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Financial Stability and Economic Sustainability: The Case of Sub-Saharan African Countries

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Abstract This study examines the effects of financial stability on economic sustainability, measured using two indicators: GDP per capita growth rate and adjusted net savings rate. Financial stability, in turn, is determined through three indicators: Z-score, bank credits, and liquidity of assets. From these three, we generated a financial stability index. Using the Generalized Method of Moments (GMM) with panel data from 28 Sub-Saharan African countries from 2010 to 2022, we obtained three main results. Firstly, financial system stability drives economic sustainability, enhancing the well-being of current and future generations. Secondly, financial stability can hinder economic sustainability when liquid assets and bank credits are allocated to environmentally polluting and resource-depleting activities. Thirdly, the effects of financial stability on economic sustainability depend on how sustainability is measured and how financial stability is apprehended. In other words, while banking stability is a factor in countries' progress toward sustainable growth, there exists a level of financial system stability that can hinder this progress. Therefore, this study recommends not only strengthening existing financial stability frameworks but also ensuring they comply with current economic sustainability requirements.

Keywords: *Financial Stability, Sustainability, Economic Sustainability, Sub-Saharan Africa*

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1. Introduction

The requirement for economic sustainability is at the heart of sustainable development, as the economy is the primary driver of positive and/or negative changes that can influence this development model [1]. Economic sustainability thus constitutes an important pillar for achieving sustainability objectives, situated at the centre of the social and environmental pillars of sustainable development. However, progress towards the economic sustainability objective proves impossible in the absence of sustainable growth, the only factor capable of contributing to the well-being of current generations while preserving natural resources for future generations. The path towards this objective passes through the acceptance and adoption by all countries of a sustainably responsible socio-economic development model favourable to conducting economic activities to preserve and promote long-term economic well-being.

Globally, despite endogenous and/or exogenous shocks, including the recent COVID-19 pandemic, all countries, developed and developing, mobilize and combine their efforts to advance national and global economies toward a long-term growth trajectory, due to a global awareness of the social, environmental, and economic sustainability requirements of sustainable development [2]. However, at a time when all countries accord greater priority to the achievement of the Sustainable Development Goals (SDGs), the challenges to be addressed seem enormous, particularly since factors that can either limit or enhance progress toward sustainable economic growth are also significant. In practice, [3] emphasize that these challenges are even more pronounced in developing countries, where the legitimate desire of governments is to reach and, if possible, exceed the development levels of currently developed countries.

At the macroeconomic level, financial stability, characterized by a situation in which the financial system can facilitate and improve economic processes, resist internal and external shocks, and absorb financial imbalances [4,5], is one of the factors likely to influence efforts and progress in economic sustainability. This is what most studies examining the impact of financial stability on economic sustainability in developed, emerging, and developing countries suggest. Globally, the dominant thesis is that financial institutions operating in a stable financial system propel economies on a sustainable growth trajectory [6,7]. This is based on the observation that financial crisis periods generally hinder economic growth, whereas periods of banking system stability increase the economy's real production [8].

However, based on contradictory empirical evidence from recent studies, it seems possible to conjecture that a stable financial system may, under certain conditions and at a certain level of financial stability, impede the progress of economies toward economic sustainability. Regarding this, [9] have highlighted the negative effects of some banking stability indicators, such as bank credits and liquid assets, on the economic sustainability of certain developing countries. Without challenging [10] assertion that the global financial system will be at the centre of humanity's attempt to achieve the SDGs, [6] nonetheless observes the negative and significant effect of financial system stability on certain sustainability objectives in Asian countries.

Despite this, the still very limited number of studies on the relationship between financial stability and economic sustainability, on the one hand, and the weakness of the methodological approaches used to measure these two entities, on the other hand, do not allow us to close the debate on how financial stability could influence the economic pillar of sustainable development. In this perspective, [9] observe that most studies do not directly address the effect of financial stability on economic sustainability but rather emphasize the effect of financial development on sustainable economic growth. This leads them to conclude that there is a lack of solid and comparable empirical evidence justifying today’s need to assess the effects of financial stability on economic sustainability. That is why we deemed it necessary to undertake this research on the link between financial stability and economic sustainability in the particular context of sub-Saharan African economies.

Thus, the research question of this study is as follows: Does financial stability advance economies on a trajectory of economic sustainability? Given that financial stability and economic sustainability are assessed using specific indicators, we will therefore verify how financial stability indicators influence economic sustainability indicators. Answers to these specific questions, on the one hand, will provide the robust empirical evidence we seek on the link between financial stability and economic sustainability and, on the other hand, will inform policymakers about strategies that can be designed and implemented to make the financial system a genuine driver of progress on the path to economic sustainability.

Our central hypothesis in this reflection is that the stability of the financial system advances sub-Saharan African countries along their sustainable economic growth path. Consequently, macro-prudential policies designed to reduce vulnerability and enhance the resilience of the financial system in the face of shocks appear to be determinants of countries’ progress toward long-term economic growth. In this respect, the Z-Score, bank credit as a percentage of deposits, and liquid assets are the three financial stability indicators through which we will verify the influence of financial stability on economic sustainability, measured by GDP per capita growth rate and adjusted net savings rate, conceived by the World Bank and considered a robust indicator for measuring economic sustainability.

To address the issues raised by this research, we opted for a panel model that allows us to consider country heterogeneity, such as differences in development levels and specific characteristics of their financial systems. Moreover, considering the dynamic nature of the variables in our analytical model, we use the Generalized Method of Moments (GMM) approach proposed by [11]. This method has the advantage of controlling for unobserved heterogeneity and endogeneity issues, resolving potential simultaneity problems between variables, and correcting for correlation errors over time as well as omissions of certain variables.

The plan for this study is as follows: In the second part, we will present a brief literature review of recent works examining the link between financial stability and economic sustainability. The third part will focus on the methodological framework adopted in this research. In the fourth part, we will present and interpret the results of our estimations. Finally, the fifth part concludes our study.

2. Empirical Works and Hypotheses

2.1. Empirical Works

In recent years, the contribution of financial stability to economic sustainability has garnered significant interest among researchers in both developed and developing countries. This interest seems increasingly justified due to the threat that a vulnerable financial system can pose a long-term economic growth. Traditionally, the financial system serves as the primary lever for financing the economy, and its efficiency in resource allocation has always been considered a factor in socio-economic progress. Today, all development policies place the financial system at the centre of the debate on sustainability [2], described by [12] as the principle ensuring that current generations’ actions do not limit future generations’ social, economic, and environmental opportunities.

