Effects of Financial Inclusion of Small and medium Sized Enterprises on Financial Stability: Evidence from SSA countries

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Abstract

We examine the impact of financial inclusion of Sub-Saharan Africa (SSA) small and medium-sized enterprises (SMEs) on financial stability. Results show that financial inclusion of SMEs negatively affects stability in SSA countries, and the negative link is even stronger as levels of financial stability increase across countries. Our findings are consistent with the theory of excessive credit expansion or extreme financial inclusion theory, suggesting that to safely promote SME financial inclusion and foster financial sector stability, efforts should be directed toward improving banking sector risk mitigation efforts, financial sector supervision and strengthening coordination among regional financial sector regulators.

Keywords:

Sub-Saharan Africa; Financial Inclusion; Financial Stability; Small and Medium sized Enterprises, Fixed Effect Model; Quantile Regression

JEL Classification: G0, G2, G21, G28

1.1 INTRODUCTION

Since the early 2000s, the idea of financial inclusion has attracted a lot of attention due to empirical research suggesting that higher levels of financial inclusion—that is, more financial services available to low-income households and small and medium-sized businesses (SMEs)—have a positive impact on the objective of reducing poverty in a nation (Shiimi, 2010). As a result, as part of their broader plans for economic and financial growth, developing economies—including those in Sub-Saharan Africa (SSA)—have actively worked to advance financial inclusion. Higher levels of financial inclusion are typically the result of low-income households and SMEs having simpler and more inexpensive access to and use of financial services and products. This helps to reduce poverty, create jobs, and increase an economy's general resilience to shocks and economic cycles. In this sense, greater financial inclusion supports SMEs' significant contributions as catalysts for both social and economic stability (Shinozaki 2012; Demirgüç-Kunt et al., 2013; Nega & Hussein, 2016). Nevertheless, a crucial lesson from the 2007–2009 global financial crisis (GFC) was that heightened levels of financial inclusion could also hamper financial stability (Creel *et al.* 2015). Therefore, it has become increasingly important for macroeconomic stability for policy makers to limit systemic financial risk and preserve financial stability. In this sense, the idea of financial stability has also become a focus of policy makers and scholars around the world.

While there is evidence that links financial stability to a country's ability to develop sustainably, there is also evidence that suggests financial instability can seriously impede the process of developing countries' ability to grow—indeed, it can even have an impact on the growth of developed economies (Creel et al., 2015). Considering these nuances, governments, central banks, and regulators worldwide have adopted policies and taken the initiative in recent years to encourage financial inclusion in their nations while carefully weighing the impact on financial stability (Caruana, 2012). The question of whether the trend toward increased financial inclusion tends to promote or worsen financial stability has drawn more attention. Despite this, there is a dearth of empirical studies addressing and demonstrating the connection between the two ideas, particularly in the SSA region's less developed economies and in relation to how SMEs' financial inclusion influences

financial stability. This is partially because country specific information on general financial inclusion and on financial inclusion of SMEs in particular is scarce (Morgan and Pontines, 2018). Motivated by this challenge, the primary objective of this study is to investigate the impact of financial inclusion of SMEs on financial stability in the SSA region. For the purposes of our study, financial stability is used interchangeably with bank level stability. This is because banks are relatively the most important supplier of financial products and services in the SSA region (Anarfo et al., 2022; Abor & Adjasi, 2022; Beck & Cull, 2014). To support our study, we use country specific data collected from the World Bank Global Financial Development Database (GFDD), International Monetary Fund (IMF) Financial Access Survey (FAS) and World Bank Development Indicators (WDI), for the years 2005 – 2019 on which we applied a fixed effects model with Driscoll and Kraay (1998) standard errors to control for cross-sectional dependence in our panels. We further investigate the financial inclusion–stability nexus using a fixed effect panel quantile regression model to investigate whether financial inclusion of SMEs affects financial stability differently when levels of financial stability fluctuate in the SSA countries in our study.

The focus on the interconnectedness between financial stability and financial inclusion of SMEs in SSA is important because although SMEs have the potential to foster macroeconomic growth, development, and stability, compared to other regions, the SSA region has lagged in offering SMEs the financial services and products they require (Oshora *et al.,* 2021). This is true even though governments in the region have widely undertaken steps to increase financial inclusion, such as the introduction and execution of National Financial Inclusion Strategies (NFISs) that target the unbaked (i.e., low-income households and SMEs) (Alliance for Financial Inclusion - AFI, 2023). Due to financial exclusion, many SMEs in the SSA region are unable to reach their full potential. For example, there are 44 million micro, small, and medium-sized businesses in SSA alone. These companies require access to funding to expand, add jobs, and boost the economy. However, 51 percent of them need more money than they currently have access to. For instance, just a third to a fifth of SMEs have a bank loan or line of credit in the SSA region (Runde *et al.,* 2021; World Bank, 2014). In the SSA region, SMEs face

significant challenges due to credit constraints - 28.3 percent of businesses are thought to be completely credit constrained (Runde *et al.,* 2021). This makes the SSA region an interesting financial inclusion case study.

There is a shortage of empirical studies investigating the link between SMEs access to and use of finance and financial stability, especially in the context of SSA. The few studies that analyse this relationship are either single country cases focused on developed economies or multiple country cases focusing on advanced and emerging economies (see Morgan and Pontines, 2018; Brei *et al.,* 2020). Notwithstanding how scant the research conducted in this area is, previous studies generally offer two conflicting views. On one hand, there is evidence to support a unidirectional positive correlation between financial stability and financial inclusion (Okpara 2011; Prasad 2010; Cull *et al.* 2012). Authors contend that in line with the institutional theory (Meyer & Rowan, 1977; DiMaggio & Powell, 1983), financial inclusion initiatives foster resource efficiency and financial intermediation, which in turn enhances financial stability provided that a nation establishes enhanced financial infrastructure and competent supervision. These efforts also give a large portion of the population, including the underprivileged, better access to and uses of banking services (Okpara 2011; Prasad 2010; Cull *et al.* 2012). On the other hand, some researchers found that more financial inclusion undermines financial stability, particularly when economic agents are given access to the formal financial sector and all its products and services regardless of their level of income or risk tolerance – a concept referred to as *extreme or excessive financial inclusion* or financial over-inclusion (Morawetz, 1908; Amatus and Alireza, 2015; Naceur *et al.,* 2019; Ozili, 2021). The disagreement in the empirical research about the impact of increased financial inclusion on financial stability —that is, whether it has a positive or negative effect makes it difficult for policymakers to decide how to effectively advance financial inclusion while preserving financial stability. In this regard, it is necessary to conduct research to determine the relationship between financial stability and inclusion, particularly in the SSA region where studies under this theme are scarce.

