

Does Trade Openness Increase Income Inequality in Africa? An Analysis Using the Squalli and Wilson Indexes, 2011

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Summary: In this paper, we assess the effect of trade openness on income inequality in Africa. Using a sample of 38 countries, we specify and estimate a panel data model using Double Least Squares (DLS) over the period 1980-2018. Using the indicators of Squalli and Wilson (2011), the results show that the relative shares of domestic country trade, domestic country trade to average world trade, world trade composition, exports and imports to GDP increase income inequality. We suggest the consolidation of structural reforms to improve the competitiveness of the industrial fabric and the diversification of the supply of goods and services.

Keywords: Africa, DLS, Inequality, Trade openness.

I. Introduction

Globalization continues to reveal two major trends. On the one hand, the increasing openness of emerging markets, with a decrease in the degree of trade protection, and greater amplitude of capital flows. On the other hand, an increase in intra- and inter-country inequalities (Daymon, 2012). This situation induces uncertainty insofar as the relationship between trade openness and inequality in developing countries remains absurd. Although free trade helps alleviate poverty through improved private sector efficiency (Winters, 2002), in the short run, trade liberalization causes significant redistributive effects within the economy and there is no consensus on the accompanying macroeconomic policies to implement.

One of the fundamental issues in trade is the distribution of income across factors. Until the 1990s, the ideal framework for understanding the link between trade and income inequality is the Stolper-Samuelson (SS) theorem in the Heckscher-Ohlin model (Lee and Wei, 2015). One implication is that trade liberalization should reduce income inequality in developing countries since trade can increase the real return to the relatively abundant factor. However, rising income inequality has been observed in developing countries (Harrison et al., 2010).

The adoption of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) in September 2015 drew attention to income inequality in Sub-Saharan Africa (UNDP, 2017). Although Sub-Saharan Africa observed a 3.4 percentage point decline in the unweighted average value of its Gini coefficient between 1991 and 2011, it remains one of the regions with the highest levels of inequality globally. Indeed, it is home to 10 of the 19 most unequal countries in the world. It is also home to seven economies that are considered outliers in terms of their Gini coefficients and, as such, are responsible for the inequality observed in the region. Between 1991 and 2011, a clear duality in inequality trends emerged among countries in the region. Moreover, 17 African countries (mostly agricultural economies in West Africa and some in other subregions) experienced declining inequality, while 12 countries, mostly in Southern and Central Africa and characterized by a large oil and mining sector, experienced rising inequality.

This observation has led to the urgent need for economists to rethink the drivers of income inequality beyond the simple prediction of the Stolper-Samuelson theorem. The first argument is to extend the Heckscher-Ohlin model for explanation (Xu (2003). The second argument is the skill bias and the technology channel (Rattso and Stokke, 2013). The third is the increase in trade in intermediate goods and vertical specialization (Grossman and Rossi-Hansberg, 2008).

The dramatic trade liberalizations implemented by developing countries or their partners since the 1980s have provided an unprecedented opportunity to learn more about the effects of trade on growth, inequality, and poverty in developing countries (Goldberg and Pavcnik, 2007). Three possible arguments support the relationship between trade openness and income inequality. First, factor endowments (Spilimbergo et al., 1999; Gourdon et al., 2008). Second, trade-related investment and outsourcing (Feenstra and Hanson, 1999; Krugman, 2008). Third, technological changes that reflect real world market conditions to the analysis of the effect of trade on income inequality (Lim and McNelis, 2016). While growth and technology improve income inequality, trade openness has mixed effects on income inequality (Jaumotte et al., 2013; Dollar and Kraay, 2002).

Theoretically, the impact of trade on inequality in developing countries could be different. Empirically, in the literature, the direction so far has been mixed. Wood (1997) concludes that trade openness is differently associated with wage inequality in Asian Tiger economies and Latin American countries. Green et al, (2001)

point out that trade liberalization has no significant effect on wage dispersion in Brazil. Meschi and Vivarelli (2009) show that trade liberalization has an impact on income distribution in developing countries. A key issue, often emphasized in the literature, is that trade is endogenous in determining income levels, and hence income inequality.

At the same time, rising inequality within a country has been a major concern in both developed and developing countries (Asteriou et al., 2014). Several studies have investigated how economic freedom and globalization are associated with income inequality (Bergh and Nilsson, 2010). For example, Dreher and Gaston (2008) find that globalization increases household income inequality, particularly in Organization for Economic Cooperation and Development (OECD) countries. Similarly, recognizing the importance of international trade, the relationship between trade or trade openness and income inequality has been discussed in the literature. Savvides (1998) concludes that trade openness worsens income distribution in less developed countries, especially open economies, in the late 1980s. However, Reuveny and Li (2003) find that trade openness reduces income inequality. Most existing studies use the share of trade in the gross domestic product (GDP) as a measure of trade openness (Anderson, 2005).

From the non-exhaustive review of the literature on the impact of trade openness on income inequality, two main points can be made. First, most of the work has focused on the influence of international trade. Yet, in the long tradition of international economics, trade openness and inequality are frequently presented as complementary and associated with the stability of international relations (Baldwin and Krugman, 1989). Second, the literature ignores the problem of the level of trade openness resulting from the fragmentation of trade flows. Moreover, the use of multiple indices of trade openness seems not to have been addressed in the literature. Our paper aims to provide some empirical evidence on these shortcomings.