Thus, as [8] argue, financial system stability is an indispensable element of economic sustainability. Moreover, sustainable economic growth requires banking system stability and the development of an efficiently functioning financial system [7]. Therefore, the financial system must resolutely align with current sustainable development requirements, prioritizing sustainable resource allocation as a factor in economic viability. Financial experts rightly emphasize the necessity of a stable financial system. Indeed, economic volatilities that lead to a decrease in sustainable growth often result from banks' financial difficulties, where the cascading effect of liquidity risk can lead to payment defaults, bank failures, and financial instability.

Although studies addressing the link between banking stability and economic sustainability are still relatively rare, recent findings highlight the positive and significant effect of financial system stability on economic sustainability, i.e., long-term economic growth. Some authors view the ongoing reforms aimed at fostering financial development while ensuring the stability of the financial system, as drivers of long-term economic growth. [13], in the context of the Nigerian economy, observe a long-term relationship between financial system reforms, a guarantee of financial stability, and long-term economic growth. Other studies also show that financial system reforms as a whole are positively correlated with banking stability contributing to the emergence of healthy and sustainable economic growth. That is why [10] argue that the global financial system and its stability enhancing reforms should be placed at the centre of current efforts toward achieving sustainable development goals.

[9] evaluated the effect of banking system stability on economic sustainability from 2000 to 2016 using a sample of 37 developing countries. Economic sustainability was measured using the World Bank's adjusted net savings rate, while the Z-Score served as an indicator of banking system stability. For developing countries, the results revealed a positive effect of the Z-Score on economic sustainability, whereas regulatory capital and bank credits exhibited negative effects. Regarding BRICS and non-BRICS countries, the results indicated a positive effect of the Z-Score, liquid assets, and bank credit on economic sustainability in BRICS economies. In contrast, liquid assets and bank credit had negative effects on economic sustainability in non-BRICS countries. The authors observed that the Z-Score had a positive effect on economic sustainability in both Asian and non-Asian countries. They also found that non-performing loans and bank credit, expressed as a percentage of bank deposits, had negative effects on economic sustainability in Asian countries, while regulatory capital had a negative effect on economic sustainability in non-Asian countries. Based on these results, the authors agree on the driving role of banking stability in progressing toward economic sustainability, acknowledging that its effects are not homogeneous.

[7] examined the causal relationship between financial inclusion, financial stability, and sustainable economic growth in Sub-Saharan African countries from 2000 to 2019. Using panel data from 26 Sub-Saharan African countries and a composite financial inclusion index constructed via principal component analysis, the results revealed a long-term relationship between financial inclusion, financial stability, and economic sustainability. Based on these findings, the two authors recommended that that policymakers and financial system regulators implement policies that make both financial inclusion and stability factors of sustainable economic growth. In the same vein, [14] notes that financial development, facilitated by significant improvements in financial inclusion, is a determining factor in economic sustainability and shared prosperity, if the financial system remains stable.

However, it is important to note that some works, such as the study by [15], suggest the negative effect of financial development on long-term economic growth, particularly when poorly channelled financial development efforts lead to financial instability. [7] also acknowledge that financial inclusion can threaten financial stability and, consequently, long-term economic growth, especially when a significant number of financial service users, particularly borrowers, are insolvent, thus exposing the financial system to credit and liquidity risks.

Using a panel of 32 European countries from 1996-2014, [16] studied the effects of the banking system on long-term economic growth using a Vector Error Correction Model (VECM). The authors observed a positive and significant effect of financial stability on long-term economic growth in European countries. Thus, financial sector stability appears as a driver of sustainable economic growth. Conversely, banking system instability leads to economic shocks that negatively affect sustainable economic growth. Using a similar methodological approach to that of [7,16] drew the same conclusion, stating that financial stability drives real economic growth and positively influences economic sustainability. For [8], periods of financial stability increase economic sustainability, while periods of financial instability reduce it.

In their study on the impact of financial stability on entrepreneurship development in 24 sub-Saharan African countries from 2004 to 2017, [17] indirectly explore the relationship between financial stability and economic sustainability. Using ordinary least squares and random effects methods, they observe the positive and significant effect of financial stability on entrepreneurship development. Given that economic dynamism largely depends on the rate of entrepreneurial activities, it follows that by positively and significantly affecting the rate of entrepreneurial activities, financial stability contributes to the dynamism of the national economy in the long term through a healthy financial environment that enables sustainable financing of businesses and supports the creation of wealth over time.

2.2. Hypotheses and Analytical Framework

Based on recent works, the following five hypotheses are formulated to achieve the objectives of this study in the specific context of Sub-Saharan African countries.

Hypothesis 1: The Z-Score of the financial system has a positive and significant effect on the economic sustainability of Sub-Saharan African countries;

Hypothesis 2: Bank credits allocated to environmentally polluting and resource-depleting activities do not contribute to Sub-Saharan African countries' long-term growth trajectory;

Hypothesis 3: The liquid assets of the banking system drive economic sustainability in Sub-Saharan African countries;

Hypothesis 4: The Financial Stability Index (FSI) has a positive effect on economic sustainability in Sub-Saharan African countries;

Hypothesis 5: There is a positive and significant relationship between GDP per capita and adjusted net savings, the two indicators of economic sustainability.

From these hypotheses, we derive the research framework represented by the figure below:

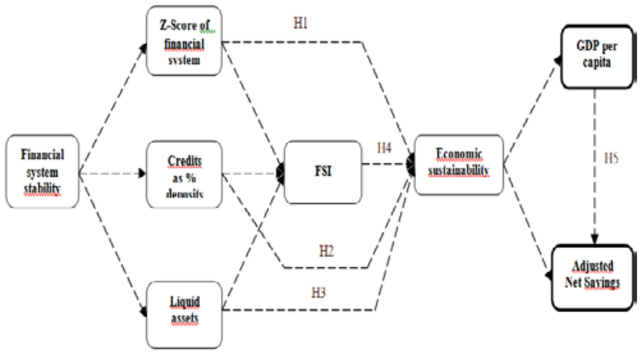

Figure 1. Analytical Framework of the Study. Source: Author

3. Methodological Framework

3.1. Choice of Model Variables

3.1.1. Endogenous Variables

Two variables are used: one as a traditional measure of economic sustainability, the growth rate of Gross Domestic Product per capita (GDP per capita); and the other as a modern and robust measure of economic sustainability, the Adjusted Net Savings Rate (ANSR).

