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Impact of Financial Inclusion on Sustainable Development in Sub-Saharan Africa

* Alade Ayodeji ADEMOKOYA (Ph.D.)

Abstract

All the three aspects of sustainable development, vis-à-vis, sustainable economic, social and environmental development, are crucial, inter-linked and mandatory if the SDGs are to be achieved and they balanced out each other and none is more important than the other. In spite of the bright outlook of financial inclusion derived from financial technology adoption, several challenges still ringer in Sub-Saharan African countries regarding financial inclusion. This reason and the fact that the impact of financial inclusion on sustainable development has not gained focus in the literature led to the emergence of this study to examine the impact of financial inclusiveness on sustainable development in Sub-Saharan Africa and specifically, to: examine the level of financial inclusion, economic, social and environmental development in Sub-Saharan Africa; assess the impact of financial inclusiveness on sustainable economic development in Sub-Saharan Africa; determine the impact of financial inclusiveness on sustainable social development in Sub-Saharan Africa; and investigate the impact of financial inclusiveness on sustainable environment development in Sub-Saharan Africa. The study employed panel dynamic fixed effects estimator on the panel data of 38 Sub-Sahara African countries over the period between 2012 and 2020. The findings of the study financial inclusion have negative impact on CO_2 emission, implying that financial inclusion improves environmental sustainability but does not have impact on economic and social sustainability. The study concluded that financial inclusion is vital for sustainable development in Sub-Saharan Africa, primarily, through its contribution to environmental sustainability by reducing environmental degradation through the reduction in CO2 emission. The study recommended that inclusive financial system and activities should be pursued by policy makers of Sub-Saharan Africa in order to achieve their sustainable development goals through improved environmental sustainability.

Keywords: Financial inclusion, Sub Sahara Africa, Sustainable Development

1. Introduction

The sustainable development goals (SDGs) set by the United Nations (UN), which took effect from the end of the millennium development goals (MDGs) in 2015, is comprised of an ambitious 17 goals, with 169 targets and represent a broader scope of developmental objectives expected to guide actions of governments, international agencies, civil society and other institutions for 15 years 2016 to 2030 (United Nations (UN), 2015). The SDGs were born out of the collective realization that for meaningful development to take place globally, a

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paradigm shift is needed that will foster stronger international environmental governance, and ensure a balanced integration of the economic, social and environmental dimensions of sustainable development (United Nations Environmental Programme (UNEP), 2015). All the three aspects of sustainable development are crucial, inter-linked and mandatory if the SDGs are to be achieved and they balanced out each other and none is more important than the other. Only by integrating and interlinking economic, social and environmental sustainability can negative synergies be arrested, positive synergies fostered, and real development encouraged (Demirguc-Kunt, Klapper, Singer & Oudheusden, 2015). Economic, social and environmental sustainability form elements of a dynamic system. Therefore, they cannot be pursued in isolation for sustainable development to flourish. It becomes pertinent to determine the factors that can help foster these three sustainable development branches. One of the most talked-about factors that can guarantee sustainable development from these three perspectives is the level of financial development in the country. A more developed financial system can facilitate the much-needed financial resources for economic, social and environmental development (Ademokoya, 2020). More specifically, the level of financial inclusion can foster sustainable development in these three regards. Although, the SDGs do not explicitly target financial inclusion, greater access to financial services is a key enabler for many of them.

Sub-Saharan African (SSA) countries have achieved milestones in financial inclusion, particularly on penetration, access, and usage dimensions. This outcome has been driven mainly by mobile money services as a platform for financial services delivery. Substantial increase in usage of formal non-bank financial services is notable, especially in the middle-income countries, such as Nigeria, Mauritius, Seychelles, South Africa, Namibia and Morocco (Balele, 2019).

In spite of the bright outlook of financial inclusion derived from financial technology adoption, several challenges still ringer in Sub-Saharan African countries regarding financial inclusion. These include limited outreach of the brick and mortar model, especially in rural areas, high and sticky levels of financial illiteracy, high lending rates leading to significant spread between lending and deposit rates, and low saving and poor loan repayment culture (Dabla-Norris, Ji, Townsend & Unsal, 2015). The banking infrastructure is still less developed in most SSA countries, with most of the banking services concentrated in urban areas. Other challenges include the predominance of cash-based economy (Adam, Kessy, Nyella & O'Connell, 2010), default risk attributed by absence of collateral registry for registration of movable assets, and higher degree of informal sector. Scheneider, Buenhn and Motenegro (2010) identified Mozambique, Tanzania, and Nigeria as countries with the highest proportion of shadow economy, with 58.3%, 56.4%, and 55.2%, respectively. Dell'Anno, Davidescu and Balele (2018) found that the Tanzanian shadow economy ranged between 50% and 61% during 2004-2014). All these factors exert friction on the speed of financial inclusion in SSA despite the adoption of financial technology.