Following this theoretical framework and drawing on empirical methodologies widely documented in the literature, the objective of this paper, which constitutes its originality, is to examine the effects of five dimensions of trade openness on income inequality in Sub-Saharan Africa. To this end, we consider a sample of 38 African countries over the period 1980-2018 and apply Double Least Squares (DLS). The results show that the relative shares of domestic country trade, domestic country trade to average world trade, world trade composition, exports and imports to GDP increase income inequality. To this end, and more specifically, the study contributes to the literature on the subject in at least three ways. First, it incorporates, in addition to the traditional determinants, trade openness as a relevant indicator of income inequality. Second, it uses disaggregated indices of trade openness to better illustrate the relative relevance of each of the indices on income inequality in Sub-Saharan Africa. Finally, it shows its polysemic nature, which can be understood through the use of disaggregated indices, in order to make relevant recommendations.

The rest of the article is divided into five additional sections. The second section outlines synthesis of the state of the art. The third presents the stylized facts. The fourth presents the empirical strategy. The fifth analyses the results. The sixth concludes and suggests some policy recommendations.

II. Review of the literature

The dynamics of trade openness favor the emergence of challenges and opportunities related to inequalities (Ravallion, 2001). It is accompanied by processes of human, physical, financial and commercial integration that transform the well-being of populations (Dollar and Kraay, 2002). Policies must respond to these inequalities to promote trade in sustainable goods and services to foster inclusive growth and accelerate structural transformation.

Following Adam Smith (1776), who based explanations of inequalities in international trade on absolute advantages, the literature on trade openness has been characterized by three main theories. First, the traditional theories that include Ricardo's theory of comparative advantage (1817) and the Heckscher-Ohlin-Samuelson (HOS) model. Then, the modern theories that incorporate the new theory of international trade developed by Krugman (1979) and the institutional theory with North (1981). Finally, the financial theories highlight two effects. A direct effect based on the postulate that a country with a developed financial system favors trade openness through the channeling of financial flows, diversification and risk management, as well as the densification of trade in goods and services (Levine, 2005). An indirect effect that explains trade openness by a country's ability to have a sufficiently developed financial system and greater access to finance that can stimulate economic activities (Enrique et al., 2014).

Previous work on the trade and inequality relationship is based on the Heckscher-Ohlin (HO) model, which predicts that countries benefit from trade using their many factors (Chang and Wu, 2016). The Stolper-Samuelson theorem explains the main link between trade openness and income inequality. According to this theorem, capital-rich developed countries tend to export capital-intensive goods, while labor-rich developing countries tend to export labor-intensive goods. Once they open their markets, the relative prices of capital-intensive goods rise in developed countries, increasing the incomes of those with capital and reducing the

incomes of labor. The opposite effects occur in developing countries, increasing the relative incomes of those who benefit from lower capital.

The growing interconnection of economies has led to the need to explore the impact of trade openness on inequality, the roots of which go back to the seminal work of Kletzer and Bardhan (1987), which showed that imperfections in goods and services markets resulting from trade openness affect income inequality. These aspects left no doubt about the relevance of such a relationship, showing that income inequality depends on trade openness. Yet trade openness plays a major role in the evolution of inequality within countries through its effect on the prices of goods and factors. According to international trade theories, the degree of a country's exposure to foreign trade alters household incomes through changes in relative prices, reallocations of resources, and the introduction of new production techniques—all of which affect the organization of production, job creation, and labor incomes (Anderson, 2005). According to the traditional Heckscher-Ohlin model associated with the Stolper-Samuelson theorem (HOS), trade openness contributes to greater specialization of countries, an increase in their national income, and a change in the primary distribution of income according to factor endowments.

The literature identifies three types of factors that determine inequality. First, economic determinants such as population density (Heerink et al., 2001), income (Midlarsky and Roberts, 1985), natural resources (Anyanwu et al., 2016), trade globalization (Laigle, 2005), financial globalization (Jaumotte et al., 2013), government spending (Lee et al., 2013), inequality (Ongo-Nkoa and Song, 2019), and investments (Fosu, 2018). Second, social determinants such as education (Buffi and Atolia, 2012), household size (Mahmood and Noor, 2014), unemployment (Shafiullah, 2011), and aid (Monnin, 2014). Third, institutional determinants such as democracy (Brunori et al., 2015), governance (Campante and Do, 2007), colonial background (Bigstein, 2018), and ethnolinguistic fragmentation (Shimeles et Nabassaga, 2018).