This study contributes to literature in three ways. First, despite the well documented benefits of SMEs on economic growth and poverty reduction (Annemalla & Kasturi, 2023; Shinozaki 2012; Demirgüç-Kunt et al., 2013; Nega & Hussein, 2016), research on the impact of financial inclusion of SMEs on financial stability, especially in the SSA region is still limited. We fill this gap by empirically assessing the impact of financial inclusion of SMEs on financial inclusion in SSA. In this regard, we offer evidence-based conclusions to support existing studies focused on the SSA region (See; Jungo *et al.,* 2022; Amatus and Alireza, 2015).

Second, we add to recent studies on the financial inclusion and stability nexus (see Matsebula and Sheefeni, 2022; Anthony-Orji et al., 2019; Al-Smadi, 2018; Neaime and Gaysset, 2018; Jungo et al., 2022; Jima and Makoni, 2023) by looking into whether, when financial stability levels in the SSA countries change, financial inclusion of SMEs has a varied impact on financial stability in the region. This allows us to provide a nuanced account of the implications of financial inclusion of SMEs on financial stability in each case and give policymakers a prism through which to more effectively craft focused policy initiatives meant to safely promote SMEs' financial inclusion in the SSA region.

Third, in contrast to preceding empirical studies (see Amatus & Alireza, 2015; Naceur *et al.,*2019) we cater for the possibility of cross-sectional dependence between the study's countries. In the increasingly globalized financial and economic environment, policy actions in one country can have a substantial effect on several other countries. This is especially true in the SSA region. Cross-sectional dependence between SSA countries is suggested by political agreements that support regional financial integration and market development, as they may have spillover effects such as capital account opening and cross-border financial institution liberalization (De Hoyos & Sarafidis 2006; Dogan *et al.,* 2017; Latif *et al.,* 2018; Lovegrove *et al.,* 2007; Bhatia *et al.,* 2009; Frey & Volz, 2013). To control for possible cross-sectional dependence among the panels in our study, we use a fixed effect panel regression model with Driscoll and Kraay (1998) standard errors as our baseline model. The model is robust to very general forms of

cross-sectional ("spatial") and temporal dependence as well as heteroskedasticity and autocorrelation (Hoechle, 2007; Mehmood & Mustafa, 2014). Consequently, policymakers will be able to avoid the less-than-ideal policy designs that would otherwise result from empirical research and subsequent studies that neglected to account for cross-sectional dependence.

Our findings reveal a negative relationship between financial inclusion of SMEs and financial stability in the context of SSA countries, and the negative link is even stronger as levels of financial stability increase across countries. Our findings are in line with the extreme financial inclusion or financial over-inclusion theory (Morawetz, 1908). The research findings indicate that further efforts are required to advance the financial inclusion of SMEs safely and securely in the SSA region. The financial system can be made more stable, especially if efforts are made to enhance risk mitigation in the banking sector, enhance financial sector supervision, and improve cooperation amongst regional financial sector authorities.

The remainder of this paper is organized as follows. Section 2 gives a brief review of the theoretical and empirical literature. Section 3 presents the methodology and offers the data sources. Section 4 discusses the empirical results. The last section deals with concluding remarks and offers policy recommendations.

2. LITERATURE REVIEW

2.1.1 Theoretical Literature

Although financial inclusion and financial stability have gained significant interest among policy makers, there is no one standard definition of financial stability or financial inclusion. Broadly, financial inclusion ensures equal access to basic financial products and services for individuals and businesses, including transactions, payments, savings, credit, and insurance, in a safe, responsible, and sustainable manner (World Bank, 2018). In general, a stable financial system is one that doesn't hinder an economy's performance and can eliminate both internal and external financial imbalances caused by large adverse and unforeseen events (Schinasi, 2004).

Scholars have suggested both positive and negative impacts of increasing SME financial inclusion on financial stability. For instance, consistent with the institutional theory (Meyer & Rowan, 1977; DiMaggio & Powell, 1983), financial inclusion of SMEs can encourage more efficient resources mobilization and financial intermediation, which enhances financial stability, so long as a nation improves its financial infrastructure while also strengthening the effectiveness of its financial sector supervision and regulatory frameworks. In this way, by increasing lending to smaller firms can diversify bank assets, reducing the riskiness of a bank's loan portfolio, thereby reducing the inter-connectedness risks of the financial system (Khan, 2011). Adasme *et al.* (2006) found that small firms' non-performing loans have quasi-normal loss distributions, reducing the risk of large and infrequent losses. This simplifies lending processes for this class, indicating that the systemic risk of small firms is less than that of large firms, thus positively affecting financial stability. Hannig and Jansen (2010) suggest that low-income groups are resilient to economic cycles, making their inclusion in the financial sector beneficial for financial stability. They note that financial institutions that serve economic agents at the low-income spectrum can weather macro-crises and sustain local economic activity. Prasad (2010) highlights that inadequate credit access for SMEs negatively impacts employment growth, potentially adversely affecting macroeconomic and financial stability. Financially excluded SMEs usually use cash for most transactions and make decisions regardless of the monetary policies of the central bank. In addition to facilitating their integration into the formal economy, financial inclusion improves the efficiency of the monetary policy transmission mechanism (Prasad, 2010; Adasme *et al.*, 2006)

Conversely, consistent with the theory of extreme credit extension (Morawetz, 1908) increased financial inclusion of SMEs can have a negative impact on banking sector stability when access to the formal financial sector and its various products and services is granted to economic agents irrespective of their income level and degree of riskiness (i.e., extreme financial inclusion or financial over-inclusion) (Cull, *et al.,* 2012; Ahamed & Mallick, 2019; Frączek, 2019; Ozili, 2021). For instance, if an attempt to expand the pool of borrowers results in a reduction in lending standards, this could contribute to a similar

crisis as the 2007-2010 “sub-prime” crisis in the United States, that led to the 2007-2009 global financial crisis. Similarly, if banks outsource various functions such as credit assessment to reach smaller borrowers, this could increase their reputational risk and adversely impact financial stability (Khan, 2011; Cull, *et al.,* 2012; Ahamed & Mallick, 2019; Frączek, 2019; Danisman &Tarazi, 2020; Feghali *et al.,* 2021).