Adjusted Net Savings Rate (ANSR): a measure of economic sustainability

The ANSR was designed in the 1990s by the World Bank to measure a country's sustainable development trajectory [18]. It is now accepted as a robust indicator of economic sustainability [19]. The ANSR accurately reflects the level of investment contributing to present and future well-being, i.e., sustainable development [9,20]. According to [21], its relevance stems from its calculation method, which accounts for the development of human capital, measured by public education expenditures, the level of depletion of natural resources, and environmental degradation resulting from air pollution. Considered by the World Bank as the true savings rate through which economies can account for their efforts in terms of economic sustainability, the adjusted net savings rate, in its simplest formulation, is calculated as follows:

ANSR = (NNS – DCP + CCE – ΣNRC – CDCO2) / GNI (1)

Where: ANSR = Adjusted Net Savings Rate, NNS = Net National Savings, DCP = Depreciation of physical capital, CCE = Current education expenditures, NRC = Natural resource depletion, CDCO2 = Carbon dioxide emissions damage, GNI = Gross National Income.

A positive ANSR indicates that the economy is on its sustainable development path, meaning that total wealth created does not decrease but increases as the economy accumulates new assets and improves the efficiency of its human capital. On this path, each generation is expected to leave future generations more wealth than it has utilized to meet its present needs. Conversely, a negative ANSR implies that total wealth is decreasing, indicating a trajectory of unsustainable economic growth.

GDP per capita growth rate: a measure of economic sustainability

The GDP per capita growth rate (GDP/cap gr) has established itself over time as the indicator for measuring well-being and economic sustainability. Unlike the ANSR, it is the most commonly used indicator for measuring economic sustainability [7,9], although it captures this concept only weakly. However, it is, used because it allows for the assessment of economies' ability to ensure economic growth that positively affects the well-being of current and future generations based on the assets they have.

Like [22] and [9], we prefer the Solow model, which is a long-term economic growth model, to the Harrod-Domar growth model to determine the GDP/capita growth rate. The Solow model defines a production function with properties of diminishing returns to scale. To demonstrate that the trajectory of production growth is stable over time, [23] combines flexible factors of production as well as variable proportions of these factors. Furthermore, in the Solow production function, technological progress is integrated and seen as a means of increasing the productivity of production factors. The Cobb-Douglas production function, combining labour (L), capital (K), and natural resources (R), is expressed as follows: $Y = f\left(K, L, R\right)$ (2)

In this equation, Y represents the level of real output, K is the capital employed, L is the labour factor, and R is the natural resources. Thus, real output depends on three factors: capital, labour, and natural resources. These factors grow exogenously at rates designated respectively as v, w, and q. To modify the equation (2) above, we introduce an index (A), assumed to grow at the rate g, which captures the impact of unobservable residual variables, including technological progress, on real output. Thus, considering this index, the new production equation is: $Y_t = A_t K_t^a L_t^b R_t^c$ (3)

Where, $= A_0 e^{gt}$; $K_t = e^{vt} K_t$; $L_t = e^{wt} L_t$; $R_t = e^{qt} R_t$. *a, b* and *c* represent the elasticities of real production with respect to capital, labour, and natural resources. Regarding the growth rates of the factors of production, it is important to note that when new technology is associated with new capital goods, the growth rate of capital quality is positive (v > 0). Next, a positive labour quality improvement rate (w > 0) suggests positive investment growth in education, health, and nutrition. Finally, the natural resource growth rate can be either positive (q > 0) or negative (q < 0). This rate will be negative when the exploitation of a resource decreases its stock and positive when it allows for the regeneration of the existing stock.

In a closed economy, macroeconomic equilibrium is achieved when savings equal investment (S = I). At this equilibrium level, we assume the labour force will grow at rate t and natural resource depletion at rate z. We also assume that non-renewable resource stocks decrease as they are exploited and renewable resources when not exploited beyond their regeneration capacity can be sustainably preserved. Based on these assumptions, the growth rate of productivity is:

$$\frac{dy}{y} = \theta + \alpha.\left[\frac{sy - nk}{k}\right] - \left(1 - \alpha - \beta\right).t - \gamma z \quad (4)$$

In equation 4, $\theta = g + \alpha v + \beta w + \gamma q$ represents the overall growth rate of factors, $y = \frac{Y}{L}$ is the output per unit of labour, $k = \frac{K}{L}$ is the ratio of employed capital per unit of labour, corresponding to the domestic savings rate. Additionally, based on equation 4, long-term economic growth (economic sustainability) can be understood as the sum of labour productivity growth and the labour force participation rate, n-p (with p representing population growth). Consequently, expanding the above model leads to the expression of the following equation:

$$\frac{dy*}{y*} = \theta + \alpha.\left(\frac{sy}{k}\right) + \beta n - \gamma u - p \quad (5)$$

Where y* represents output per capita. This equation shows that the economic growth rate is a function of the net savings rate (s), technological progress rate (g), and total factor productivity rate of capital (K), labour (L), and natural resources (R), growing at rates v, w, and q, respectively, as well as labour force growth rate (t). Equation 5 also indicates that long-term economic growth rate is negatively affected by natural resource depletion (z) and population growth rate (p).