However, Bergh and Nilsson (2010) and Fluckiger et al (2002), using time series analysis, find that increased trade openness generates income inequality in Switzerland. Similarly, Zhang and Zhang (2003) find that trade globalization has increased inequality in China through the promotion of large regional income differences. Aradhyula et al (2007) and Chakrabarti (2000) have investigated the effect of trade openness on income and distributional levels. Using panel data from sixty paid surveys over the period 1985-1994, they find that trade openness increases income inequality. Other studies have distinguished between the impact of trade openness on developed and developing countries, finding that greater openness increases inequality, at least in poor countries (Barro 2000; Ravallion 2001; Easterly, 2007; Bensidoun et al., 2011). For example, Borras (2007) and Galiani and Sanguinatti (2003) pointed out that although trade openness led to increased production in the agricultural sector, with local farmers competing with imports from neighboring countries, trade openness not only failed to improve living standards in the Philippines but increased poverty and income inequality. Furthermore, Dutt and Mukhopadhyay (2005) analyzed the correlation between globalization and income inequality in developing countries between 1977 and 1998, concluding that trade openness and capital flows have led to an increase in income inequality.

Recently, Anderson (2020) using computable general equilibrium models, finds that trade liberalization tends to reduce poverty, but is more likely to increase income inequality in developing countries. Similarly, Hirte et al. (2020) applying a gravity-type instrument that uses natural disasters hitting trading partners, as well as a Bartik-type instrument, conclude that trade openness increases economic disparities in countries that have higher domestic heterogeneity in terms of global market access and their intra-country trade costs.

However, other studies have confirmed a negative relationship between trade openness and income inequality (Calderon and Chong, 2001), suggesting that greater trade openness is associated with lower income inequality. Dollar and Kraay (2004) find that greater openness to improving the rule of law favorably affects income distribution. This occurs if countries reduce regulatory barriers to competition, trade openness and foreign direct investment. Reuveny and Li (2003) find that trade globalization significantly reduces levels of income inequality in both developed and developing countries. Meyer (2003) finds that trade openness is accompanied by a reduction in income inequality, gender inequality and sex segregation. Wagle (2007), Rama (2002) concluded that trade openness reduces income inequality in developing countries. Causa, de Serres and Ruiz (2015) pointed out that some trade reforms have contributed to narrowing inequality. Lin and Fu (2016) using the Stolper-Samuelson theorem in the Heckscher-Ohlin model in a sample of developed and developing countries over the period 1985-2012 found that trade openness reduces income inequality. Arabiyat et al, (2019), Hartmann et al, (2017) show that countries exporting complex products have lower income inequality than those exporting simple products. Similarly, Goh and Law (2019) using the system generalized method of moments in a sample of 65 developed and developing countries over the period 1984-2012, find that trade openness contributes to lower income inequality. Mahesh (2016) using the method of generalized moments in the system over the period 1991-2013, finds that increasing trade openness contributes to the deterioration of income inequality in BRICS countries.

However, Kentor (2001) finds no effect of trade globalization levels on income inequality trends in a panel of 88 developing countries over the period 1980-1997. Meschi and Vivarelli (2009) suggest an

insignificant relationship between trade openness and income inequality in developing countries, but they find that trade with developed countries intensifies income inequality in developing countries.

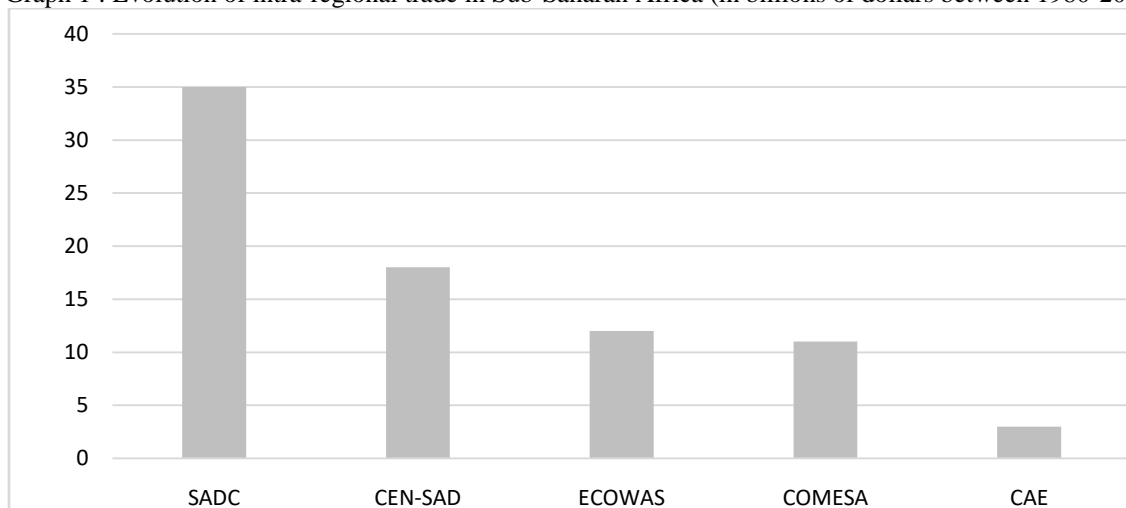
III. Some stylized facts

Three stylized facts can be noted to characterize trade openness and income inequality in Sub-Saharan Africa.