Furthermore, the level economic, social and environmental development in Sub-Saharan Africa has not been encouraging, most especially, in the case of environmental development (Ademokoya, 2020). The environment appears to have been neglected for long when it comes

to developmental issues (Norbert & Saleh, 2003). Naturally, the environment has an epidemiologic or determinant role when it comes to sustainable development.

Despite the overwhelming consensus on the role of financial inclusion on economic growth (Aker, Boumnijel, McClelland & Tierney, 2011; Andrianaivo & Kpodar, 2011; Bruce, Gine, Goldberg & Yang, 2013; Harihanan & Marktanner, 2012), the impact of financial inclusion on sustainable development has not gained focus in the literature. This study is therefore motivated by this absence of attention being given to investigating this phenomenon. This led to the emergence of this study to investigate: the impact of financial inclusiveness on sustainable economic development in Sub-Saharan Africa; the impact of financial inclusiveness on sustainable social development in Sub-Saharan Africa; and the impact of financial inclusiveness on sustainable environment development in Sub-Saharan Africa.

2. Literature Review

Review of Concepts

Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It therefore depends on how effectively the present and future social, economic, and environmental needs are balanced when making the decision today (United Nations, 2015).

The three pillars of sustainable development, vis-à-vis economic growth, environmental stewardship, and social inclusion carry across all sectors of development, from cities facing rapid urbanization to agriculture, infrastructure, energy development and use, water availability, and transportation (Omar & Inaba, 2020). Many of these objectives may seem to conflict with each other in the short term. For example, industrial growth might conflict with preserving natural resources. Yet, in the long term, responsible use of natural resources now will help ensure that there are resources available for sustained industrial growth far into the future (United Nations Environmental Programme, 2015).

While economic sustainability implies a system of production that satisfies present consumption levels without compromising future needs, social sustainability implies a system of social organization that alleviates poverty and social inequality and environmental sustainability requires maintaining natural capital as both a provider of economic inputs (called 'sources') and an absorber (called 'sinks') of economic outputs (called 'wastes') (Serageldin, 1993)

On the other hand, financial inclusion is the sustainable provision of affordable financial services that bring the poor into the formal economy (United Nations, 2016). Financial inclusion may also be defined as the use of formal financial services by the poor (Beck, Demirgüc-Kunt & Levine, 2007; Bruhn and Love, 2014).

Theoretical Review

Both the financial repression and financial intermediation theory provide theoretical background to this study, in that they establish the foundation to which the making or removal of government policies could promote more financial inclusion (or financial exclusion) which will further establish (or deter) a sustainable economic, social and environmental development in the society. As for the financial repression theory by Mckinnon (1973) and

Shaw (1973), it posits that excessive government regulations and laws such as interest rate control, liquidity ratio requirements, high reserve requirement, high transaction cost, capital controls, restrictions on entry into the financial sector, restrictions on directions or allocation of credit, government ownership or domination of banks and other legal restrictions affect effective financial intermediation in an economy. The financial intermediation on the other hand, established the extent to which financial institution connect the deficit spending units and surplus spending units together (Ndebbio, 2004).

Linking the two theories to the study, the financial repression theory advocates for the removal of government policies and initiatives that could discourage savings and lending in the country's financial system and retain those that foster financial inclusion. If after measuring financial inclusion in Nigeria, the index is seen as low, this theory suggests the removal of those government policies and initiatives as indicated by the index to be hindering financial inclusion and if it increases, the theory suggest the retention of those policies and initiatives as the index indicates. Furthermore the financial intermediaries perform the function of distribution of information and reduction of transaction cost, greater number of people will further use the financial services, thereby reducing the rate of financial exclusion.