3.1.2. Banking Stability and Control Variables

The banking stability and control variables are summarized in Table 1 below:

Table 1. Banking Stability and Control Variables

	Variable	Code	Description/ measure	Sources
Banking stability variables	Z-Score of banking system	Z-Score	Measures the probability of bank default. Generally, higher Z-score values indicate greater solvency of the banking system or financial entity. Thus, the higher the Z-score, the healthier the banking system.	GFD (2022)
	Bank credits	CRED	Represents the financial resources provided to the private sector by the banking system as a percentage of total deposits (current, term, and savings deposits in banks accepting customer deposits)	GFD (2022)
	Liquid assets	LQA	Represents the ratio of the value of liquid assets (easily convertible to cash) to short-term financing plus total deposits	GFD (2022)
Control variable	Renewable Energy	REC	Renewable energy consumption expressed as a percentage of total energy consumption	WDI (2022)
	Trade openness	TO	Represents the actual size of a country's imports and exports, measured by the ratio of total trade (exports and imports) of goods to GDP.	WDI (2022)
	Foreign Direct Investment	FDI	Inflows of foreign direct investment reported as a percentage of GDP. Represents ownership stakes (10% or more of voting shares) in a company operating within an economy other than that of the investor.	WDI (2022)
	Human Capital	HC	Encompasses all public education expenditures aimed at enhancing knowledge, qualifications, skills, and individual characteristics that facilitate socio-economic well-being	WDI (2022)
	Public Debt	DEBT	Measures public debt as a percentage of GDP. This debt includes bilateral and multilateral external debt as well as domestic state debt.	WDI (2022)
	Industrialization	INDUS	Reflects the level of industrial development. Industrialization is measured by the value added (wealth) generated by the industrial sector as a percentage of GDP	WDI (2022)
	Inflation	INFL	Inflation measures the evolution of the Consumer Price Index (CPI) over the years.	WDI (2022)
	Telecommunications Infrastructure	INFRAS	Represents a composite index measuring the density of digital infrastructure, namely the total number of fixed and mobile telephone subscribers per 100 inhabitants	WDI (2022)

Source: Author

3.2. Empirical Model Specification

This study aims to verify the effects of financial stability on economic sustainability in the specific context of Sub-Saharan African countries (Equation 1). Additionally, given that the theoretical and empirical literature posits a link between the two sustainability variables retained in this research, we will examine the nature of this relationship in Sub-Saharan African countries (Equation 2). Following [7,9], the objectives of this study are specified as follows:

$$Y_{it} = \alpha + \gamma Y_{t-1} + \delta X_{it} + \beta Z_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (6)$$

$$Y_{it} = \alpha + \gamma Y_{t-1} + \beta Z_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (7)$$

Where $Y_{i,t}$ represents economic sustainability measured by GDP per capita growth rate (GDP/cap gr) and adjusted net savings rate (ANSR). $Y_{i,t-1}$ is the lagged value of the two economic sustainability variables. $X_{i,t}$ is the matrix of banking stability variables, namely the Z-Score of the banking system, bank credits, and liquid assets. $Z_{i,t}$ is the matrix of control variables, including renewable energy consumption, trade openness, foreign direct investment, human capital, public debt, industrialization, and inflation rate. δ_i captures country-specific effects, and μ_t captures time-specific effects. ε_{it} is the error term.

3.3. Estimation Technique: Generalized Method of Moments (GMM)

In this study, we opt for a panel model to account for country heterogeneity, such as differences in development levels and specific characteristics of their banking systems. Additionally, considering the dynamic nature of the variables, we use the generalized method of moments (GMM) proposed by [24]. According to [25], the GMM method allows, on one hand, to control for unobserved heterogeneity and endogeneity issues and, on the other hand, to address potential simultaneity problems between the variables, correct for time-series correlation errors, and account for the omission of certain variables. However, to obtain consistent parameter estimates, two conditions must be met when using GMM: i) the use of instruments to ensure the validity of the restrictions; ii) the absence of second-order autocorrelation. The Hansen test allows us to verify the first condition, with the null hypothesis being the validity of the restrictions generated by the instruments used. As for the second condition, it is verified using the second order autocorrelation test, where the null hypothesis is the absence of second order autocorrelation. In both conditions, failure to reject the null hypothesis in both conditions indicates the validity and robustness of GMM. Thus, the advantages offered by GMM method support the application of a dynamic GMM model.

3.4. Data

Our analysis focuses on a sample of 28 sub-Saharan African countries. This sample was selected based on the availability of data for the variables of economic sustainability, banking stability, and control for the period from 2010 to 2020. Data for the banking stability variables were extracted from the Global Financial Development (GFD) database of the World Bank, while data for economic sustainability and control variables were obtained from the World Development Indicators (WDI) database.

The descriptive statistics on the model variables are presented in Table 3.

From Table 3 above, the correlations between the variables are not high enough to create a real multicolinearity problem.

From Table 4 above, we observe a positive relationship between the Z- score and the variables of economic sustainability, a negative relationship between asset liquidity and the variables of economic sustainability, a negative relationship between bank credit and economic sustainability, measured by the GDP per capita growth rate, while the relationship with the adjusted net savings rate is rather positive.

4. Results and Discussions

4.1. Effects on Economic Sustainability, Measured by GDP Per Capita (GDPPC)

Table 5 below presents the results of the effects of financial stability on economic sustainability measured by the GDP per capita growth rate.

Table 2. Countries in the Study Sample

Angola, Burundi, Benin, Burkina Faso, Botswana, Côte d'Ivoire, Cameroon, Democratic Republic of the Congo, Cape Verde, Ethiopia, Gabon, Ghana, Guinea, Kenya, Lesotho, Djibouti, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Togo, Uganda, South Africa, Zambia, Zimbabwe

Source: Author

Table 3. Descriptive Statistics

	Variable	Obs	Mean	Std. Dev	Min	Max
(1)	GDPPC	308	3.1860	0.4288	2.3361	4.2266
(2)	ANSR	308	1.1647	0.4871	-1.2718	1.7123
(3)	ZSCORE	308	1.1354	0.1853	0.5875	1.4505
(4)	CRED	308	1.8405	0.1420	1.2639	2.7517
(5)	LQA	308	1.5059	0.1947	1.0707	1.9262
(6)	REC	308	1.6897	0.3920	-0.1487	1.9869
(7)	TO	308	1.7061	0.2055	1.1820	2.4205
(8)	FDI	308	0.3780	0.5678	-2.6786	1.7502
(9)	INFRAS	308	1.8607	0.2255	0.8853	2.2684
(10)	DEBT	308	1.5507	0.3053	0.3491	2.6266
(11)	INDUS	308	1.3676	0.16802	0.9747	1.7844
(12)	HC	308	0.5967	0.1750	0.1628	1.0134
(13)	INFL	308	0.5585	0.4807	-0.8821	2.7460

