



# FINTECH AND FINANCIAL STABILITY IN SUB-SAHARAN AFRICA

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**Abstract:** The aim of this paper is to investigate the effects of fintech's on the financial stability of banks in Sub-Saharan Africa (SSA). To do so, we used data from the Global Financial Development Database (GFDD) and World Government Indicators (WGI) covering a panel of 28 countries over the period 2014-2021. The results of the estimation using the panel standard error correction (PSEC) method, combined with a robustness test using Ordinary Least Squares (OLS), revealed that financial innovations have no negative effects on financial stability (as measured by the banking Z-score) in SSA. Better still, the rapid development of fintech's is helping to strengthen the financial stability of banks in SSA. In addition, our results revealed that economic growth, political stability and bank concentration improve financial stability in SSA. However, our results show that the inflation rate negatively influences financial stability in SSA. In any case, commercial banks would benefit from taking financial innovations into account in their development process, by offering financial products and services that are accessible to all, via digital channels. Moreover, policymakers must constantly assess the adequacy of their regulatory frameworks in the context of the development and growing adoption of fintech's.

**Keywords:** fintech's, financial stability, PCSE, Sub-Saharan Africa (SSA)

**JEL codes:** C23, E44, G23

## 1. INTRODUCTION

In developing countries, financial innovation (fintech) has become an essential pillar in the pursuit of financial inclusion policies. These financial innovations

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have rapidly revolutionized the financial landscape with a global boom in financial products and services and actors using innovative techniques to improve their productivity (Cevik, 2023; Kamal et al., 2022; Bofondi and Gobbi, 2017). As a subsidiary of finance, the advent of fintech's has profoundly altered consumer expectations and preferences. All of which has fostered an increase in the number of users eager for fast, easily accessible services via cell phones and other electronic devices (Vučinić, 2020). By contributing to financial inclusion through faster, transparent, efficient and broader access to financial services, the development of these fintech's raises the underlying issue of their compatibility with the objective of financial system stability. In particular, it is useful to know whether financial innovations do not hinder the stability of the conventional banking system.

On theoretical level, one body of literature (Kamal et al., 2022) argues that financial innovations boost the stability of the financial system. However, some analysts (Vučinić, 2020; Boot and Marinć, 2012) believe that financial innovations offer opportunities and benefits to market players and customers, but also carry risks for financial stability at micro and macro levels. To Moosa (2022), fintech's' implications for financial stability and inclusion are important for assessing the associated costs and benefits, as well as for determining to what extent and in what way the fintech industry should be regulated.

In Sub-Saharan Africa (SSA), especially in the West African Economic and Monetary Union (WAEMU) countries, financial inclusion performance is partly linked to the development of e-money services (Tou and Diarra, 2024). Indeed, the proportion of the region's adult population having made or received payments by digital means has risen from 28% in 2014 to 50% in 2021, an increase of 22 percentage points over the period. Moreover, the share of the adult population using a mobile phone to make payments through an account opened with a financial institution reached 38% in 2021.

These statistics reveal the extent to which innovative financial tools are becoming part of the habits of the region's economic agents. However, the growing use of fintech's is raising questions about the stability of the traditional banking system. In other words, it seems legitimate to question the effects of fintech's on financial stability in SSA.

In the empirical literature, some works have found that fintech's improve financial stability by positively affecting the banking score index (Koranteng

and You, 2024; Safiullah and Paramati, 2022; Daud et al., 2022). Whereas, Cevik (2023) argues that financial innovations could harm financial stability. However, in SSA, few works to our knowledge have focused on the effects of financial innovations on financial stability.

By focusing on the development of financial innovations in Sub-Saharan Africa, this study aims to assess the effect of these financial innovations on the financial stability of banking institutions in this region. Its contribution to the empirical literature is twofold. Firstly, it fills the gap in the literature on the effects of fintech's on financial stability. Secondly, it allows us to assess the effect of mobile payments and digital payments on financial stability in SSA. By examining the effects of fintech's on financial stability, banking institutions in the region will be able to better understand the influence of the rapid development of financial innovation, in order to reposition themselves, while ensuring that financial stability is maintained.