The conceptual framework of our study incorporates insights from the review of theoretical literature regarding the relationship between financial stability and financial inclusion. It also incorporates empirical research by Čihák et al., (2016, 2021), Wang and Luo (2022), Le *et al.,* (2019), Hakimi *et al.,* (2022), and Koudalo and Toure (2023). The excessive financial inclusion theory (Morawetz, 1908) is the basis we use to identify channels through which the negative effects of financial inclusion on financial stability are communicated. It implies that the promotion of financial services to economic agents irrespective of their income or risk tolerance may jeopardize financial stability (Morawetz, 1908; Hakimi *et al.,* 2022; Le *et al.,* 2019; Čihák *et al.,* 2016; Koudalo & Toure, 2023). Risks associated with growing financial inclusion, especially for low-income economic agents, include heightened transaction and information costs because of information asymmetry and incomplete credit and collateral histories. This can jeopardize the stability of the financial system. For this reason, maintaining financial stability requires strong governance as well as adequate financial regulation and supervision (Hakimi *et al.,* 2022; Le *et al.,* 2019; Wang & Luo, 2022).

We use the institutional theory to determine the channels through which financial inclusion's positive effects on financial stability are disseminated (Meyer & Rowan, 1977; DiMaggio & Powell, 1983). It makes the argument that greater financial stability can result from enhanced financial system regulation and oversight, which can be achieved by more access to and use of financial products and services (Čihák *et al.,* 2016; Koudalo & Toure, 2023; Meyer & Rowan, 1977; DiMaggio & Powell, 1983; Wang & Luo, 2022). Through financial inclusion, banks may increase savings, retail deposits, and the transmission of monetary policy in addition to diversifying loan portfolios and lowering nonperforming loan

levels. In economies with high levels of institutional quality, this effect is particularly noticeable (Hakimi *et al.,* 2022; Le *et al.,* 2019; Wang & Luo, 2022).

2.1.2 Empirical Literature

Empirical studies on the relationship between financial inclusion and financial stability have mostly concentrated on the banking sector stability and how it is influenced by increased access and use of financial services and products. Studies of these nature with a particular focus on the impact of financial inclusion of SMEs on financial stability have been limited. An overview of some of these empirical studies is provided in Appendix A1. The studies generally cover developed and developing countries and regions, including SSA. Most of the studies use single proxies for financial inclusion and financial stability, respectively. The most used proxy for financial stability is the bank's distance to default – or the bank z-score, while financial inclusion is either proxied by an indicator of usage or access to financial services and products. Macroeconomic indicators such as gross domestic product (GDP), inflation (CPI), domestic private sector credit, and the exchange rate to name a few are usually used as control variables. The studies reflect conflicting evidence of both positive and negative impacts of financial inclusion on financial stability.

In a study of the impact of financial inclusion over monetary policy in several Sub-Saharan Africa (SSA) and Latin America and Caribbean (LAC) countries, Jungo *et al.,* (2021) discover that in SSA and LAC, by extending its impact to a greater segment of the population, financial inclusion increases the effectiveness and efficiency of monetary policy in containing inflation. In line with the institutional theory (Meyer & Rowan, 1977; DiMaggio & Powell, 1983), Hakimi *et al.,* (2022) discovered that increased financial inclusion results in greater bank stability in the Middle East and North Africa (MENA) region by providing banks with increased liquidity, and that a stable macroeconomic environment could foster greater financial stability. Similarly, Neaime and Gaysset (2018) assess the impact of financial inclusion on income inequality, financial stability, and poverty in MENA countries. They discover that financial inclusion decreases income inequality but has no effect on poverty. However, financial inclusion is found to have a positive impact on financial stability.

Naceur et al., (2019) investigate whether increased financial inclusion has positive effects on financial stability across almost 100 advanced, emerging, and low-income countries. They discover that although increases in financial access and depth have destabilizing effects in advanced economies, efficiency reduced the likelihood of banking crisis episodes in these counties. For low income and emerging economies, they found that financial access has positive effects on stability while depth and efficiency do not. Amatus and Alireza (2015) explore the relationship between financial inclusion and financial stability in SSA countries. According to the study, the presence of outstanding deposits with commercial banks has a detrimental effect on financial stability, suggesting that bank deposit accounts in SSA banks are not well diversified.

From the discussion of the empirical literature, three gaps are discernible. First, the use of proxies for measuring financial inclusion and stability are not consistent throughout the studies. Second, the degree of regional representation is sparse and SSA countries are least represented. Third, the analytical methods although useful do not address the likelihood of cross-sectional dependence in panels. Our study aims to fill these gaps.