Source: Author

Table 4. Correlation Matrix

Var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	1.00												
(2)	0.16	1.00											
(3)	0.23	0.04	1.00										
(4)	-0.02	0.02	0.08	1.00									
(5)	-0.04	-0.06	0.06	-0.56	1.00								
(6)	-0.73	-0.05	-0.35	0.08	-0.09	1.00							
(7)	0.42	-0.04	0.11	-0.25	0.22	-0.49	1.00						
(8)	0.11	0.21	-0.04	-0.08	0.14	-0.17	0.24	1.00					
(9)	0.68	-0.05	0.24	0.24	-0.25	-0.49	0.26	0.06	1.00				
(10)	-0.02	-0.02	-0.13	-0.02	0.14	-0.02	0.18	0.19	0.03	1.00			
(11)	0.17	0.01	-0.25	-0.02	0.03	0.16	0.16	-0.03	0.19	-0.07	1.00		
(12)	0.21	-0.04	-0.02	0.08	-0.23	-0.22	0.28	-0.05	0.21	0.09	-0.16	1.00	
(13)	-0.13	0.02	-0.02	-0.16	0.18	0.13	-0.07	-0.04	-0.24	0.05	0.13	-0.07	1.00

Table 5. Banking Stability and economic sustainability, measured by GDPPC

	1	2	3	4	5	6
GDPPC (-1)	0.687***	0.588***	0.698***	0.560***	0.711***	0.564***
	(18.47)	(13.68)	(18.86)	(11.80)	(19.12)	(11.34)
Z-SCORE	0.248***	0.080**				
	(5.25)	(2.20)				
CRED			0.106***	0.063**		
			(7.06)	(2.48)		
LQA					-0.018***	-0.002
					(-6.73)	(-0.11)
REC		-0.361***		-0.412***		-0.406***
		(-5.61)		(-7.95)		(-6.12)
TO		0.054*		0.062**		0.061**

	1	2	3	4	5	6
		(1.91)		(2.22)		(2.21)
FDI		-0.011***		-0.013***		-0.014***
		(-4.27)		(-3.85)		(-3.50)
INFRAS		0.017		0.013		0.026
		(0.65)		(0.44)		(1.23)
DEBT		-0.152***		-0.156***		-0.160***
		(-9.04)		(-7.49)		(-8.27)
INDUS		0.229***		0.246***		0.253***
		(4.93)		(4.93)		(3.47)
HC		-0.058**		-0.084***		-0.073***
		(-2.10)		(-3.31)		(-3.03
INFL		0.006		0.004		0.002
		(1.58)		(0.93)		(0.89)
Constant	0.725***	1.659***	0.769***	1.794***	0.953***	1.867***
	(5.96)	(7.40)	(5.33)	(7.85)	(6.63)	(7.58)
Obs.	280	280	280	280	280	280
Wald test	416.83	588.22	386.80	586.02	383.81	591.32
Sargan test	203.521	184.378	203.521	182.678	206.942	185.994
AR(1)	0.0934	0.0785	0.0872	0.0808	0.0900	0.0842
AR(2)	0.3642	0.3310	0.2469	0.2551	0.2878	0.3199
Significance levels: *** p<0.01, ** p<0.05, * p<0.1						

Source: Author

The results from our estimations are generally interesting regarding the effect of financial stability on economic sustainability, measured by the GDP per capita growth rate. Concerning our three variables of interest, the results first indicate that the Z-Score of the banking system positively and significantly influences economic sustainability at the 1% level (Model 1) and the 5% level (Model 2). Next, they present a positive and significant coefficient for bank credit on economic sustainability at the 1% significance level (Models 3 and 4). Finally, they indicate a negative and significant effect of liquid assets on economic sustainability at the 1% significance level (Models 1 and 2).

In terms of implications, this suggests that an increase in the Z-Score, indicative of a solvent banking sector, is necessary for advancing sub-Saharan African countries along a long-term growth path. This result aligns with that of [9], whose study reveals a positive and significant effect of the Z-Score on the economic sustainability of developing economies. At the same time, bank credit serves as an important driver of economic sustainability due to its positive impact on the GDP per capita growth rate. The banking sector, through its traditional role in financial intermediation, constitutes a significant leverage point for countries to progress toward sustainable growth. Moreover, an overly liquid banking sector can hinder efforts toward economic sustainability. While a liquid banking sector indicates a stable banking system, excessive liquidity may lead to weaknesses in credit allocation, which could negatively affect GDP per capita and slow or even reverse the evolution of economies toward a stable and sustainable growth path.

The results obtained are also interesting concerning the relationship between economic sustainability and the control variables retained in this research. From the examination of the results, we observe a negative and significant effect of renewable energy consumption (REC) on GDP per capita growth at the 1% level (Models 2, 4, and 6). Access to a clean energy source does not necessarily improve the well-being of current and future generations because the effect of renewable energy consumption on economic sustainability depends, on one hand, on the type of renewable energy consumed and, on the other hand, on the usage threshold. [26] find that the effect of renewable energy consumption on long-term growth is positive if countries utilize renewable energy above a certain threshold, while below a certain threshold, the effect is likely negative. For this reason, in sub-Saharan African countries, the significantly low share of renewable energy in total energy consumption seems to justify the observed negative effect. A significant increase in renewable energy production and consumption capacities would help reach the required usage threshold that contributes to economic sustainability.

Regarding Foreign Direct Investment (FDI), the results indicate that it negatively and significantly affects the evolution of GDP per capita at a 1% threshold (Models 2, 4, and 6). Although FDI can be beneficial for host countries, its capacity to positively influence economic growth indeed depends on several factors, including the quality of institutions and the level of education in the country. Thus, the observed weaknesses in institutional quality and educational levels in sub-Saharan African countries may explain the negative effect of FDI on long-term economic growth. This result, however, contradicts that of [27], who view FDI as a pillar of economic sustainability. Indeed, the neoclassical theory of FDI suggests that it accelerates the economic growth of any country by mobilizing capital, increasing labour productivity, and fostering technological advancements conducive to economic sustainability [28]. Our results also present a negative and significant effect of public debt on the GDP per capita growth rate. Recent studies conclude that public debt negatively affects economic sustainability at the 1% level (Models 2, 4, and 6). In fact, in their study, [29] illustrate the negative effect of public debt on the sustainability of countries in sub-Saharan West Africa. Although borrowing is an important financing lever for economies at unsustainable levels, it is detrimental to long-term economic growth and represents a significant burden for future generations. The results also indicate a negative and significant relationship between human capital and economic sustainability at the

5% level (Model 2) and at the 1% level (Models 4 and 6). Two reasons may justify this result in the particular context of sub-Saharan African countries. On one hand, the quality of education leaves much to be desired and poses a real problem by limiting the potential of human capital, sustained wealth creation, and the improvement of collective well-being. On the other hand, the types of training offered do not always align with the needs of businesses.