The remainder of this paper is structured around the following sections. The first section reviews the literature on the relationship between fintech's and financial stability. The second presents the methodological approach and data sources. Section 3 presents the results and discussions. The final section concludes with some policy implications.

## **2. LITERATURE REVIEW**

The issue of whether fintech's destabilize financial markets or enhance their stability has attracted the attention of researchers. Indeed, in the economic literature, some studies have looked at the effects of financial innovations on financial stability. To this end, one part of the literature maintains that financial innovations have a positive influence on financial stability. Other studies conclude that financial innovations could have a negative impact on financial stability.

From a theoretical perspective, Kamal et al, (2022; 2021) argue that banking sectors use financial technology and financial stability practices to achieve their financial stability objectives and gain competitive advantages. So, for them, financial technology has increased the financial stability of the global banking sector. Boot and Marinč (2012), for their part, believe that financial innovations can be beneficial for banks when they complement markets. However, they can be a source of instability when they aim to increase

tradability and tie banks inextricably to financial markets. In the same vein, Boot and Marinč (2012) and Vučinić (2020) point out that fintech offers opportunities and benefits to market players and customers, but it also entails risks that need to be properly assessed and managed. The Financial Stability Board (FSB, 2017) argues that through the diversity of its operations and business models, fintech promotes the diversification and decentralization of financial products and services, which mitigates financial shocks resulting from the failure of a financial institution.

Aware of the urgency for regulators to react appropriately and in a timely manner, so as to address the new risks that recent financial innovations could have on financial stability, Dabrowski (2017) argues, for his part, that financial innovation will not seriously affect the process of implementing monetary policy, nor is it likely to undermine the effectiveness of monetary policy. For his view, financial innovation is unlikely to compromise central banks' ability to fulfill their price stability mission.

Empirically, Koranteng and You (2024) examine the impact of Fintech on financial stability in a group of 25 countries over the period 2013-2020. Their results reveal firstly that there is a positive spatial dependence of financial stability between countries. Secondly, they find that fintech's improve financial stability both nationally and in neighboring countries. However, the positive influence seems stronger in countries where the volume of fintech financing is lower.

Osoro and Kiplangat (2023) examine, at the same time, the effect of Fintech credit on bank stability using an unbalanced data panel of 37 commercial banks in Kenya between 2013 and 2020. Their results from fixed and random effects estimations, as well as a robustness test using the generalized method of moments (GMM), lead to the conclusion that Fintech credit is not a source of fragility for the Kenyan banking sector. On the contrary, the empirical results reveal that FinTech credit is associated with greater bank stability insofar as credit intermediated by FinTech is associated with a higher bank Z-score and therefore greater stability.

Using panel sample of banks across 84 countries, Fung et al (2020) examine the heterogeneous effect of fintech's on the fragility of financial institutions. They find that a shock to financial innovations has no net effect on the fragility of financial institutions when market characteristics are ignored. Furthermore, they argue that the promotion of fintech's reduces the fragility

of financial institutions in emerging financial markets, but increases their fragility in developed financial markets. Finally, they find that fintech's affect the fragility of financial institutions through the profitability channel.

Daud et al (2022) investigate the effect of fintech's on financial sector stability for a sample of 63 countries covering the period 2006-2017. Their results from GMM indicate that fintech's are positively and significantly correlated with financial stability. In light of their findings, they suggest that financial institutions should embrace fintech's and lead the way in evolving and creating a fintech-friendly ecosystem. At the same time, Safiullah and Paramati (2022) assess the impact of FinTech firms on the stability of the banking system in Malaysia. Estimation of data from a sample of 26 banks over the period 2003-2018 by ordinary least squares (POLs) and GMM reveals that the development of fintech firms over time improves the financial stability of banks. The study also found that the impact of fintech firms on banks' financial stability holds when controlling for bank size, type of bank (Islamic versus conventional) and level of corporate governance.