Trade openness remains low in Sub-Saharan Africa

According to Penn World Trade (2018), Sub-Saharan Africa remains on the margins of global trade, accounting for less than 1.7 percent, compared to 40 percent for the European Union, 28 percent for East Asia, 14.5 percent for North America, 5 percent for Latin America, and 2 percent for Africa. Although Sub-Saharan Africa's share of world trade is still marginal, some countries stand out such as Nigeria (0.054), Rwanda (0.043), Kenya (0.040) and Botswana (0.039) due to the implementation of structural transformation strategies and industrialization efforts. However, the composition of world trade is improving because exports are mainly primary at 94 percent. Plausible explanations for this are the staking of value chains and efforts to diversify production structures. Sub-Saharan Africa's participation in value chains is characterized by producing countries supplying, mainly to developed countries, raw materials and semi-processed intermediate products with low added value. As shown in Figure 1, intraregional trade in the regional economic communities was highest and estimated at \$34.7 billion in the Southern African Development Community (SADC), \$18.7 billion in the Community of Sahel-Saharan States (CEN-SAD), \$11.4 billion in the Economic Community of West African States (ECOWAS), and \$10.7 billion in the African Union (AU), 10.7 billion for the Common Market for Eastern and Southern Africa (COMESA), \$4.2 billion for the Arab Maghreb Union (AMU), \$3.1 billion for the East African Community (EAC), and \$0.8 billion for the Economic Community of Central African States (ECCAS).

Graph 1 : Evolution of intra-regional trade in Sub-Saharan Africa (in billions of dollars between 1980-2018)

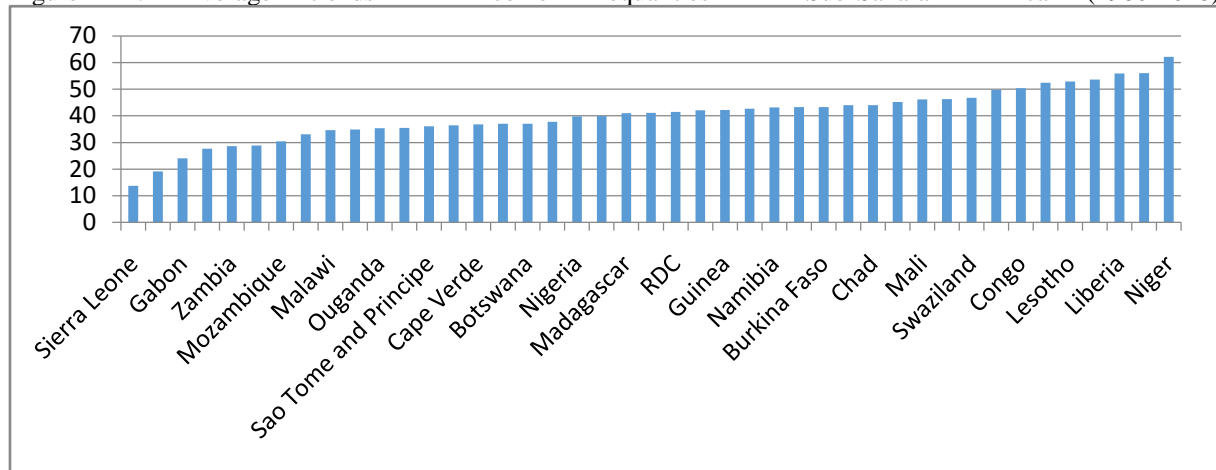


Source: Author, from World Bank Database (2019).

Income Inequality Rising in Sub-Saharan Africa

Figure 1 shows that seven of the ten most unequal countries in the world are in Sub-Saharan Africa. Significant disparities remain between urban and rural areas, across regions and between countries. These inequalities stem from the highly dualistic structure of the economy, multinational corporations and the extractive sector, which offer a limited capacity to generate employment compared to the informal sector, and lack of respect for environmental standards. In addition, the high concentration of physical capital, human capital and land, and the limited distributive role of the state, manifested through the natural resource cause, amplify the divergence in inequality in Sub-Saharan Africa.

Figure 2 : Average trends in income inequalities in Sub-Saharan Africa (1980-2018)