3. METHODOLOGY AND DATA

3.1.1 General Functional Form

To empirically test the theoretical connection between financial inclusion of SMEs and financial stability in SSA, the general form of our model, presented in Equation 1 is informed by the review of literature and the study's conceptual framework that is enshrined in theory. Equation 1 is also consistent with the benchmark models used by Greene (2001), Brei *et al.,* (2020), Morgan and Pontines (2018), Siddik *et al.,* (2018) as well as Amatus and Alireza (2015).

$$FINSTAB_{i,t} = \beta SME\_INCL_{i,t}, + \gamma X_{i,t} + \Omega_{i,t} + \vartheta_{i,t} + \varepsilon_{i,t} \quad (1)$$

where the panel of countries and the study's time dimension are represented by $i = 1, \dots, N$ *and* $t = 1, \dots, T,$ respectively. FINSTAB is financial stability, the study dependent

variable which is proxied by bank credit to bank deposits (%), bank z-scores, liquid assets to deposits & short-term funding (%), and a composite indicator of financial stability (the method of principal component analysis – PCA), respectively. The bank Z-scores measure banks' distance from insolvency. They are calculated as the sum of the return on assets and the capital asset ratio divided by the standard deviation of the return on assets (Demirgüç-Kunt and Huizinga, 2010; Laeven and Levine, 2009; Brei *et al.,* 2020; Morgan and Pontines, 2018).

SME_INCL is our main independent variable of interest. It represents the financial inclusion of SMEs. It is proxied using two measures. First, deposit accounts with commercial banks: of which SME deposit accounts. Second, depositors with commercial banks: of which SME depositors.

The proxies of financial inclusion of SMEs used in this study are like those used by Brei *et al.,* (2020) and Morgan and Pontines (2018), and they are in line with theoretical underpinnings of previous studies that investigated the relationship between bank performance, credit growth and bank riskiness (see Borio and Lowe, 2002; Fahlenbrach, *et al,* 2018; Köhler, 2012). X is a vector of parsimonious control variables that have a potential effect on financial stability (Brei *et al.,* 2020; Morgan & Pontines, 2018; Siddik *et al.,* 2018; Amatus, & Alireza, 2015). They include the logarithm of GDP per capita (which is used as a proxy for economic development), the ratio of private sector credit by deposit money banks and other financial institutions to GDP (which is used to proxy financial sector development), and inflation, as used in the study by Phan *et al.,* (2021). In the model, β and γ are coefficients of the model. The time and country fixed effects are captured with $\Omega_{i,t}\ and\ \vartheta_{i,t}$, respectively. They control for unobserved time-invariant variation in banking system stability across countries. ε is the error term.

3.1.2 The Fixed Effect Model with Driscoll and Kraay Standard Errors

Equation 1 can be estimated using methods like GMM, fixed effects, and random effects, but these techniques overlook heterogeneity and cross-sectional dependency between groups. Policy decisions in one country can significantly influence multiple nations in

globalized financial and economic sectors, especially in the SSA region (De Hoyos and Sarafidis 2006; Dogan *et al.,* 2017; Latif *et al.,* 2018). For example, political agreements in the SSA region promoting regional financial integration and financial market development may result in spillover effects like capital account opening and cross-border financial institution liberalization. (Lovegrove *et al.,* 2007; Bhatia et al., 2009; Frey and Volz, 2013). This suggests that there may be cross-sectional dependence between the SSA countries in our study. To control for possible cross-sectional dependence among the panels in our study, we estimate Equation 1 using a fixed effects model with Driscoll and Kraay (1998) standard errors as our baseline model. Driscoll-Kraay standard errors are robust to cross-sectional and temporal dependence. The technique is nonparametric and does not plan restrictions on the limiting behavior of the number of panels. In this regard, the cross-sectional dimension in finite samples does not affect feasibility, even if the number of panels is significantly larger than T (Driscoll and Kraay, 1998; Mehmood & Mustafa, 2014).

To estimate the fixed effects model with Driscoll-Kraay standard errors, our study makes use of the "xtscc" command in STATA 17. Under this command, a two-step method is used to apply the fixed effects model with Driscoll-Kraay standard errors (Hoechle, 2007; Mehmood & Mustafa, 2014). First the STATA command "xtreg" is used to within transform all model variables $z_{i,t} \in \{ y_{i,t}, x_{i,t}\}$ as follows:

$\tilde{z}_{it} = z_{it} - \bar{z_\iota} + \bar{\bar{z}}$ where $\sum_{t=t_i}^{T_i} z_{it}$ and $\bar{\bar{z}} = (\sum T_i)^{-1} \sum_i \sum_t z_{it}$

Recognizes that the within-estimator corresponds to the OLS estimator of

$$\tilde{y}_{it} = \tilde{x}'_{it}\theta + \tilde{\varepsilon}_{it} \quad (2)$$

The second step estimates equation 2 using pooled OLS estimation with Driscoll-Kraay standard errors. Another key advantage of the STATA implementation of the approach is that it works for both, balanced and unbalanced panels, respectively. And is capable of handling missing values (Hoechle, 2007).

3.1.3 Data Sources and Variables

This study uses panel data from 11 SSA countries from 2005 – 2019[1]. The number of countries that comprise the study sample are chosen based on those with the most comprehensive data availability. We use country specific data collected from the World Bank Global Financial Development Database (GFDD), International Monetary Fund (IMF) Financial Access Survey (FAS) and World Bank Development Indicators (WDI). The choice of study variables was informed by the literature and by the availability of data. The description of variables and their respective sources are presented on Appendix A3.

Four proxies of financial stability are included in the study, namely the ratio of bank credit to bank deposits (in percent), bank Z-scores, the ratio of liquid assets to deposits and short-term funding (in percent), as well as a composite indicator of financial stability calculated using the method of principal component analysis (PCA). Similar proxies of financial stability have been used in previous studies (see Pal & Bandyopadhyay, 2022; Jungo *et al.,* 2022; Hakimi *et al.,* 2022; Abdulkarim & Ali, 2019; Saha & Dutta, 2021; Matsebula & Sheefeni, 2022; Siddik *et al.,* 2018; Operana, 2016). Two proxies of financial inclusion of SMEs are included in the study, namely SME deposit accounts with commercial banks and SME depositors with commercial banks, respectively. The same proxies of financial inclusion of SMEs were used in previous studies (see Amatus & Alireza, 2015).