However, other studies have argued that the presence and continued expansion of financial innovations could exacerbate the risk of instability in the financial system. Thus, in an empirical approach, Nguyen and Dang (2022) investigate the effect of financial technology (FinTech) development on financial stability in Vietnam. Analysis of data from 37 Vietnamese commercial banks for the period 2010-2020 reveals that FinTech development has negatively affected financial stability, and that market discipline can mitigate this effect. For them, this negative impact of fintech's on financial stability and the role of market discipline in mitigating this effect are stronger when banks are state-owned and weaker when banks are foreign-owned.

Next, Cevik (2023) follows fintech development (excluding cryptocurrencies) and empirically assesses its effect on financial stability in a panel of 198 countries over the period 2012-2020. The results reveal that the degree of impact and statistical significance of fintech's depend on the type of instrument (digital loan or consumer loan). In addition, the overall effect of all fintech instruments turns out to be negative due to the overwhelming share of digital loans in the total, albeit statistically insignificant. However, the results show that raising digital capital appears to have a positive effect on financial stability in advanced economies, while its effect is negative in developing countries.

In summary, a major finding of the literature dealing exclusively with the effects of financial innovation on financial stability is the absence of work in the SSA region. This study fills this gap by assessing the effects of financial innovation on the financial stability of banks in SSA.

### 3. METHODS AND DATA SOURCES

#### 3.1. Model Specification

This paper seeks to examine the influence of financial innovations on financial stability in Sub-Saharan Africa (SSA). To do so, we use on a panel dataset covering the 48 countries over the period 2014-2021. Based on the reviewed literature and recent empirical studies (Nguyen and Dang, 2022; Safiullah and Paramati, 2022; Cevik, 2023; Fung et al., 2020; Daud et al., 2022), it emerges that inflation rate; political stability, banking concentration, economic growth rate and trade openness are the main control variables likely to affect financial stability. For the purposes of this study, financial stability (FS) is measured by the banking z-score index at national level. The relationship between financial stability and the control variables mentioned above and the variables measuring financial innovation is expressed by equation 1 below:

$$FS_{it} = f(Fintech_{it}, Political\_stab_{it}, Inflation_{it}, Bank\_Cons_{it}, gdp\_growth_{it}) \quad (1)$$

Where FS denotes financial stability. The latter is measured by the banking z-score at national level. The banking z-score provides an explicit measure of the solvency risk of the banking system on a continuous basis (Cevik, 2023). This indicator measures the probability of default of a country's banking system<sup>1</sup>. The banking Z-score is calculated as follows:

$$Z - score_{it} = \frac{ROA_{it} + (Equity_{it} / Assets_{it})}{\delta ROA_{it}} \quad (2)$$

With  $ROA_{it}$ ;  $Equity_{it}/Assets_{it}$  et  $\delta ROA_{it}$  which represent, respectively, the return on assets, the capital/assets ratio and the standard deviation of the return on assets in country i and at time t. Thus, the higher the z-score value, the higher the level of financial stability.

Fintech reflects the vector of financial innovation (fintech) variables composed of variables measuring mobile payment (*mobile\_payment*) and

digital payment (*digital\_payment*). Based on empirical literature, the expected sign of financial innovation variables can be either positive or negative

$$Fintech = \begin{pmatrix} digital\_payment \\ mobile\_payment \end{pmatrix} \tag{3}$$

*Political\_stab*: the degree of political stability, whose expected sign is positive. Indeed, a stable political environment and/or absence of violence favors the strengthening of economic dynamics and consequently the stability of the financial system; *Inflation* : the inflation rate whose expected sign is negative; *Bank\_Cons*: banking concentration whose expected sign is positive; *gdp\_growth*: the economic growth rate whose expected sign is positive; *openness*: trade openness whose expected sign is positive.