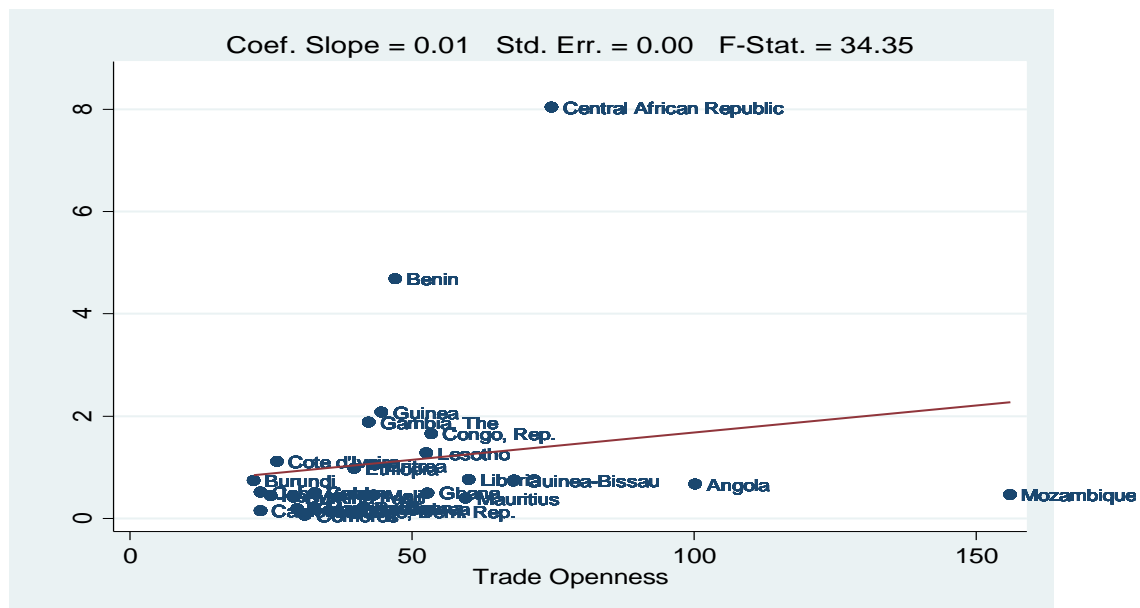


Source: Author, World Bank Database (2019).

Trade openness is positively correlated with income inequality

Trade openness is positively correlated with income inequality, as shown in Figure 3, provided that countries ease the constraints on integration faced by economic operators and firms. These aspects, in addition to constituting an issue for inequalities, favor the emergence of projects that are accompanied by a capacity for insertion, innovation and hiring. Also, the capacity for trade increases income in those parts of the world where diversification is advocated and reduces it in those localities where the concentration of export products is accentuated.

Figure 1 : Correlations between trade openness and inequalities in Sub-Saharan Africa



Source: Author, World Bank Database (2019).

IV. Methodological strategy

The methodological strategy is presented in three steps: the empirical model, the estimation technique and the data.

4.1. The empirical model

The model is inspired by the work of Mahesh (2016) and Hartmann et al, (2017) which highlight the impact of exports and trade openness on income inequality in Africa. The compact version of the model is described by equation 1.

$$Income_inequality_{it} = \alpha + \gamma Trade_openness_{it} + \varphi X_{it} + \mu_i + v_t + \varepsilon_{it} \tag{1}$$

Where $Income_inequality_{it}$ represents the inequality index of country i at date t . They describe the income gap between the affluent who can afford better living conditions and those living below the income

poverty line (Mahmmud and Noor, 2014). $[[Trade_openness]]$ _it is trade openness as measured by Squalli and Wilson's (2011) indicators. It incorporates five indicators that take into account:

- The trade share of country *i* in world trade (TS), i.e. the sum of exports and imports in relation to GDP. With TS, the Trade Share index; *X* is the volume of exports; *M* is the volume of imports; GDP is the gross domestic product in real terms and *i* is the index relative to the different countries. This measure is important because it allows us to capture the trade gains of the country under consideration. Its formula is as follows :

$$TS_i = (X + M) / PIB$$

- The proportion of the country's trade in relation to the world average. For a value greater than 1, the country participates strongly in the world average trade. With CTS_i represents the composite trade share index or Composite Trade Share. The CTS_i index is calculated as follows:

$$CTS_i = \frac{(X + M)_i}{\frac{1}{n} \sum_{j=1}^n (X + M)_j} * \frac{(X + M)_i}{PIB_i}$$

- The trade openness index is measured by the World Trade Share or WTS_i . It captures the relative contribution that a country has in world trade. With *j* the index of all countries in a considered group. The larger WTS_i of country *i*, the better the country's contribution to world trade. Its formula is as follows:

$$WTS_i = \frac{(X + M)_i}{\sum_{j=1}^n (X + M)_j}$$

For the first three indices of trade openness presented above, Organization for Economic Cooperation and Development (OECD) countries lead in the following order: United States, Germany, Russia, Great Britain, and Japan (Squalli and Wilson, 2011). Generally, African countries occupy the last places in the ranking.

- The share of exports in the GDP of country *i* as a measure of trade openness. This index provides information on the weight of exports in the GDP of country *i*. Overall, it provides an overview of the volume of exports in relation to national production. On the other hand, it provides little information on the behavior of the country in relation to the trade volume of other countries. However, high weight of the volume of exports in the GDP reflects its degree of openness. Its formula is as follows.

$$x_i = \frac{X_i}{PIB_i}$$

- The share of imports in the GDP of country *i*. The index provides information on the volume of imports in the GDP.

$$m_i = \frac{M_i}{PIB_i}$$

The last two indices capture the volume of trade in the country's GDP. They provide little information on the positioning of the country in relation to other countries at the global level (Harrison, 1996). These measures illustrate the ranking of African countries according to their degree of trade openness.

X is the vector of control variables composed of: (i) real gross domestic product (GDP) growth increases the volume of trade based on diversification of production on the one hand and the search for gains from trade on the other (Chen and Turnovsky, 2010); (ii) human capital approximated by the number of students enrolled in secondary school. It explains the ability to acquire and internalize new technologies (Anyanwu, 2014). A better-educated population will tend to import sophisticated goods, thus compensating for the insufficient modernization of the national production system; (iii) domestic investment, measured by gross fixed capital formation, reflects the acquisition of new equipment in order to increase production and captures the contribution of the private sector to national production (Choong et al., 2010). Thus, μ_i captures unobserved country-specific effects. ν_t captures the time-specific effect common to all countries and ϵ_{it} is the error term. Thus, α , β and φ are the parameters to be estimated.