Empirical Review

A number of studies conducted for developed economies have demonstrated research efforts to investigate the role of financial inclusion on macroeconomic conditions in general, and on economic growth in particular (e.g., Levine *et al.*, 2000;Hariharan & Marktanner, 2012; Yoruk&az, 2016).The focus of these studies were not channelled towards the impact of financial inclusion on sustainable development. The only exception is the study by Cichowicz and Rollnik-Sadowska (2018), which was conducted on the impact of inclusive growth on sustainable development in Central and Eastern European countries. The studies conducted for developing countries (e.g., Andrianaivo & Kpodar, 2011; Hariharan & Marktanner, 2012; Zuzana Fungáčová & Weill, 2014; Park and Mercado, 2015) were also majorly on the impact of financial inclusion on economic growth and poverty but not sustainable development. However, the study by Koirala and Pradhan (2019) was on other macroeconomic determinants aside financial inclusion on sustainable development.

Similarly, for studies in SSA, most of them were conducted on impact of financial inclusion on economic growth and development (see, for example, Aina & Oluyombo, 2014; Micheal, 2014; Onaolapo, 2015; Nkwede, 2015; Adetiloye, Erin & Modebe, 2017), with no attention given to sustainable development. The only exception is the study by Yakubu, Loganathan and Ali (2019), which was conducted to examine the impact of financial and economic factors on sustainable economic performance. Even at that, Yakubu *et al.*,(2019) did not specifically looked at financial inclusion, more so, the study is only specific to sustainable economic development economic, which is just an aspect of overall sustainable development. This shows that there is a gap in the empirical literature regarding the impact of financial inclusion on sustainable development.

Furthermore, the studies mentioned above were basically conducted on either static time series or static panel analysis, making them to ignore the dynamism that may exist in the relationship between financial inclusion and sustainable development. This also indicates a

methodological gap in the empirical literature which seeks to be filled. More so, the use of only sustainable economic development which was employed in the work of Yakubu *et al.* (2019) is not suitable for overall sustainable development, as sustainable development encompasses economic, social and environmental sustainability. This also indicates a conceptual and variable measurement gap which seeks to be filled.

The present study therefore fills the above-mentioned gaps by examining the impact of financial inclusion on sustainable development in Sub-Saharan Africa, employing a dynamic panel autoregressive distributive lag (ARDL) model in order to capture the dynamic relationship. The study employed three measures viz: economic growth (for economic sustainability), income inequality (for social sustainability) and carbon emission (for environmental sustainability).

$$C_t = \alpha_0 + \alpha_1 lnE_t + \alpha_2 lnY_t + \alpha_3 lnF_t + \alpha_4 lnTR_{it} + \mu_{it} \quad (1)$$

where:

C is CO_2 emissions per capita

E is energy consumption per capita

Y is real GDP per capita

F is financial development

TR is trade openness

The modifications include the transformation of the focus of the model from just environmental sustainability to include economic sustainability and social sustainability. The empirical models of this study is therefore given as follows.

Model for Economic Sustainability

$$GDPgr_{it} = \alpha_0 + \alpha_1 POPgr_{it} + \alpha_2 GCF_{it} + \alpha_3 TOP_{it} + \alpha_4 FI_{it} + \varepsilon_{it} \quad (2)$$

where:

GDPgr is economic growth

POPgr is population growth

GCF is gross capital formation

TOP is trade openness

FI is financial inclusiveness

ε is the disturbance term of the model

α_0 is the constant term

$\alpha_1 - \alpha_4$ are the coefficients of the variables included in the model

A priori Expectation

The expected signs of the coefficients of the variables included in the above model are discussed here. It is expected that population growth, capital formation, trade openness and financial inclusiveness have positive signs and thus, have positive impacts on economic sustainability. This can be summarized in the following inequality notations.

$$\alpha_1, \alpha_2, \alpha_3, \alpha_4 > 0$$

Model for Social Sustainability

$$Gini_{it} = \beta_0 + \beta_1 GDPgr_{it} + \beta_2 GEF_{it} + \beta_3 RegQ_{it} + \beta_4 TOP_{it} + \beta_5 FI_{it} + \epsilon_{it} \quad (3)$$

where:
Gini is Gini coefficient (income inequality)
GEF is government effectiveness
RegQ is regulatory quality
ϵ is the disturbance term of the model
Other variables are as defined earlier
β_0 is the constant term
$\beta_1 - \beta_5$ are the coefficients of the variables included in the model

A priori Expectation
It is expected that economic growth, government effectiveness, regulatory quality trade openness and financial inclusiveness have positive signs and thus, increase the Gini coefficient, thereby reducing income inequality and having improving the social sustainability. This can be summarized in the following inequality notations.