To analyze empirically the effect of fintech on financial stability in Sub-Saharan Africa, we use panel standard error correction (PSEC) methods. The choice of this model is explained by the fact that, when calculating standard errors and variance-covariance estimates, PSEC assumes that by default, disturbances are heteroskedastic and contemporaneously correlated between panels.

The general equation translating the effect of financial innovation on financial stability is formulated as follows:

$$Y_{it} = \beta_0 + \beta_1 Fintech_{it} + \theta_i X_{it} + \varepsilon_{it} \tag{4}$$

Where  $Y_{it}$  denotes the endogenous variable ( $FS_{it}$ ),  $X_{it}$  the set of control variables affecting banks' financial stability, namely: political stability; inflation rate; economic growth rate and trade openness;  $\beta_0$  the coefficients,  $\beta_i$  the set of parameters and  $\varepsilon_{it}$  the error term. The particular modeling concerns only the  $\varepsilon_{it}$  hazard specification.

The basic form is simply written:

$$\varepsilon_{it} = u_i + v_t + w_{it}$$

Where  $u_i$  denotes a term, constant over time, depending only on individual  $i$ ,  $v_t$  a term depending only on period  $t$ , and  $w_{it}$  a random cross term.

Specifically, we have the following econometric formulation:

$$FS_{it} = \beta_0 + \beta_1 Fintech_{it} + \beta_2 Political\_stab_{it} + \beta_3 Inflation_{it} + \beta_4 Bank\_Conc_{it} + \beta_5 gdp\_growth_{it} + \varepsilon_{it} \tag{4}$$

Where  $\varepsilon$  : the error term;  $i$  and  $t$  denote country and year, respectively.

Subsequently, the robustness of our results is tested using Ordinary Least Squares (OLS) method.

### 3.2. Data Source

The data used in this study come from the World Bank database (global financial Development database (GFDD), World Government Indicators (WGI)). These data are annual data collected on 28 Sub-Saharan African countries, and cover the period 2014, 2017 and 2021. Table 1 presents the notation, definition and source of each variable.

**Table 1: Notation, Description and Source of Variables**

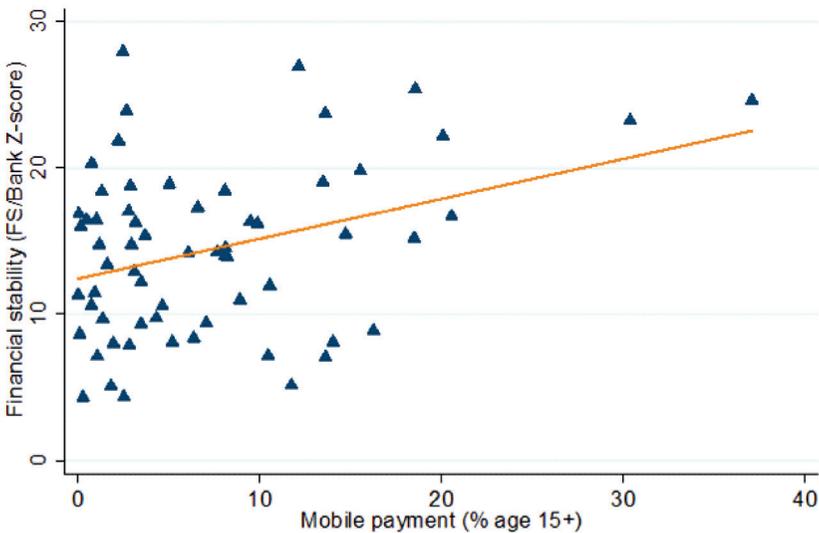
<i>Variable notation</i>	<i>Description of variables</i>	<i>Source of variables</i>
<i>FS</i>	It captures the probability of default of a country's commercial banking system. Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns.	World Bank/ Global Financial Development Database (GFDD)
<i>Digital_Payment</i>	The percentage of respondents who used electronic payments in the past 12 months to make payments on bills or to buy things using money from their accounts (% age 15+).	GFDD
<i>Mobile_Payment</i>	The percentage of population who report using a mobile phone to pay bills in the past 12 months (% age 15+).	GFDD
<i>Bank_Conc</i>	Assets of three largest commercial banks as a share of total commercial banking assets.	GFDD
<i>Political_stab</i>	Political Stability and Absence of Violence/Terrorism measures the perception of the likelihood of political instability and/or politically motivated violence, including terrorism. The percentile rank indicates the rank of the country among all countries covered by the aggregate indicator, with 0 corresponding to the lowest rank (high instability risk) and 100 to the highest rank (low instability risk).	World Government Indicators (WGI)
<i>gdp_growth</i>	Annual growth rate as a percentage of GDP at market prices based on constant local currency.	World Development Indicators (WDI)
<b><i>Inflation</i></b>	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.	WDI