4.2. The estimation technique

The estimation technique adopted is Double Least Squares (DLS), which is used when in a linear regression at least one of the explanatory variables is endogenous or when an explanatory variable is measured with error (Nwakuya and Ijomah, 2017). In this case, that variable and the error term will be correlated. To estimate such a model, it is more advisable to consider instrumental variables. In the case of an endogeneity problem, it is also advisable to use the generalized method of moments. However, considering that the changes in the data on the Women's Political Empowerment indices, very little fluctuation emerges. Thus, the lagged variables have little influence on the present variables. We then decline this technique. However, if an endogenous variable exists, the classic model techniques are no longer considered. If such a variable exists, it is

possible to obtain a convergent estimate of the parameter of interest. The most classical estimator is the double least squares estimator. It is obtained by regressing the dependent variable not on the endogenous regressor, but on its ordinary least squares prediction from the first stage regression. We then carry out a double estimation, hence the name of Double Least Square. Moreover, having verified the non-existence of an endogeneity problem, the robustness of the results is achieved by estimating the basic model by Ordinary Least Squares. This technique reduces the problem of measuring the dependent variable.

4.3. The data

The sample consists of 38 countries in Africa (Table 1). The study covers the period 1980-2018. The availability of data on the various indices of trade openness justifies the sample size. Macroeconomic variables are taken from the World Bank's World Development Indicators (2018). Income inequality specific data are taken from Standardized World Income Inequality Database (SWIID).

Table1: List of countries

Sierra Leone, Seychelles, Gabon, Ghana, Zambia, Mauritius, Mozambique, Benin, Malawi, Erythre, Ouganda, Rwanda, Sao Tome and Principe, Guinea-Bissau, Cape Verde, Afrique du sud, Botswana Kenya, Nigeria, Equatorial Guinea, Madagascar, Gambia, RDC, Comores, Guinea, Angola, Namibia, Burundi, Burkina Faso, Cote d'Ivoire, Chad, Senegal, Mali, Tanzania, Swaziland, RCA, Congo, Togo, Lesotho, Cameroon, Liberia, Ethiopia, Niger

Source: author.

The descriptive statistics show small variations (Table 2). It is recognized that when the data fluctuate slightly, the results tend to converge.

Table2: Descriptives statistics

<i>Variables</i>	<i>Observations</i>	<i>Moyennes</i>	<i>Ecart-type</i>	<i>Minimum</i>	<i>Maximum</i>
Income inequalities	1634	3.937821	12.87274	8.740	65.8
Trade share(TS)	1634	69.32657	35.94212	6.320343	311.3541
Composition of trade(CTS)	1634	87.14805	215.7527	0	1931.51
World trade share(WTS)	1634	6286.614	18728.93	0	193151
Export/PIB	1634	29.45556	18.83434	2.524688	107.9944
Import/PIB	1634	39.87101	21.45984	2.982036	236.391
GDP/Capiter	1634	4.011719	7.128599	-50.24807	149.973
Human capital	1634	33.38022	24.71945	2.48434	115.9565
Private investment	1634	20.33231	9.203847	-2.424358	89.38613

Source: author, from World Bank Database (2019).

The correlations between the different analysis variables are not high enough to cause serious multicollinearity problems (Table 3). Financial development indicators are positively correlated with trade openness.

Tableau 3 : Correlation matrix

	<i>Income_ine</i>	<i>TS</i>	<i>CTS</i>	<i>WTS</i>	<i>WTSPRIME</i>	<i>X/PIB</i>	<i>M/PIB</i>	<i>GDP</i>	<i>Hum_cap</i>	<i>Dom_inv</i>
<i>Income_ine</i>	1.0000									
<i>TS</i>	-0.0132	1.0000								
<i>CTS</i>	0.0021	0.0526	1.0000							
<i>WTS</i>	0.0045	0.0762	1.0000	1.0000						
<i>WTSPRIME</i>	0.0046	0.0762	1.0000	1.0000	1.0000					
<i>X/PIB</i>	0.3398	0.6510	0.6728	0.4650	0.0280	1.0000				
<i>M/PIB</i>	0.0938	0.1832	0.2103	0.0664	0.1277	-0.063	1.0000			
<i>GDP</i>	-0.0058	0.1241	0.0479	0.0258	0.0257	0.0434	-0.025	1.0000		
<i>Human_cap</i>	0.0441	0.4492	0.3398	0.3552	0.3553	0.6728	0.4650	0.0280	1.0000	
<i>Domes_inves</i>	-0.0108	0.3120	0.0938	0.1118	0.1118	0.2103	0.0664	0.1277	0.2184	1.0000

Source: author.

V. Results and interpretations

We first present the results of the basic model and then we perform a robustness analysis.