The descriptive statistics of the variables are presented in Appendix A4. Each series' average values are represented by its mean, and its degree of variability, or how far it deviates from the mean, is captured by its standard deviation. For every series, the minimum and maximum denote the lowest and highest values, respectively (Livingston, 2004). The composite measure of financial stability has a mean value of zero and a standard deviation that is approximately equal to one. In this regard, the composite

[1] Countries in the sample are presented in Appendix A2.

indicator follows a Gaussian or standard normal distribution, according to these data properties (Livingston, 2004). Further, we note that on average, the bank credit to bank deposits ratio is 64.9 percent in SSA and the ratio of liquid assets to deposits and short-term funding is around 41.9 percent, respectively. As can be observed from the comparatively large standard divisions of private sector credit by deposit money banks as a ratio of GDP and levels of inflation, respectively, the descriptive statistics also demonstrate the presence of heterogeneity in the panels. The standard deviations of the bank credit to deposit ratio, the liquid asset to deposit ratio, and the short-term financing ratio all support the same conclusion. This supports the application of panel data approaches that account for the heterogeneity of each country.

Three macroeconomic variables, namely, gross domestic product (GDP) per capita, the ratio of private credit by deposit money banks to GDP (in percent) and consumer prices (annual percentage change), respectively are included in the baseline model as part of the control variables. Similar control variables are commonly used in studies related to financial stability (See Pal & Bandyopadhyay, 2022; Jungo *et al.,* 2022; Hakimi *et al.,* 2022; Abdulkarim & Ali, 2019; Saha & Dutta, 2021; Matsebula & Sheefeni, 2022; Siddik *et al.,* 2018; Operana, 2016). In this regard, per capita GDP is a measure of economic progress and is expected to have a positive impact on financial stability. The private credit to GDP ratio gauges the state of the financial system generally and is expected to have a mixed effect on financial stability since high levels may point to a higher susceptibility to instability of the financial system. We anticipate that inflation will have a negative effect on stability as price fluctuations might lead investors to restrict borrowing since they are estimating possible future returns to be adversely affected by high debt service costs (Fouejieu, 2017; Morgan & Pontines, 2018; Amatus & Alireza, 2015; Koudalo & Toure, 2023)

4. EMPIRICAL RESULTS AND ANALYSIS

4.1.1 Testing For Cross-Sectional Dependence

We first test for the presence of cross-sectional dependence (or weak cross-sectional dependence) using two tests, namely, tests by Pesaran (2015, 2021), and the power

enhancement CD test by Fan *et. Al.,* (2015). From Table 2, the cross-sectional dependence exponent is significantly higher than 0.5, and the CD tests reject the null hypothesis of weak cross-sectional dependence for all variables. The evidence suggests that an estimation method that considers cross-sectional dependence is necessary.

Table 2: *Results of Cross-Sectional Dependence Tests*

Variables	CD	CDw+
FINSTAB_1	7.200	127.570
	(0.000)	(0.000)
FINSTAB_2	0.000	0.000
	(1.000)	(1.000)
FINSTAB_3	0.000	0.000
	(1.000)	(1.000)
FINSTAB_PCA	0.000	0.000
	(1.000)	(1.000)
SME_INCL_1	9.880	109.230
	(0.000)	(0.000)
SME_INCL_2	5.150	162.880
	(0.000)	(0.000)
GDPPC	2.520	136.850
	(0.012)	(0.000)
PSC	10.760	140.880
	(0.000)	(0.000)
INF	2.550	58.150
	(0.011)	(0.000)

Source: Authors' composition using xtcd2 commands in STATA 17.
Note: p-values in parenthesis. CD is the cross-sectional dependence test by Pesaran (2015, 2021). CDw+ is the cross-sectional dependence test by with power enhancement by Fan *et. Al.* (2015)

4.1.2 Choice Between Random Effects and Fixed Effects Model

The primary objective of this study is to investigate the impact of financial inclusion of SMEs on financial stability in the SSA region. To facilitate this, we support the choice between a random effects and fixed effects model. Table 3 presents results from the random effects and fixed effects model variants across four panels, respectively. From Table 3, the p-value of the LM test statistic across most of the panels is less than 0.05 (except for panel 4). This indicates the presence of panel (fixed or random) effects in the model variants. Therefore, in most of the cases, the random effects model is preferred over the simple OLS model. The null hypothesis of the Hausman test is that the difference in coefficients is not systematic. From Table 3, the p-value of the test statistic is less than 0.05 in panel 1 and less than 0.1 in panel 4. This indicates that the fixed effects model is more preferred relative to the random effects model. In this regard, subsequent sections

will focus on fixed effects models with $FINSTAB\_1$ and $FINSTAB\_PCA$ as dependent variables.

Table 3: *Random Effects and Fixed Effects Model Post Estimation Results*

Panel 1: **FINSTAB_1 (Dependent Variable)**

	Random Effects Model		**Fixed Effects Model**		**Random Effects Model**		**Fixed Effects Model**	
	Model 1		**Model 1**		**Model 2**		**Model 2**	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	-0.485	0.894	0.391	0.925				
	(3.639)		(1.756)					
SME_INCL_2					-1.873	0.605	-1.444	0.447
					(3.622)		(1.891)	
$GDPPC$	-12.719	0.000	-70.047	0.000	-9.498	0.043	-54.54	0.000
	(3.293)		(10.967)		(4.694)		(12.917)	
PSC	1.650	0.004	2.221	0.000	1.421	0.000	1.851	0.000
	(0.574)		(0.359)		(0.386)		(0.405)	
INF	-0.500	0.001	-0.269	0.161	-0.447	0.015	-0.333	0.077
	(0.193)		(0.191)		(0.184)		(0.186)	
Observation	139		139		121		121	
R-Squared – Overall	0.269		0.021		0.291		0.013	
Overall Significance	Wald chi2(4) = 54.53		F(4,124) = 25.67		Wald chi2(4) = 106.84		F(4,106) = 11.17	
	Prob > chi2 = 0.0000		Prob > F = 0.0000		Prob > chi2 = 0.0000		Prob > F = 0.0000	
Breusch-Pagan Lagrange multiplier (LM)	chibar2(01) = 43.82				chibar2(01) = 60.76			
	Prob > chibar2 = 0.0000				Prob > chibar2 = 0.0000			
Hausman Test: Choice between Fixed or Random Effects			chi2(4) = 37.03				chi2(4) = 20.40	
			Prob > chi2 = 0.0000				Prob > chi2 = 0.0004	