Source: author

## 4. RESULTS AND DISCUSSION

### 4.1. Analysis of the Relationship between Financial Innovation and Financial Stability in SSA over the Period 2011-2021

In order to obtain a preliminary analysis of the relationship between financial innovation and financial stability in SSA over the period 2014-2021, we construct scatter plots. A linear prediction line allows us to perceive the general trend in the association between the financial innovation variable and the banking Z-score (measure of financial stability). Graph 1 shows the relationship between the share of people (% age 15+) which made a utility payment, using a mobile phone (mobile\_payments) and financial stability. Graph 2 illustrates the link between payments made by digital instruments and financial stability. Analysis of the graph 1 reveals a positive relationship between mobile payments and financial stability. This positive relationship means that high use of mobile payments by SSA populations strengthens the stability of the banking system in SSA. In any case, mobile payments appear to be an opportunity rather than a threat for commercial banks operating in SSA.

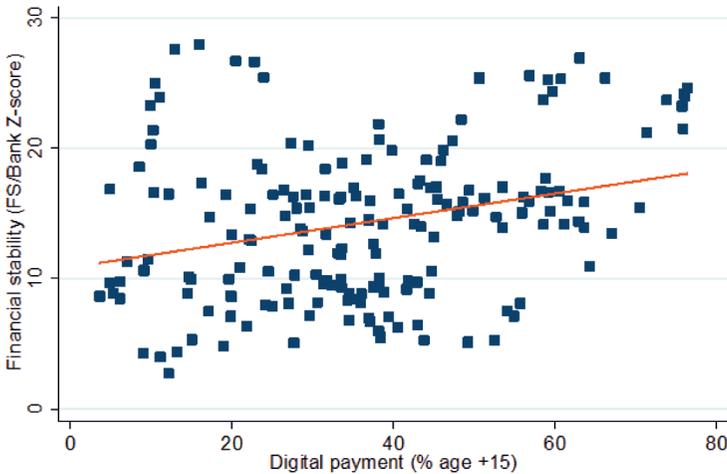


**Graph 1 : Relationship between mobile payments and financial stability**

Source: author

The graph 2 bellow illustrates the link between payments made by digital instruments and financial stability. Its analysis reveals a positive relationship

between the digital payments and financial stability. This positive relationship means that high use of digital payments by SSA populations strengthens the stability of the banking system in SSA. Therefore, fintech's appear to be an opportunity rather than a threat for commercial banks operating in SSA.