5.1. Trade Openness and Inequality: Results from the Basic Model

Table 4 below illustrates the relative relevance of the variables. Overall, the results show that the relative shares of home country trade, home country trade to world average trade, world trade composition, exports and imports to GDP increase income inequality in SSA. As a result, there are barriers to social inclusion, which fuel poverty as people seek better opportunities. In addition, the low diversification of traded products and the lack of true value chains in the different commodity chains is not beneficial to the poor in SSA, as it hinders

the efficient allocation of capital, which inhibits overall growth by tightening credit constraints that largely disadvantage households, to the benefit of income inequality. However, trade flows accentuate the inequity of income and wage distribution. Although these results run counter to traditional HOS theory, they confirm the theoretical model of Feenstra and Hanson (1996). Indeed, when developing countries trade with developed countries, income inequality increases. Although trade openness is unequal in terms of income distribution, in developed countries it is the main source of income for the poor. Trade liberalization has aggravated income inequality in Sub-Saharan Africa by reducing the share of value added in manufacturing, coupled with relative macroeconomic stability, higher inflation, and a less competitive real exchange rate that exacerbates income disparity. The increase in inequality is also attributable to the decline in the share of value added of labor-intensive manufacturing in total output, which has been induced by trade liberalization and the corresponding decline in the average tariff rate.

While trade openness in Africa has helped improve production efficiency, it has not allowed firms to achieve economies of scale (lower unit production costs as the market size increases). This lack of price decline is compounded by the lack of diversity of supply, which is a source of price instability, particularly in agricultural markets. The embryonic development of global value chains does not allow for the integration of some African countries into globalization, thus reducing national income per capita. Yet GVCs offer the opportunity to integrate into global markets at lower cost, since firms will only produce a portion of the final product. As a result, the gains from participating in GVCs and globalization, in general, are not equally distributed across and within countries, leading to rising inequality. The adverse effects of trade openness are very often localized and long-lasting because of interregional and intersectoral rigidities in labor mobility. These aspects exacerbate inequalities due to the predominance of large firms, wage premiums that reflect rents that firms share with labor, and the intensification of competition in the final goods market that the elimination of trade barriers bring about. Thus, trade openness affects industrial wage premiums through labor productivity. Indeed, if industrial firms facing the largest tariff cuts following liberalization of their sector manage to improve their relative productivity, they will be able to transfer part of these productivity gains in the form of wage increases. Nevertheless, there is a significant risk that rising income inequality will lead to conflict and civil war.

Table 4: Effects of trade openness on income inequality in Sub-Saharan Africa

<i>Estimation technique : Doubles Least Squares</i>						
<i>Dependante variable: Income inequality</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
<i>GDP/Capita</i>	0.0344** (0.0283)	0.0434** (0.0283)	0.0459*** (0.0334)	0.0348* (0.0282)	0.0396*** (0.0284)	0.0419*** (0.0281)
<i>Human capital</i>	0.0446*** (0.0058)	0.0368*** (0.0063)	0.0529*** (0.0066)	0.0499*** (0.0061)	0.0404*** (0.0063)	0.0376*** (0.0060)
<i>Domestic investment</i>	0.0486*** (0.0148)	0.0369** (0.0152)	0.0648*** (0.0164)	0.0465*** (0.0148)	0.0445*** (0.0150)	0.0335** (0.0152)
<i>Trade Share (TS)</i>		0.0144*** (0.0448)				
<i>Composition Trade Share (CTS)</i>			0.00175*** (0.0066)			
<i>World Trade Share (WTS)</i>				0.0508* (0.0292)		
<i>Exportations/GDP</i>					0.0139* (0.0827)	
<i>Importations/GDP</i>						0.0294*** (0.0757)
<i>Constante</i>	-0.706* (0.372)	-1.140*** (0.394)	-1.206*** (0.429)	-0.698* (0.371)	-0.850** (0.382)	-1.292*** (0.399)
Observations	817	817	693	817	817	817
Countries	38	38	38	38	38	38
R²	0.098	0.110	0.130	0.107	0.107	0.115

Notes: () standard deviations robust to heteroscedasticity *, **, and *** indicate significance at the 10%, 5%, and 1% confidence level respectively.

Source: author.

Real GDP per capita increases income inequality in Sub-Saharan Africa. The plausible explanations are that the low level of income that characterizes African wage earners and non-wage earners does not allow them

to meet their basic needs or to afford decent housing because of the high cost of living. In addition, the inefficient redistribution of the benefits of growth, particularly natural resources, does not benefit all segments of the population. As a result, marginalized populations find themselves in a precarious situation, unable to find housing even at lower costs. This finding corroborates that of Fosu (2018) who points out that socioeconomic disparities increase income inequality in Africa.

Human capital contributes to accentuating income inequalities because of the knowledge acquired by populations, and therefore membership in international organizations by almost all African countries restricts activities that affect income disparities. Indeed, human capital induces a propensity for educated people to want to migrate even though they do not have the means. As a result, these people end up in uncomfortable housing at the risk of their well-being. Education and learning are of relative quality and inequality and exclusion exist at all levels. Even with the substantial increase in the number of children accessing basic education, a large number are still out of school due to the distribution of essential infrastructure such as schools. These findings are consistent with those of Acosta et al (2008).