Trade openness positively affects the GDP per capita growth rate at a 10% level (Model 2) and a 5% level (Models 4 and 6). Therefore, greater trade openness for sub-Saharan African countries appears as a driver of economic sustainability. trade openness strategies therefore enhance the well-being of populations. This gain in well-being propels the economy toward its long-term economic growth trajectory. It follows that sufficiently effective structural transformation strategies aimed at reducing dependence on raw material exports are a means to increase the gains associated with trade openness and their positive impact on economic sustainability. In the same vein, [30] argue that accelerating trade liberalization leading to greater trade openness in economies is an excellent engine for accelerating long-term economic growth. The results also present a positive and significant coefficient for industrialization at a 1% level on the evolution of GDP per capita. This positive and significant effect positions industrialization as a factor of economic sustainability through increased industrial production and sustained innovation development. This result aligns with the observation made by [31] that industrialization advances economies toward sustained growth. Thus, in the particular context of sub-Saharan African countries, it is more than necessary to implement "green" structural transformation strategies that allow for the sustainable advancement of economies along their path to economic sustainability.

It is also worth highlighting the positive effect of inflation on the evolution of GDP per capita (Models 2, 4, and 6). Although not significant, recent works, such as [32], highlight the positive and significant relationship of inflation on sustainable growth. Likewise, the results suggest a positive but non-significant relationship between the GDP per capita growth rate and infrastructure (Models 2, 4, and 6). Investments in infrastructure, provided they are well planned and executed, are significant determinants of economic sustainability. Finally, from the examination of the results, it emerges that the existing GDP growth rate positively and significantly affects the creation of new wealth for current and future generations. It follows that current strategies to increase GDP per capita aimed at improving the well-being of present generations are compatible, when sustainable, with progress toward a trajectory of sustainable economic growth.

4.2. Effects on Economic Sustainability, measured by ANSR

These effects are presented in the table below.

Table 6. Banking Stability and Economic Sustainability, measured by ANSR

	1	2	3	4	5	6
ANSR (-1)	0.805*** (14.34)	0.685*** (11.39)	0.780*** (14.46)	0.6523** (11.30)	0.806*** (14.75)	0.676*** (11.48)
Z-SCORE	0.047** (2.43)	-0.072 (-0.86)				
CRED			-0.998*** (-3.23)	-0.636*** (-2.68)		
LQA					0.197*** (18.10)	0.073 (1.19)
REC		-0.356** (-2.32.)		-0.655** (-2.32)		-0.252 (-1.58)
TO		-0.449*** (-3.19)		-0.387*** (-3.00)		-0.183 (-1.07)
FDI		0.160*** (13.73)		0.144*** (9.78)		0.151*** (11.42)
INFRAS		0.246* (1.96)		0.080 (1.36)		0.246** (2.08)
DEBT		-0.181** (-2.15)		-0.135* (-1.66)		-0.195** (-2.44)
INDUS		-0.247* (-1.68)		-0.177* (1.94)		-0.233*** (-3.45)
HC		-0.813*** (-12.67)		-0.594*** (-10.79)		-0.715*** (-12.71)
INF		0.028*** (2.70)		0.035*** (5.21)		0.015* (1.84)
Constant	0.188*** (9.36)	2.383** (4.19)	2.117*** (3.63)	3.957*** (3.61)	-0.053*** (-3.17)	1.547*** (2.74)
Observations	280	280	280	280	280	280
Wald test	217.49	304.89	235.01	314.24	219.17	306.55
Sargan test	101.787	111.464	97.549	110.548	101.842	111.798
AR(1)	0.0338	0.0227	0.0312	0.0256	0.0333	0.0248
AR(2)	0.6458	0.8700	0.6868	0.7810	0.7777	0.8331

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Source: Author

From the results contained in Table 6 above, it emerges that the Z-Score and liquid assets have a positive and significant effect on adjusted net savings, respectively at the 5% significance level (Model 1) and the 1% level (Model 5). At the same time, the same results suggest a positive and significant effect of liquid assets on adjusted net savings. These results reveal that adjusted net savings improve when the banking system is generally stable. This positive effect propels economies toward their sustainable growth trajectory. Thus, the decrease in the probability of default in the banking system associated with an increase in the Z-Score secures and simultaneously improves adjusted net savings for both current and future generations. A perfect mastery of banking risks, including insolvency risk, is necessary to advance sub-Saharan African countries toward a long-term trajectory. This involves, on one hand, strict adherence by banks to capital requirements and, on the other hand, more effective regulation of banking markets and prudential supervision. Similarly, the results show that liquid assets significantly influence the adjusted net savings rate and therefore positively affect economic sustainability. This underscores the importance for the banking system to have a buffer of liquid assets that reduces its exposure to liquidity risk [33], thereby stabilizing the banking system with a positive effect on long-term economic growth.

Conversely, the negative and significant effect of bank credit on adjusted net savings makes this variable a factor that reduces adjusted net savings. Indeed, in their traditional role as financial intermediaries, banks are supposed to allocate credits from available savings. As a result, an increase in bank credit decreases savings. Furthermore, bank credit directed towards financing investments, without a genuine consideration of sustainability requirements, may lead to increased pollution and depletion of natural resources. These combined effects will have an overall negative impact on adjusted net savings. This result aligns with that found by [9], namely that bank credit has a negative effect on economic sustainability in developing countries.

Moreover, we observe that renewable energy consumption presents a positive and significant coefficient (Models 2 and 4) on adjusted net savings. This result seems to indicate that an increase in renewable energy consumption would lead to a decrease in the rate of adjusted net savings. Two reasons may justify this result. On one hand, we can consider that in the context of sub-Saharan African countries, characterized by low savings, investments in renewable energy and its consumption significantly reduce savings. On the other hand, the still insignificant contribution of renewable energy consumption to total energy consumption cannot yet absorb the damage caused to the environment due to high fossil fuel consumption. Similarly, the currently limited sources of renewable energy could justify their negative effect on long-term economic growth.