Panel 2: **FINSTAB_2 (Dependent Variable)**

	Random Effects Model		**Fixed Effects Model**		**Random Effects Model**		**Fixed Effects Model**	
	Model 1		**Model 1**		**Model 2**		**Model 2**	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	-0.019	0.555	-0.012	0.548				
	(0.033)		(0.200)					
SME_INCL_2					-0.037	0.304	-0.030	0.197
					(0.363)		(0.023)	
$GDPPC$	-0.124	0.731	-0.199	0.511	-0.105	0.774	-0.128	0.688
	(0.360)		(0.301)		(0365)		(0.317)	
PSC	0.003	0.133	0.002	0.587	0.006	0.087	0.004	0.349
	(0.002)		(0.004)		(0.003)		(0.004)	
INF	-0.002	0.384	-0.002	0.533	-0.002	0.284	-0.002	0.517
	(0.002)		(0.002)		(0.002)		(0.002)	
Observation	87		87		78		78	
R-Squared – Overall	0.127		0.015		0.367		0.226	
Overall Significance	Wald chi2(4) = 7.30		F(4,75) = 0.44		Wald chi2(4) = 100.15		F(4,66) = 0.80	
	Prob > chi2 = 0.121		Prob > F = 0.7828		Prob > chi2 = 0.0000		Prob > F = 0.5321	
Breusch-Pagan Lagrange multiplier (LM)	chibar2(01) = 133.76				chibar2(01) = 43.82			
	Prob > chibar2 = 0.0000				Prob > chibar2 = 0.0000			
Hausman Test: Choice between Fixed or Random Effects			chi2(4) = 3.66				chi2(4) = 2.35	
			Prob > chi2 = 0.4539				Prob > chi2 = 0.6712	

Panel 3: **FINSTAB_3 (Dependent Variable)**

	Random Effects Model	**Fixed Effects Model**	**Random Effects Model**	**Fixed Effects Model**

	Model 1		Model 1		Model 2		Model 2	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	-0.272	0.874	-1.041	0.336				
	(1.717)		(1.074)					
SME_INCL_2					1.574	0.190	1.152	0.315
					(1.199)		(1.138)	
$GDPPC$	-1.344	0.791	15.975	0.324	-1.159	0.778	13.412	0.390
	(5.062)		(16.105)		(4.112)		(15.506)	
PSC	-0.350	0.205	-0.341	0.129	-0.447	0.080	-0.476	0.041
	(0.276)		(0.222)		(0.256)		(0.228)	
INF	0.019	0.857	0.726	0.620	0.052	0.675	0.098	0.499
	(0.108)		(0.146)		(0.123)		(0.145)	
Observation	89		89		80		80	
R-Squared – Overall	0.537		0.178		0.537		0.019	
Overall Significance	Wald chi2(4) = 13.62		F(4,76) = 1.35		Wald chi2(4) = 16.90		F(4,67) = 1.28	
	Prob > chi2 = 0.0086		Prob > F = 0.2593		Prob > chi2 = 0.0020		Prob > F = 0.2883	
Breusch-Pagan Lagrange multiplier (LM)	chibar2(01) = 42.21				chibar2(01) = 41.40			
	Prob > chibar2 = 0.0000				Prob > chibar2 = 0.0000			
Hausman Test: Choice between Fixed or Random Effects			chi2(4) = 2.10				chi2(4) = 2.42	
			Prob > chi2 = 0.7174				Prob > chi2 = 0.6590	

Panel 4: **FINSTAB_PCA (Dependent Variable)**

s	**Random Effects Model**		**Fixed Effects Model**		**Random Effects Model**		**Fixed Effects Model**	
	Model 1		**Model 1**		**Model 2**		**Model 2**	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	-0.133	0.471	-0.094	0.263				
	(0.185)		(0.834)					
SME_INCL_2					-0.247	0.013	-0.258	0.003
					(0.099)		(0.832)	
$GDPPC$	-0.209	0.478	0.256	0.839	-0.223	0.203	0.135	0.905
	(0.296)		(1.252)		(0.176)		(1.134)	
PSC	0.056	0.001	0.418	0.018	0.057	0.000	0.057	0.001
	(0.016)		(0.172)		(0.134)		(0.016)	
INF	-0.014	0.125	-0.006	0.579	-0.019	0.108	-0.010	0.347
	(0.009)		(0.113)		(0.119)		(0.010)	
Observation	87		87		78		78	
R-Squared – Overall	0.692		0.589		0.744		0.706	
Overall Significance	Wald chi2(4) = 73.33		F(4,75) = 2.24		Wald chi2(4) = 50.71		F(4,124) = 4.34	
	Prob > chi2 = 0.0000		Prob > F = 0.0722		Prob > chi2 = 0.0000		Prob > F = 0.0036	
Breusch-Pagan Lagrange multiplier (LM)	chibar2(01) = 0.76				chibar2(01) = 0.00			
	Prob > chibar2 = 0.192				Prob > chibar2 = 0.499			
Hausman Test: Choice between Fixed or Random Effects			chi2(4) = 8.06				chi2(4) = 9.19	
			Prob > chi2 = 0.0894				Prob > chi2 = 0.0565	

Note: Regression results are authors' estimation using xtreg [, re] and xtreg [, fe] commands in STATA 17. Values in parenthesis under coefficients contain robust standard errors. Breusch-Pagan Lagrange multiplier (LM) test conducted using xttest0 command in STATA 17. Hausman test for choice between fixed or random effects models conducted using xtreg and Hausman commands in STATA 17.

4.1.3 Tests for Serial Correlation and Heteroskedasticity in Fixed Effects Regression

Table 4 presents results of the serial correlation and heteroskedasticity tests performed on the estimated fixed effects model variants, across two panels. The study horizon, spanning 15 years, used the Wooldrige test to test for serial correlation, rejecting the null hypothesis of no first-order correlation. The modified Wald test was used to test for heteroskedasticity, rejecting the null hypothesis of homogeneous residuals. The results suggest that future econometric techniques should account for the presence of serial correlation and heteroskedasticity in financial inclusion of SMEs in SSA.