Private investment has a positive and statistically significant effect on income inequality in Sub-Saharan Africa. Moreover, human capital is a multidimensional and multifunctional factor in income inequality. As a component inserted in specific socio-historical systems, it constitutes a process of formation of economic agents, but not of socialization, which crowds out the diffuse process of transmission and creation of value, favoring the perpetual stockpiling of skills, the absence of innovation within production units, which reduces their supply to international trade. This result could be explained by the fact that private investment is not a prerequisite and indispensable condition for the processes of reducing disparities, as well as for the effective application of strategies to eradicate the daily obstacles of households. As the engine that drives the economic machine, it does not allow entrepreneurs to gather the resources needed to produce goods and services that are conducive to job creation, the adoption of innovations, and especially international trade. These results corroborate those of Alejandro et Chavèz (2016).

5.2. Robustness analysis

In order to ensure the robustness of our results, we estimate the effects of trade openness on income inequality in Sub-Saharan Africa using the Pool Mean Group econometric technique.

Overall, the results are consistent with those obtained in the baseline model and the empirical literature. The relative shares of home country trade, home country trade to average world trade, world trade composition, exports and imports to GDP increase income inequality in Sub-Saharan Africa as shown in Table 5 below. Without claiming to be exhaustive, three explanations can be put forward. First, the highly dualistic structure of the economy, where jobs in government, multinationals, and the resource sector are reserved for elites, while the majority of workers have to make do with much lower incomes from the formal economy or the subsistence sector (Buffi and Atolia, 2012). Second, the high concentration of physical capital, human capital, and land, especially in the East and Southern African economies and in specific groups or regions. Finally, the limited distributive role of the state, often manifested through the "natural resource curse," urban bias in public policy, and ethnic and gender inequalities. These explanations are compounded by rising domestic and international investment in extractive industries and rising terms of trade in resource-rich countries, which polarize income disparities. Recent literature also highlights the suboptimal structural transition of the economy from cash crop agriculture characterized by low levels of inequality to sectors with high levels of inequality, such as livestock production, trade, transport, and formal and informal services, which are responsible for inequality. There is also an uneven distribution of socioeconomic and physical facilities (roads, electricity, schools, hospitals, water, and sanitation) between rural and urban areas and across regions, leading to income disparities. These results are consistent with those of Hirte et al., (2020), Bergh et Nilsson (2010).

Table 5: Effects of trade openness on income inequality in Sub-Saharan Africa

<i>Estimation technique : Pool Mean Group</i>						
<i>Dependante variable: Income inequality</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
		0.0378**				
<i>GDP/Capita</i>	0.0276** (0.0202)	* (0.0214)	0.0409 (0.0268)	0.0258* (0.0196)	0.0334* (0.0217)	0.0369* (0.0208)
	0.0456**	0.0376**			0.0411**	
<i>Human capital</i>	* (0.0050)	* (0.0070)	0.0544*** (0.0053)	0.0515*** (0.0053)	* (0.0077)	0.0382*** (0.0052)
<i>Investissement domestique</i>	0.0446**				0.0397**	
	*	0.0312**	0.0571***	0.0433***	*	0.0275**

	(0.0125)	(0.0143)	(0.0158)	(0.0122)	(0.0138)	(0.0130)
Trade Share (TS)		0.0158*				
		(0.0086)				
Composition Trade Share (CTS)			0.0174***			
			(0.0044)			
World Trade Share (WTS)				0.0456***		
				(0.0050)		
Exportations/PIB					0.0165	
					(0.0181)	
Importations/PIB						0.0315***
						(0.0108)
Constante	-0.683**	1.170***	-1.117***	-0.730***	0.872***	-1.290***
	(0.270)	(0.313)	(0.315)	(0.268)	(0.274)	(0.318)
Observations	817	817	693	817	817	817
Countries	38	38	38	38	38	38
R²	0.76	0.84	0.64	0.67	0.83	0.57

Notes: () standard deviations robust to heteroscedasticity *, **, and *** indicate significance at the 10%, 5%, and 1% confidence level respectively.

Source: author.

IV. Conclusion

The objective of this paper was to assess the role of trade openness on income inequality using a sample of 38 Sub-Saharan African countries over the period 1980-2018. Starting from traditional and modern theories of international trade and inequality, we considered the five measures of trade openness proposed by Squalli and Wilson (2011). To the best of our knowledge, very few works have taken such an encompassing empirical approach. From the estimates made on a dynamic panel data model by Double Least Squares, the results indicate that the relative share of domestic country trade, the relative share of trade in the composition of world trade, the share of exports to GDP, the share of imports to GDP, and the relative share of domestic country trade to average world trade increase income inequality in Sub-Saharan Africa.

From these results, some non-exhaustive policy suggestions can be made to mitigate income inequality in SSA. First, the implementation of appropriate strategies to attract investment in processing sectors, particularly in industry, in order to reduce raw product exports and consolidate the industrial fabric of African economies. Second, to reduce imports, particularly of food products, by implementing reforms to increase the productivity of agricultural sectors and organize regional markets. Third, consolidate and finalize the implementation of structural reforms to improve the competitiveness of traditional export sectors and diversify the supply of goods and services.

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