The results also show that trade openness has a positive and significant coefficient on the rate of adjusted net savings. This implies that greater trade openness in sub-Saharan African countries reduces savings capacity. First, economies based on the export of raw materials, as is the case for sub-Saharan African countries, generate less income capable of supporting savings. Second, because they are predominantly specialized in raw material exports, their intensive exploitation reduces available natural resources, negatively influencing adjusted net savings. Finally, the negative effect on adjusted net savings in these countries stems from their dependence on imports of consumer and investment goods, which not only leads to significant capital outflows but also to population immigration. This suggests the necessity to implement policies that do not hinder trade openness but rather favour a significant and sustained increase in the rate of adjusted net savings to ensure economic sustainability.

Additionally, the results indicate a positive and significant effect of Foreign Direct Investment (FDI) on economic sustainability (Models 2, 4, and 6) at the 1% level. In this regard, FDI appears as a powerful driver of economic sustainability. Their positive effect on the rate of adjusted net savings means that an increase in FDI is necessary to advance sub-Saharan African countries toward their trajectory of economic sustainability. This result does not seem to corroborate that of [34]. They found a negative and significant effect of FDI on economic sustainability, measured by the rate of adjusted net savings, in African countries. This can be explained by differences in the measurement of FDI. It is evident that inflows and outflows of FDI do not have the same effect on economic sustainability, just as FDI in renewable energy will not have the same effect as FDI in non-renewable energy on economic sustainability. Therefore, FDI attraction policies are effective only when they contribute to a significant increase in the rate of adjusted net savings, favourable to economic sustainability.

Infrastructure presents a positive and significant coefficient on adjusted net savings at the 10% significance level for Model 2 and at the 5% level for Model 6. This result suggests that investments in infrastructure advance sub-Saharan African countries toward achieving sustainable development goals in general and toward meeting the requirement of economic sustainability in particular. By stimulating economic growth and employment, infrastructure contributes to increasing the stock of adjusted net savings as they create both "value for people" and "value for the planet." [35] support this result, as they find in their research that new investments in infrastructure improve the quality of economic growth and, consequently, economic sustainability in developing countries. [36] assert that to achieve economic sustainability, infrastructure must play a decisive role.

Regarding industrialization, it presents a negative and significant effect on the rate of adjusted net savings at the 10% significance level (Models 2 and 4) and at the 1% level (Model 6). Although in sub-Saharan African countries, the industrial sector harbours great potential for economic sustainability [37]; its environmental effects explain its inverse relationship with adjusted net savings, which account for air pollution and depletion of natural resources. It follows that the almost inevitable effects of industrialization on environmental sustainability are likely to undermine efforts toward economic sustainability. To avoid this, sub-Saharan African countries must design sustainable industrialization strategies that allow them to stimulate industrial development while minimizing both environmental pollution and the depletion of non-renewable resources, which should contribute to a significant improvement in adjusted net savings, a prerequisite for economic sustainability. As for human capital, it presents a negative and significant coefficient at the 1% level on the adjusted net savings of sub-Saharan African countries. This suggests that an increase in investment in human capital negatively affects adjusted net savings.

Furthermore, our results illustrate the positive and significant effect of inflation on adjusted net savings. It is indeed established that inflation has a negative and significant effect on gross savings and reduces wealth; however, its effect appears positive and significant on adjusted net savings, and by extension, on economic sustainability. Research, such as that of [38], establishes a positive relationship between inflation and environmental quality. Indeed, rising prices create uncertainty and discourage investment and consumption projects, contributing to the reduction of pollution and the exploitation of natural resources. This results in an improvement in adjusted net savings and an effort toward progress for economies on their long-term economic growth trajectory. Moreover, adjusted net savings, accounting for the damage caused by CO2 emissions on the environment, improve the rate of adjusted net savings and contribute to enhancing economic sustainability [39].

Finally, existing adjusted net savings positively and significantly determine future adjusted net savings. Thus, to minimize air pollution and the depletion of natural resources, which are supposed to increase adjusted net savings for both current and future generations, current strategies fit perfectly within the requirement for economic sustainability and sustainable development.

4.3. Effect of GDP Per Capita Growth Rate on Adjusted Net Savings Rate

The Solow growth model (1956) posits a relationship between savings and GDP per capita. Table 7 presents the results of this relationship.

The results in the above table reveal the existence of a significant relationship between GDP per capita growth rate and adjusted net savings rate. This relationship corroborates the Solow growth model's postulate, which emphasizes the role of savings in economic growth. The positive and significant coefficient of GDP per capita growth rate on adjusted net savings suggests that economic growth contributes to increased savings. This result aligns with the theoretical framework, which considers savings as a determining factor in economic growth. In conclusion, the findings of this study highlight the importance of financial stability, renewable energy consumption, trade openness, foreign direct investment, infrastructure, industrialization, human capital, and inflation in influencing adjusted net savings and economic sustainability in Sub-Saharan African countries. The results in the above table show that the GDP per capita growth rate has a positive and significant effect on the adjusted net savings rate at the 1% threshold (models 1 and 2). These results suggest that strategies are necessary to increase GDP per capita in the context of Sub-Saharan African countries, ensuring optimal adjusted net savings that contribute to the well-being of current and future generations. This idea confirms our hypothesis that the GDP per capita growth rate, while improving adjusted net savings, propels countries toward a sustainable growth trajectory. Moreover, the results obtained here suggest that increasing adjusted net savings is an effective means to improve the well-being of current and future generations and, consequently, propel countries toward their sustainable growth path.

Table 7. Relationship between GDP per capita and adjusted net savings

	Dependent Variable: ANSR	
	1	2
ANSR (-1)	0.754*** (13.71)	0.654*** (10.84)
GDPPC	0.512*** (3.26)	0.536* (1.77)
REC		-0.386 (-1.05)
TO		0.152*** (3.75)
FDI		-0.022 (-0.08)
INRAS		-0.051 (-0.32)
DEBT		-0.492 (-1.13)
INDUS		-0.492 (-1.13)
HC		-0.857*** (-3.33)
INFL		0.025 (0.47)
Constant	-1.314*** (-2.73)	0.425 (0.25)
Observations	280	280
Wald test	244.55	320.20
Sargan test	102.600	113.905
AR(1)	0.0353	0.0191
AR(2)	0.7964	0.8189
Significance levels: *** p<0.01, ** p<0.05, * p<0.1		

Source: Author

4.4. Robustness Analysis through Calculating a Financial Stability Index

In this section, we verify the robustness of our baseline model's results through a possible improvement that involves changing the main variable. Financial stability is generally analysed as a comprehensive process. Some research prioritize constructing a composite financial stability index. The equally weighted variance method, the most commonly used due to its simplicity, is the approach retained to generate this index from the three financial stability variables considered in this study: Z-Score, bank credits as a percentage of deposits, and liquid assets. It is calculated as follows:

$$FSI = \sum_{i=1}^{k} \omega_i i \frac{X_i i, t - \overline{X}}{\sigma i_i}$$

Where FSI is the financial stability index, expressed in terms of deviation from the mean; k represents the number of variables composing the index, $\underline{X}$ is the arithmetic mean of the variables, σ_i is the standard deviation, and ωi is the coefficient of each variable.