$$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$$

Model for Environmental Sustainability

$$CO2_{it} = \theta_0 + \theta_1 GDPgr_{it} + \theta_2 GEF_{it} + \theta_3 RegQ_{it} + \theta_4 TOP_{it} + \theta_5 FI_{it} + \mu_{it} \quad (4)$$

where:
μ is the disturbance term of the model
Other variables are as defined earlier
θ_0 is the constant term
$\theta_1 - \theta_5$ are the coefficients of the variables included in the model

A priori Expectation
It is expected that economic growth has a positive sign, thereby increasing CO2 emission and contributing negatively to environmental sustainability. On the other hand, government effectiveness, regulatory quality trade openness and financial inclusiveness have negative signs and thus, reducing CO2 emission, thereby improving the environmental sustainability. This can be summarized in the following inequality notations.

$$\theta_1 > 0;\ \theta_2, \theta_3, \theta_4, \theta_5 < 0$$

Research Design
This study adopted the *ex-post* facto research design. This research design is appropriate for this study because of its peculiar features of examining existing facts and utilizing existing (secondary) source of data. Also, *ex-post* facto is suitable for this study used because it examines how independent variables present in prior study affect the dependent variable.

Population and Sample Size

The population of the study is made up of all forty-nine (49) countries in Sub-Saharan Africa, while the sample of the study covers thirty-eight (38) based data availability on financial inclusion and economic, social and environmental sustainability. These thirty-eight (38) countries include: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central Africa Republic, Chad, Comoros, Congo Dem. Rep., Congo Rep., Cote d'Ivoire, Djibouti, Eswatini, Ethiopia, Gabon, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

Source of Data Collection

Secondary source of data was used for this study. The secondary data used in this study have been extensively sourced from the World Bank's World Development Indicators (WDI) and Global Financial Index (FINDEX) of 2021.

Method of Data Analysis

This study applied the dynamic panel estimators to test for the long-run relationship and obtain the long-run estimates of the financial inclusion sustainable development. The estimation technique was macro panel data analysis, which deals with large number of time period (T) relative to number of cross-sections (N) or large number of both the periods and cross-sections. In the case of large T and small N, Roodman (2009) asserted that GMM estimators would produce spurious results due to the following reasons: (1) As T becomes larger, the instruments increase too, which subsequently a□ect the validity of Sargan test of over-identifying restriction. As such, the null hypothesis of exogeneity of instruments may be unnecessarily rejected. This can lead to doubt about the validity of the estimates. (2) Having small N can lead to a doubtful or unreliable autocorrelation test. In general, the application of GMM estimators in such situation may result in inconsistent and unreliable results. The suitable estimators for such panel setting are panel ARDL estimators, which include mean group (MG), pooled mean group (PMG), and dynamic fixed e□ect (DFE).

To specify the model of this study, it is pertinent to note that Pesaran *et al.*, (1999), Loayza and Ranciere (2006), and Samargandi *et al.*, (2015) asserted that dynamic heterogeneous panel could be incorporated into an error correction model based on ARDL (p,q) approach, with p as the dependent variable's lag and q as regressors' lag.

4. Results and Discussions

This section presents the results of both the descriptive and inferential analyses. While the summary statistic tools of mean, standard deviation minimum and maximum were employed to describe the variables of this study, the main inferential analysis tool employed here is regression analysis, which is to examine the effect of financial inclusion on sustainable development in Sub-Saharan Africa.

Descriptive Statistics

Table 1: Results of Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
GDPgr (in %)	4.21	4.34	-36.39	20.72
Gini (in %)	43.27	7.15	31.50	63.00
CO2 (in tonnes)	21,057.84	76,757.34	135.68	464,495
FI (index)	0.30	0.16	0.01	0.76
POPgr (in %)	2.43	0.83	0.03	3.91
GCF (in % of GDP)	23.22	9.19	-0.10	77.89
TOP (in % of GDP)	73.30	44.51	16.67	348.00
GEX (in dollars)	5,410,000,000	12,600,000,000	102,000,000	82,700,000,000
GEI (in % rank)	26.29	19.56	0.95	81.73
Regq (in % rank)	30.20	14.56	1.90	83.65

Source: Author's Computation, 2022

The summary statistics results presented in Table 4.1 shows that GDP growth (which measures economic sustainability) has a mean value of 4.21, standard deviations of 4.34, minimum value of -36.39 and maximum value of 20.72. This indicates that the sampled SSA countries, on the average, recorded economic growth to the tune of 4.21 per cent. The standard deviation also suggest that these countries are unequal in terms of their economic growth. The result also indicates that the country with the lowest economic growth during the period recorded a negative growth of -36.39 percent. On the other hand, the country with the highest economic growth during the period recorded it as a very high 20.72 per cent.