Table 4: Results of Serial Correlation and Heteroskedasticity Tests

Panel 1: **FINSTAB_1 (Dependent Variable)**

	Fixed Effects Model			
	Model 1		**Model 2**	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	0.391	0.925		
	(1.756)			
SME_INCL_2			-1.444	0.447
			(1.891)	
$GDPPC$	-70.047	0.000	-54.54	0.000
	(10.967)		(12.917)	
PSC	2.221	0.000	1.851	0.000
	(0.359)		(0.405)	
INF	-0.269	0.161	-0.333	0.077
	(0.191)		(0.186)	
Observation	139		121	
R-Squared – Overall	0.021		0.013	
Wooldridge Test for Serial Correlation	F(1, 10) = 79.537		F(1, 10) = 29.545	
	Prob > F = 0.0000		Prob > F = 0.0003	
Modified Wald Test for Group Wise Heteroskedasticity	chi2 (11) = 5223.32		chi2 (11) = 8391.34	
	Prob>chi2 = 0.0000		Prob>chi2 = 0.0000	

Panel 2: **FINSTAB_PCA (Dependent Variable)**

	Fixed Effects Model			
	Model 1		**Model 2**	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	-0.094	0.263		
	(0.834)			
SME_INCL_2			-0.258	0.003
			(0.832)	
$GDPPC$	0.256	0.839	0.135	0.905
	(1.252)		(1.134)	
PSC	0.418	0.018	0.057	0.001
	(0.172)		(0.016)	
INF	-0.006	0.579	-0.010	0.347
	(0.113)		(0.010)	
Observation	87		78	
R-Squared – Overall	0.589		0.706	
Wooldridge Test for Serial Correlation	F(1, 6) = 20.713		F(1, 6) = 20.797	
	Prob > F = 0.0039		Prob > F = 0.0038	
Modified Wald Test for Group Wise Heteroskedasticity	chi2 (8) = 1.1e+32		chi2 (8) = 6.1e+31	
	Prob>chi2 = 0.0000		Prob>chi2 = 0.0000	

Note: Wooldridge Test for Serial Correlation results are authors' estimation using xtserial command in STATA 17. Modified Wald Test for Group Wise Heteroskedasticity results are authors' estimation using xttest3 command in STATA 17.

4.1.4 Results of the Baseline Model

This study's main objective is to investigate the impact of financial inclusion of SMEs on financial stability in the SSA region. From Sections 4.1 and 4.3, the statistical tests performed call for the use of a fixed effects model that controls for presence of cross-sectional dependence, serial correlation and heteroskedasticity. In this regard, our study uses the fixed effects model with Driscoll and Kraay standard errors. Table 5 presents the results of the OLS fixed effects model alongside those of the fixed effects model with Driscoll and Kraay standard errors across two panels. Comparing the two versions of fixed effects models, the results show no significant differences between them. That is, the values of the coefficients in both models as well as their signs and levels of significance are broadly similar. For instance, in panel 1 – where the dependent variable is $FINSTAB\_1$ (i.e., bank credit to bank deposits (%)), financial inclusion of SMEs in the case of both proxies used (i.e., SME_INCL_1 and SME_INCL_2) does not have a statistically significant impact on financial stability (i.e., $FINSTAB\_1$). Conversely, in panel 2 – where the dependent variable is $FINSTAB\_PCA$ (i.e., the composite indicator of financial stability), financial inclusion of SMEs as proxied by SME_INCL_2 has a negative and statistically significant impact on financial stability (i.e., $FINSTAB\_PCA$) in the SSA region, at the 5 percent level. That is, a one percent increase in financial inclusion of SMEs, as proxied by SME depositors with commercial banks decreases the composite indicator of financial stability by 0.258 percent, ceteris paribus. This emphasizes the significance of considering financial stability as a holistic idea and being mindful of how financial inclusion of SMEs in the SSA region is measured.

The findings are explained by the excessive financial inclusion theory (Morawetz, 1908) that asserts that the promotion of financial services and products to SMEs irrespective of their income or risk tolerance may jeopardize financial stability (Morawetz, 1908; Hakimi *et al.,* 2022; Le *et al.,* 2019; Čihák *et al.,* 2016; Koudalo & Toure, 2023). Similar findings were obtained by Amatus and Alireza (2015) and Naceur *et al.,* (2019). They argue that the negative sign of outstanding deposits in commercial banks indicates a high probability of bank default, on the back of high risks of bank runs during financial stress. That is, demand-deposit contracts offer banks liquidity but also expose them to panic-based bank

runs (Goldstein and Pauzner, 2005). This is reflective of a low and less diversified depositor base in the SSA region. A similar point is made by Kulu *et al.,* (2022), who argues that theoretically, higher saving deposits should allow banks to generate more credits, which will strengthen their balance sheet and increase their assets and efficiency. The SAA case exhibits a less diversified deposit mix, which implies that the number of outstanding deposits with commercial banks has an inverse relationship with financial stability.

