globalization	A sub- dimension of the measure of social globalization, obtained by aggregation of variables on trade in cultural goods, trade in personal, cultural and recreational services, a subcomponent in the Balance of Payments, expression and belief, associational and organizational rights, rule of law and personal autonomy and individual rights.	KOF Swiss Economic Institute
GDP growth	GDP growth (annual %)	WDI (World Bank)
Mobile phones	Mobile cellular subscriptions (per 100 people)	WDI (World Bank)
Credit	Monetary Sector credit to private sector (% GDP)	WDI (World Bank)
Population growth	Population growth (annual %)	WDI (World Bank)
Education	School enrollment, primary and secondary (gross), gender parity index (GPI)	WDI (World Bank)

GDP: Gross Domestic Product. WDI: World Development Indicators. ILO: International Labor Organization.

Appendix 2: Summary Statistics

	Mean	S.D	Min	Max	Obs
Female employment in Agriculture	106.566	29.806	44.547	220.729	875
Female employment in Manufacturing	59.945	43.198	4.936	211.111	875
Female employment in Services	101.077	30.220	27.772	163.285	875
Globalization	44.850	8.9414	22	72	875
Economic globalization	42.353	10.760	20	85	875
Social globalization	36.118	12.936	10	78	875
Political globalization	15.670	15.037	20	89	875
Trade globalization	39.699	13.016	13	84	875
Financial globalization	45.114	11.203	21	87	875
Interpersonal globalization	37.339	14.487	9	81	875
Informational globalization	42.148	15.644	8	83	875
Cultural globalization	28.838	13.213	7	74	850
GDP growth	4.521	7.581	-28.099	149.973	875
Mobile phones	37.587	41.666	0.000	165.599	863
Credit	15.605	15.656	0.000	160.306	851
Population growth	2.540	0.933	-1.694	8.117	875
Education	0.887	0.133	0.446	1.147	497

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

Appendix 3: Correlation matrix (uniform sample size : 478)

	Dependent variables			Globalization dynamics									Control variables				
	rfmemag	rfmemind	rfmemserr	kofgi	kofecgi	kofsogi	kofpogi	koftrigi	koffigi	kofipgi	kofingi	kofcugi	gdpg	mobile	credit	popg	pse
rfmemag	1.000																
rfmemind	-0.458	1.000															
rfmemserr	-0.731	0.303	1.000														
kofgi	-0.424	-0.053	0.467	1.000													
kofecgi	-0.262	-0.075	0.218	0.743	1.000												
kofsogi	-0.459	0.020	0.437	0.828	0.711	1.000											
kofpogi	-0.173	-0.060	0.304	0.561	-0.022	0.105	1.000										
koftrigi	-0.281	-0.133	0.159	0.687	0.920	0.711	-0.067	1.000									
koffigi	-0.186	-0.010	0.243	0.670	0.907	0.587	0.026	0.672	1.000								
kofipgi	-0.402	0.064	0.386	0.664	0.678	0.933	-0.126	0.661	0.576	1.000							
kofingi	-0.455	0.052	0.481	0.813	0.488	0.875	0.362	0.490	0.407	0.722	1.000						
kofcugi	-0.383	-0.040	0.304	0.765	0.775	0.889	0.039	0.776	0.629	0.797	0.625	1.000					
gdpg	-0.042	-0.009	-0.029	-0.036	-0.015	-0.094	0.031	-0.026	-0.009	-0.107	-0.068	-0.078	1.000				
mobile	-0.375	-0.058	0.396	0.694	0.387	0.706	0.372	0.398	0.315	0.585	0.846	0.452	-0.044	1.000			
credit	-0.372	-0.047	0.238	0.779	0.679	0.766	0.245	0.686	0.553	0.651	0.649	0.776	-0.123	0.519	1.000		
popg	0.235	0.026	-0.231	-0.495	-0.668	-0.641	0.167	-0.656	-0.563	-0.698	-0.366	-0.680	0.179	-0.256	-0.557	1.000	
pse	-0.135	-0.165	0.100	0.562	0.529	0.674	0.059	0.521	0.446	0.572	0.572	0.693	-0.077	0.465	0.423	-0.484	1.000

rfmemag : female employment in agriculture. rfmemind : female employment in manufacturing. rfmemser : female employment in services. kofgi : globalization. kofecgi : economic globalization. kofsogi : social globalization. kofpogi : political globalization. koftrigi : trade globalization. koffigi : financial globalization. kofipgi : interpersonal globalization. kofingi : information globalization. kofcugi : cultural globalization. gdpg : gross domestic product growth. mobile : mobile phone penetration. credit : private domestic credit. popg : population growth. pse : inclusive education.

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