Table 4.1 also shows that Gini coefficient, which measures the level of inequality (and is used to proxy social sustainability) has a mean value of 43.27, standard deviation of 7.15, minimum of 31.50 and maximum of 63.0. This indicates that the sampled SSA countries, on the average, have 43.27 value out of 100 in terms of Gini coefficient, suggesting that they are widely unequal. This has a minimal spread of 7.15. The result also indicates that the country with the lowest Gini coefficient (and highest inequality) has 31.50 out of 100, while the country with the highest Gini coefficient (and lowest inequality) has 63 out of 100.

The results also show that CO2 emission, (used to proxy environmental sustainability) has a mean value of 21,057.84, standard deviation of 76,757.34, minimum of 135.68 and maximum of 464,495.0. This indicates that the sampled SSA countries, on the average, emit 21,057.84 tonnes of carbon on an annual basis. This has a wide spread of 76,757.34 tonnes. The result also indicates that the country with the lowest CO2 emission emit 135.68 tonnes per year, while the country with the highest CO2 emission emit 464,495 tonnes per year.

The summary statistics results show that financial inclusion, has a mean value of 0.30, standard deviation of 0.16, minimum of 0.01 and maximum of 0.76. This indicates that the sampled SSA countries, on the average, have an index score of 0.3 out of 1 in terms of their inclusiveness. This is quite small. This is also minimally spread by of 0.16. The result also indicates that the country with the lowest financial inclusion during the period has a value of 0.01, while the country with the highest financial inclusion during the period has a value of 0.76 out of 1.

The summary statistics results presented in Table 4.1 shows that population growth has a mean value of 2.43, standard deviations of 0.83, minimum value of 0.03 and maximum value of 3.91. This indicates that the sampled SSA countries, on the average, recorded population growth to the tune of 2.43 per cent. The standard deviation also suggest that these countries are minimally spread in terms of their population growth. The result also indicates that the country with the lowest population growth during the period recorded it as 0.03 percent. On the other hand, the country with the highest population growth during the period recorded it as 3.91 per cent.

The results also shows that gross capital formation as ratio of GDP has a mean value of 23.22, standard deviations of 9.19, minimum value of -0.10 and maximum value of 77.89. This indicates that the sampled SSA countries, on the average, recorded gross capital formation as percent of GDP to the tune of 23.22 per cent. The standard deviation suggests that these countries are minimally spread in terms of their capital formation. The result also indicates that the country with the lowest capital formation during the period recorded it as a negative 0.10 percent of GDP. On the other hand, the country with the highest capital formation during the period recorded it as 77.89 per cent of GDP.

Trade as ratio of GDP (which measures trade openness) has a mean value of 73.30, standard deviations of 44.51, minimum value of 16.67 and maximum value of 348.0. This indicates that the sampled SSA countries, on the average, recorded trade openness as percent of GDP to the tune of 77.3 per cent. The standard deviation suggests that these countries are widely spread apart in terms of their trade openness. The result also indicates that the country with the lowest trade openness during the period recorded it as 16.67 percent of GDP, while the country with the highest trade openness during the period recorded it as 348 per cent of GDP.

Government expenditure has a mean value of 5,410,000,000, standard deviations of 12,600,000,000, minimum value of 102,000,000 and maximum value of 82,700,000,000. This indicates that the governments of the sampled SSA countries, on the average, spend about 5.41 billion dollars annually. The standard deviation suggests that these expenditures are widely spread apart from country to country. The result also indicates that the country with the lowest government expenditure during the period recorded it as 102 million dollars, while the country with the highest government expenditure during the period recorded it as 82.7 billion dollars.

Government effectiveness has a mean value of 26.29, standard deviations of 19.56, minimum value of 0.95 and maximum value of 81.73. This indicates that, on the average, the sampled SSA countries have a score for government effectiveness of 26.29 in percentile rank. The standard deviation suggests that these countries are spread apart by 19.56 in percentile rank. The result also indicates that the country with the lowest government effectiveness during the period recorded it as 0.95 in percentile rank, while the country with the highest government effectiveness during the period recorded it as 81.73 in percentile rank.