Having calculated the composite financial stability index for Sub-Saharan African countries, the regression results are contained in Table 8 below.

From the results in Table 4, we observe, on one hand, a positive and significant effect of banking stability on the GDP per capita growth rate at the 1% level (Model 1) and at the 10% level (Model 2). On the other hand, a negative and significant influence of banking stability on the rate of adjusted net savings at the 5% significance level (Model 3) and at the 1% level (Model 4). Four implications can be drawn from these results. The first is that a stable banking system enhances the well-being of populations because it serves as a potential driver for wealth creation for both current and future generations. The second implication is that the stability of the banking system, to some extent, may diverge sub-Saharan African countries from their long-term growth path due to its negative impact on adjusted net savings, which may arise when bank credit finances activities that pollute the environment and significantly deplete natural resources. The third point teaches that the effect of banking stability on economic sustainability depends on how economic sustainability is measured. Finally, the fourth implication indicates that there exists a threshold of banking system stability below and/or above which banking stability could either, advance sub-Saharan African countries toward their trajectory of economic sustainability or rather diverge them from this trajectory. In this regard, policymakers must always improve existing banking stability frameworks and ensure that they align with the requirements of economic sustainability.

Table 8. Relationship between GDP Per Capita and ANSR

	Endogenous Variable: GDPPC		Endogenous Variable: ANSR	
	1	2	3	4
GDPPC (-1)	0.715*** (19.38)	0.595*** (13.85)		
ANSR (-1)			0.7967*** (14.57)	0.653*** (21.72)
FSI	0.239*** (9.31)	0.088* (1.79)	-1.322** (-2.25)	-1.411*** (-4.06)
REC		-0.396*** (-5.76)		-0.709*** (-3.37
TO		0.067** (2.26)		-0.218 (-1,39)
FDI		-0.012*** (-4.03)		0.119*** (7.06)
INFRAS		0.009 (0.33)		0.016 (0.20)
DEBT		-0.153*** (-10.04)		0.017 (0.24)
INDUS		0.214*** (4.61)		-0.077*** (-0.95)
HC		-0.075*** (-3.04)		-0.728*** (-12.48)
INFL		0.002*** (0.61)		0.031** (2.23)
Constant	0.528*** (6.86)	1.669*** (6.58)	2.3734** (2.50)	4.697*** (4.46)
Observations	280	280	280	280
Wald test	384.69	586.53	222.92	310.59
Sargan test	200.644	185.108	100.539	110.458
AR(1)	0.0945	0.0685	0.0333	0.0266
AR(2)	0.2325	0.2934	0.7312	0.7679

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Source: Author

As for the control variables, the results indicate that they retain the same signs and significance as those obtained with individual financial stability variables.

5. Conclusion

Improving the socio-economic well-being of current generations without compromising the ability of future generations to achieve the same ambition is one of the major challenges facing all developed, emerging, and developing countries today. This challenge is even more critical in developing countries, where the legitimate ambition to achieve levels of economic growth that enable them to catch up with their development lag must place economic sustainability at the core of their structural transformation strategies.

Recent literature advances several factors, including financial stability, which can propel countries along a path of economic sustainability. This article aims to enrich current literature by examining the extent to which financial stability explains economic sustainability. To this end, we use cross-sectional data from 28 sub-Saharan African countries for the period from 2010 to 2020. Economic sustainability has been measured using two variables: a traditional measure of economic sustainability, the per capita economic growth rate, and a modern and robust measure of economic sustainability variable, the adjusted net savings rate. Additionally, we worked with three indicators of financial stability from the World Bank's Global Financial Development (GFD), namely the Z-Score of the banking system, bank credits as a percentage of deposits, and liquid assets relative to deposits and short-term financing.

Empirical analyses of the effect of financial stability on economic sustainability based on the generalized method of moments, which allows us to account for endogeneity, fixed time effects, and country effects, suggest overall interesting results. When economic sustainability is measured by GDP per capita growth rate, the results indicate that the Z-Score and bank credits propel Sub-Saharan African economies toward their sustainable growth path, while liquid assets appear to have the opposite effect. The results therefore confirm hypothesis 1 and hypothesis 2 and refute hypothesis 3. In contrast, when measuring economic sustainability by adjusted net savings rate, the results attest that the Z-Score and liquid assets are determinants of Sub-Saharan African countries' progress toward their long-term economic growth trajectory, whereas bank credits have an inverse effect. At this level, the results confirm hypothesis 1 and hypothesis 3 while they refute hypothesis 2. The results are equally interesting with the financial stability index, whose effect is positive on economic sustainability measured by GDP per capita growth rate and negative on economic sustainability measured by adjusted net savings rate. This confirms our hypothesis 4 when economic sustainability is measured by the growth rate of GDP per capita and invalidates it when it is measured by the adjusted net savings rate Furthermore, these results also indicate a positive and significant relationship between adjusted net savings rate and GDP per capita growth rate, the two sustainability variables. Therefore, our hypothesis 5 is confirmed.

Thus, the effect of financial stability on economic sustainability depends on how both financial stability and economic sustainability are measured. The negative influence of certain financial stability variables on economic sustainability highlights the existence of a threshold above or below which banking stability can hinder progress toward economic sustainability. Determining this threshold should crystallize future research on economic sustainability and modulate policies regulating and supervising banking and financial markets. Likewise, it would also be beneficial for future research to examine the extent to which financial stability could similarly explain the social and environmental dimensions of sustainable development in sub-Saharan African countries.

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