**Graph 2 : Relationship between Digital Payments and Financial Stability**

*Source:* author

## **4.2. Econometric Results on the Effects of Financial Innovation on Financial Stability**

The results of our estimations using panel standard error correction (PSEC) method are presented in Table 5 below. Firstly, it illustrates the results of the effects of mobile payments on financial stability (measured by the banking Z-score) in Sub-Saharan Africa (SSA). Secondly, it gives the results of the effects of digital payments on financial stability in SSA. The results of the Wald diagnostic test rejected the null hypothesis that the overall models are not significant. This implies that our models are relevant for explaining the economic phenomenon. Furthermore, the results show that more than 89% of the variations in the banking Z-score (a measure of financial stability) are explained by the model's explanatory variables. In addition, each model takes into account three macroeconomic variables. Models 1 and 3 take into account the inflation rate, economic growth, bank concentration and political stability. Models 2 and 4 use the inflation rate, economic growth, bank concentration

and trade openness, given the strong correlation observed between the political stability variable and trade openness.

The results of these models reveal that financial innovations (mobile payments and digital payments) have a positive and significant impact on financial stability in Sub-Saharan Africa. An increase in the number of mobile payments of 1 point in each of the models (1 and 2) improves financial stability (increase in the banking Z-score) by 0.369 and 0.426 points respectively. Also, an increase in the number of digital payments of 1 point in each of the models (3 and 4) improves financial stability (increase in the bank Z-score) by 0.147 and 0.151 points respectively. This stipulates that increasing the number of users of mobile or digital payment services has no negative effect on the financial stability of banks in Sub-Saharan Africa. These results can be explained by the fact that fintech operators have strong cooperative relationships with commercial banks in sub-Saharan Africa. Therefore, commercial banks in the Sub-Saharan region could take advantage of the advent of fintech's to strengthen their financial stability, on the condition that they adapt themselves to them. In addition, the development of fintech's could facilitate the financial inclusion of unbanked economic agents. Anything that could ultimately improve the effectiveness of monetary policy in the region.

This result is consistent with the findings of some recent empirical studies (Koranteng and You, 2024; Safiullah and Paramati, 2022; Daud et al. (2022), but contrary to that obtained by Nguyen and Dang (2022). These findings indicate a relatively well-disciplined banking sector in Sub-Saharan Africa.

Furthermore, the results show that an increase of the inflation rate negatively affects the stability of the banking system in SSA. This result states that an increase in the general price level can lead to instability in the financial system. A high inflation rate in a country can led to capital flight and hence instability of the country's financial system. Therefore, any policy that maintains price stability could improve financial stability in SSA. This result is similar to that obtained by Koranteng and You (2024) and Cevik (2023).

As for bank concentration, the results show a positive effect on financial stability in SSA. This result stipulates that an increase in the share of assets of the three largest commercial banks in the total assets of commercial banks promotes the stability of the banking system in SSA. Furthermore, our results show that economic growth rates positively affect financial stability in SSA. Thus, a sustainable increase of national income supports financial system stability in

SSA. This result confirms that obtained by Koranteng and You (2024) and Cevik (2023). Furthermore, the results also show that political stability has a positive impact on financial stability in SSA. This means that a decrease in the risk of political instability and/or politically motivated violence, including terrorism, promotes financial stability in SSA. This result is consistent with that obtained by Cevik (2023). Finally, our results show that trade openness positively affects financial stability in SSA. This result stipulates that, taking into account the role of the financial system in various international transactions, an increase of trade in sub-Saharan African countries could improve the stability of financial system in the region.

Overall, financial innovation does not appear to be a threat to financial stability in SSA. This means that commercial banks in the region have been able to readjust their market interventions in order to respond better to the pressure exerted by these new competitors (fintech's companies), which could compromise their business model.