Regulatory quality has a mean value of 30.20, standard deviations of 18.56, minimum value of 1.90 and maximum value of 83.65. This indicates that, on the average, the sampled SSA countries have a score for regulatory quality of 30.20 in percentile rank. The standard deviation suggests that these countries are spread apart by 18.56 in percentile rank. The result also indicates that the country with the lowest regulatory quality during the period recorded it as 1.90 in percentile rank, while the country with the highest regulatory quality during the period recorded it as 83.65 in percentile rank.

Dynamic Fixed Effects Results

The results of dynamic fixed effects variant of the panel ARDL method is presented in Table 2 to examine the impact of financial inclusiveness on economic sustainability in Sub-Saharan Africa. Both the short and long run estimates are presented with the long run estimates are presented in the upper part of the table, the short run estimates are presented in the lower part of the table.

From the long run estimates, the result shows that population growth (POPgr), gross capital formation (GCF) and trade openness (TOP) have statistically significant positive coefficients (5.273, 0.131 and 0.049 with p-values of 0.001, 0.028 and 0.092 respectively). However, financial inclusion is seen with an insignificant coefficient (78.38 with p-value of 0.114). These indicate that population growth, gross capital formation and trade openness have long-run positive impacts on economic growth while financial inclusion does not have statistically significant long-run impact on economic growth. This simply implies that long-run economic sustainability of SSA countries is determined by population growth, capital formation and trade openness and not by financial inclusion. The significant positive coefficient of population growth indicates that a per cent point increase in growth of population in SSA will lead to a long-run rise in economic sustainability by approximately 5.27 per cent points. Similarly, the significant positive coefficient of capital formation indicates that a point increase in ratio of capital formation to GDP will lead to a long-run rise in economic sustainability of SSA countries by approximately 0.13 per cent points. Also, the significant positive coefficient of trade openness indicates that a point increase in the ratio of trade to GDP will lead to a long-run rise in economic sustainability of SSA countries by approximately 0.05 per cent points.

From the short-run estimates, population growth and trade openness (TOP) have statistically significant positive coefficients (10.22 and 0.083 with p-values of 0.009 and 0.002 respectively). However, gross capital formation and financial inclusion are seen with an insignificant coefficient (0.039 and 35.69 with p-values of 0.377 and 0.260). These indicate that population growth and trade openness have short-run positive impacts on economic growth while gross capital formation and financial inclusion does not have statistically significant short-run impact on economic growth. This simply implies that short-run economic sustainability of SSA countries is determined by population growth and trade openness but not by capital formation and financial inclusion.

The results of dynamic fixed effects variant of the panel ARDL method is presented in Table 3 to examine the impact of financial inclusiveness on social sustainability in Sub-Saharan Africa. From the long run estimates, the result shows that only regulatory quality (RegQ) has a statistically significant negative coefficient (-0.078 with p-values of 0.048). Economic growth (GDPgr), government effectiveness (GEF), trade openness (TOP) and financial inclusion (FI) are seen with insignificant coefficients (-0.008, -0.032, 0.003, and -17.69 with p-values of 0.823, 0.385, 0.752 and 0.398). These indicate that regulatory quality has a long-run negative impact on Gini coefficient and in turn reduces income inequality, while economic growth, government effectiveness, trade openness and financial inclusion do not have statistically significant long-run impact on Gini coefficient and in turn, on income inequality. This simply implies that long-run social sustainability of SSA countries is determined by regulatory quality, but not economic growth, government effectiveness, trade openness and financial inclusion.

Table 2: Dynamic Fixed Effects Regression Results for Economic Sustainability

Table 2: Dynamic Fixed Effects Regression Results for Economic Sustainability

Variable	Coefficient	z	p-value
	Long-Run Estimates		
POPgr	5.273	3.25	0.001
GCF	0.131	2.2	0.028
TOP	0.049	1.68	0.092
FI	78.38	1.58	0.114
	Short-Run Estimates		
ΔGDPgr(-1)	0.926	14.45	0.000
ΔPOPgr	10.22	2.62	0.009
ΔGCF	0.039	0.88	0.377
ΔTOP	0.083	3.12	0.002
ΔFI	35.69	1.13	0.260
Constant	35.63	2.48	0.013

Source: Author's Computation, 2022.

Table 3: Dynamic Fixed Effects Regression Results for Social Sustainability

Variable	Coefficient	z	p-value
	Long-Run Estimates		
GDPgr	-0.008	-0.22	0.823
GEF	-0.032	-0.87	0.385
RegQ	-0.078	-1.97	0.048
TOP	0.003	0.32	0.752
FI	-17.69	-0.84	0.398
	Short-Run Estimates		
ΔGini(-1)	0.215	4.74	0.000
ΔGDPgr	-0.003	-0.5	0.619
ΔGEF	-0.002	-0.27	0.788
ΔRegQ	-0.013	-1.46	0.144
ΔTOP	-0.001	-0.41	0.685
ΔFI	-2.901	-0.92	0.355
Constant	-11.05	-4.3	0.000

Source: Author's Computation, 2022.

From the short-run estimates, none of the variables is seen to significant coefficient.These indicate that none of the variables have short-run impact on income inequality. This simply implies that short-run social sustainability of SSA countries is not determined by economic growth, government effectiveness, regulatory quality, trade openness and financial inclusion. The results of dynamic fixed effects variant of the panel ARDL method is presented in Table 4 to examine the impact of financial inclusiveness on environmental sustainability in Sub-Saharan Africa. From the long run estimates, the result shows that only trade openness (TOP) and financial inclusion (FI) have statistically significant negative coefficient (-18.29 and -

33307.2 with p-values of 0.063 and 0.051). Economic growth (GDPgr), government effectiveness (GEF), regulatory quality (RegQ) are seen with insignificant coefficients (16.44, -16.43 and -3.476 with p-values of 0.593, 0.575 and 0.909). These indicate that trade openness and financial inclusion have long-run negative impacts on CO2 emission and in turn reduces environmental degradation, while economic growth, government effectiveness and regulatory quality do not have statistically significant long-run impact on CO2 emission and in turn, on environmental degradation. This simply implies that long-run environmental sustainability of SSA countries is determined by trade openness and financial inclusion, but not economic growth, government effectiveness and regulatory quality.

From the short-run estimates, none of the variables is seen to significant coefficient.These indicate that none of the variables have short-run impact on CO2 emission. This simply implies that short-run environmental sustainability of SSA countries is not determined by economic growth, government effectiveness, regulatory quality, trade openness and financial inclusion.

Table 4: Dynamic Fixed Effects Regression Results for Environmental Sustainability

Variable	Coefficient	z	p-value
	Long-Run Estimates		
GDPgr	16.44	0.53	0.593
GEF	-16.43	-0.56	0.575
RegQ	-3.476	-0.11	0.909
TOP	-18.293	-1.86	0.063
FI	-33307.2	-1.96	0.051
	Short-Run Estimates		
ΔGini(-1)	1.314	19.7	0.000
ΔGDPgr	19.29	0.65	0.518
ΔGEF	-6.802	-0.17	0.868
ΔRegQ	-0.932	-0.02	0.984
ΔTOP	-1.163	-0.1	0.923
ΔFI	-9917.7	-0.65	0.513
Constant	-42976.1	-6.3	0.000

Source: Author's Computation, 2022.

From the findings of this study, it was largely revealed that all the variables took the right signs as expected,*a priori*. For example, the positive impacts of population growth,capital formation and trade openness on economic sustainability; the positive impact of regulatory quality on social sustainability; and the positive impacts of trade openness and financial inclusion on environmental sustainability are all in line with the a priori expectation and supported by the findings of Liu *et al.*, (2019), Koirala and Pradhan (2019), Nkwede (2015), Adetiloye *et al.* (2017), Cámara and Tuesta (2014), Jishajoseph and Varghese (2014) and Norris *et al.* (2015).

5. Conclusions and Recommendations

The study examined the impact of financial inclusion on economic, social and environmental sustainability in SSA countries. The conclusions that emerged from the findings are therefore that financial inclusion is only helpful in reducing carbon emission and guarantee environmental sustainability for the region but does not promote both economic and social sustainability. It is also concluded that population growth, capital formation and trade openness are vital for economic sustainability, strong regulatory quality is needed for social sustainability and trade openness is relevant for environmental sustainability. The study therefore recommends that to achieve sustainable economic, social and environmental development in SSA, policymakers should devote policy efforts to promote the growth of population, levels of investment and the openness to international trade, as well as the further inclusion of individuals of the region in the financial system.

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