**Table 2: Effect of Fintech on Financial Stability in SSA: PCSE Estimations**

VARIABLES	Financial stability (FS)	
	(1)	(2)
<i>mobile_payment</i>	<b>0.379***</b>	
	(0.0895)	
<i>digital_payment</i>		0.153***
		(0.0323)
<i>Political_stab</i>	<b>0.0608*</b>	<b>0.0169</b>
	(0.0320)	(0.0329)
<i>Inflation</i>	<b>-0.103*</b>	<b>-0.101*</b>
	(0.0563)	(0.0539)
<i>gdp_growth</i>	<b>0.659***</b>	<b>0.602**</b>
	(0.252)	(0.245)
<i>Bank_Conc</i>	<b>0.112***</b>	<b>0.103***</b>
	(0.0268)	(0.0256)
Wald chi2(4)	433.29	483.04
Prob > chi2	0.0000	0.0000
Observations	56	58
R-squared	0.886	0.893
Number of country	24	24

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: author

Next, we test the robustness of our results by changing the estimation method. In fact, we replace PCSE method by Ordinary least squares (OLS) method. The results reported in Table 6 confirm the previous results. Indeed, an improvement in the degree of financial innovation measured by 'mobile and digital payments' promotes financial stability. Thus, the increase in the number of users of mobile and/or digital payment services does not compromise financial stability in SSA. Better yet, fintech's' development can lead to a strengthening of financial stability in SSA. This means that commercial banks in SSA have been able to react appropriately to the pressure exerted by these new competitors. In any case, the development of financial innovations appears to be a source of healthy competition on the market and a good way of strengthening financial inclusion and financial stability in SSA.

**Table 3: Effects of Fintech on Financial Stability in SSA: OLS Estimations**

VARIABLES	(3)	(4)
	FS	FS
<i>mobile_payment</i>	0.379***	
	(0.0803)	
<i>mobile_payment</i>		0.153***
		(0.0380)
<i>digital_payment</i>	0.0608*	0.0169
	(0.0353)	(0.0350)
<i>Inflation</i>	-0.103**	-0.101**
	(0.0403)	(0.0498)
<i>gdp_growth</i>	0.659***	0.602***
	(0.252)	(0.224)
<i>Bank_Conc</i>	0.112***	0.103***
	(0.0270)	(0.0254)
F (5, 53)	93.14	99.86
Prob > chi2	0.0000	0.0000
Observations	56	58
R-squared	0.886	0.893
Number of country	24	24

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: author

## 5. CONCLUSION AND POLICY IMPLICATIONS

This paper investigated the effects of financial innovation on financial stability in Sub-Saharan Africa (SSA). To this end, we first estimated our data using the panel standard error correction (PSEC) methods, then robustness tested using ordinary least squares (OLS) method.

The results of our estimations revealed that financial innovations as a whole positively affect the banking Z-score (proxy for financial stability) in SSA. In this context, the promotion of financial innovations could be an essential instrument for strengthening financial stability in SSA. This result confirms the findings of a number of recent studies (Koranteng and You, 2024; Safiullah and Paramati, 2022; Daud et al., 2022). Thus, the advent of fintech's appears to be an opportunity rather than a threat for the banking system in the Sub-Saharan region because it does not undermine its stability. Furthermore, our results reveal that bank concentration, economic growth rate, political stability and trade openness positively affect the banking Z-score (thus improving financial stability) in SSA. However, our results show that the inflation rate negatively influences financial stability in SSA. Thus, any increase in the general price level could lead to capital flight from the region. This could lead to instability in the banking system in SSA.

Finally, this study shows that financial innovations do not have a negative influence on the financial stability of banks in SSA. These financial innovations appear to be vectors of healthy competition on the market, while leading commercial banks to improve their services for unbanked customers. In any event, in their development process, commercial banks must take account of financial innovations by offering financial products and services that are accessible to all, via mobile telephony and digital technology. Public authorities, for their part, must constantly assess the adequacy of their regulatory frameworks in the context of the development and growing adoption of fintech's. This will enable the benefits of fintech's to be exploited, while mitigating the potential risks to the financial stability of banks in SSA.

### *Note*

1. See: <https://databank.worldbank.org/metadataglossary/global-financial-development/series/GFDD.SI.01>

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