Table 5: *Results of Fixed Effects Model and Fixed Effects Model with Driscoll and Kraay Standard Errors*

Panel 1: **FINSTAB_1 (Dependent Variable)**

	Fixed Effects Model (*Ordinary Least Square, OLS)*				**Fixed Effects Model** *with Driscoll and Kraay Standard Errors*			
	Model 1		**Model 2**		**Model 1**		**Model 2**	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	0.391	0.925			0.391	0.905		
	(1.756)				(3.233)			
SME_INCL_2			-1.444	0.447			-1.443	0.643
			(1.891)				(3.045)	
$GDPPC$	-70.047	0.000	-54.54	0.000	-70.04	0.004	-54.54	0.011
	(10.967)		(12.917)		(20.477)		(18.732)	
PSC	2.221	0.000	1.851	0.000	2.221	0.001	1.852	0.001
	(0.359)		(0.405)		(0.497)		(0.469)	
INF	-0.269	0.161	-0.333	0.077	-0.269	0.248	-0.333	0.168
	(0.191)		(0.186)		(0.223)		(0.229)	
Observation	139		121		139		121	
R-Squared	0.021		0.013		0.453		0.296	
Overall model significance	F(4,124) = 25.67		F(4,106) = 11.17		F(4,14) = 73.81		F(4,14) = 39.05	
	Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.0000	

Panel 2: **FINSTAB_PCA (Dependent Variable)**

	Fixed Effects Model (*Ordinary Least Square, OLS)*				**Fixed Effects Model** *with Driscoll and Kraay Standard Errors*			
	Model 1		**Model 2**		**Model 1**		**Model 2**	
Regressors	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
SME_INCL_1	-0.094	0.263			-0.094	0.506		
	(0.834)				(0.138)			
SME_INCL_2			-0.258	0.003			-0.258	0.02
			(0.832)				(0.098)	
$GDPPC$	0.256	0.839	0.135	0.905	0.256	0.877	0.135	0.928
	(1.252)		(1.134)		(1.629)		(1.148)	
PSC	0.418	0.018	0.057	0.001	0.042	0.114	0.057	0.011
	(0.172)		(0.016)		(0.025)		(0.019)	
INF	-0.006	0.579	-0.010	0.347	-0.006	0.433	-0.01	0.172
	(0.113)		(0.010)		(0.008)		(0.007)	
Observation	87		78		87		78	
R-Squared	0.589		0.706		0.107		0.208	
Overall model significance	F(4,75) = 2.24		F(4,124) = 4.34		F(4,14) = 1.38		F(4,14) = 4.81	
	Prob > F = 0.0722		Prob > F = 0.0036		Prob > F = 0.2907		Prob > F = 0.0118	

Note: Regression results are authors' estimation using xtreg [, fe] and xtscc [, fe] commands in STATA 17. Values in parenthesis are standard errors.

4.1.5 Panel quantile regression model

For the purpose of robustness, our study proposes a fixed effect panel quantile regression model to investigate whether financial inclusion of SMEs affects financial stability differently when levels of financial stability fluctuate in the 11 SSA nations. This allows for the examination of the impact of financial inclusion of SMEs on financial stability in SSA across the conditional distribution, accounting for unobserved individual country variability. The quantile regression method being proposed was developed by Koenker and Bassett (1978). It is a semi-parametric approach which in contrast to linear regression, does not assume the distribution of the errors or call for normally distributed data. This enhances its resistance to anomalies and non-normal errors (Porter, 2014; Petscher & Logan, 2014). The method is also unaffected by monotonic transformations like logarithmic transformations, a feature that linear regression models lack (Koenker, 2005). Depending on whether financial stability is distributed at a low, average, or high level in each country, the impact of the predictor factors, including the financial inclusion of SMEs will vary.

The results of the quantile regression model are presented in four panels in Table 6. The results are broadly in line with those of the fixed effects models presented in Section 4.4. In panel 1 and panel 3, respectively, financial inclusion of SMEs as proxied by SME_INCL_1 has a negative albeit statistically insignificant impact on the proxies of financial stability (i.e., $FINSTAB\_1$ and $FINSTAB\_PCA$) across all quantiles. Conversely, in panel 2, the impact of financial inclusion of SMEs as proxied by SME_INCL_2 has a negative and statistically significant impact on $FINSTAB\_1$ only from the 40th to 90th quantile at an average of -9.019 percent. Similarly, In panel 4, the impact of financial inclusion of SMEs as proxied by SME_INCL_2 has a negative and statistically significant impact on $FINSTAB\_PCA$ only from the 40th to 70th quantile at an average of -0.254 percent. These results indicate that financial inclusion of SMEs as proxied by SME depositors with commercial banks has a negative impact on financial stability in the SSA region. The impact is more pronounced as the level of financial stability as proxied by the ratio of bank credit to bank deposits in the region increases, with some moderation when

the financial stability proxy is bank z-scores. Similar results were obtained by Isayev (2024) who concludes that in line with the excessive financial inclusion theory (Morawetz, 1908), if the promotion of financial services and products to SMEs is done irrespective of their income or risk tolerance, it may raise the risk of extreme events, unanticipated losses to the financial system, and eventually more frequent banking crises (Morgan and Pontines, 2018).

Table 6: *Quantile Regression Results*

FINSTAB_1 (Dependent Variable)									
Panel 1	**10th**	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
Regressors	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**
SME_INCL_1	-1.773	-2.320	-2.672	-3.092	-4.150	-5.117	-5.817	-6.262	-6.957
GDPPC	70.941	62.544	57.141	50.691	34.432	19.587	8.831	1.994	-8.678
PSC	0.656	0.751	0 .812	0.884	1.068*	1.236**	1.357**	1.434*	1.555*
INF	-0.062	-0.066	-0.069	-0.073	-0.082	-0.090	-0.095	-0.099	-0.105
Observation	87	87	87	87	87	87	87	87	87
Panel 2	**10th**	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
Regressors	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**
SME_INCL_2	-2.290	-3.472	-5.261	-6.231*	-7.298**	-8.747**	-9.959**	-10.820**	-11.596**
GDPPC	50.284	43.844	34.097	28.816	23.001	15.109	8.509	3.818	-0.406
PSC	0.988	1.091	1.248**	1.332***	1.426***	1.553***	1.659***	1.734**	1.802**
INF	-0.226	-0.214	-0.197	-0.187	-0.177	-0.163	-0.151	-0.143	-0.135
Observation	78	78	78	78	78	78	78	78	78
FINSTAB_PCA (Dependent Variable)									
Panel 3	**10th**	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
Regressors	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**
SME_INCL_1	-0.074	-0.078	-0.083	-0.087	-0.095	-0.100	-0.107	-0.111	-0.116
GDPPC	4.112	3.301	2.322	1.626	0.141	-0.922	-2.207	-3.028	-3.972
PSC	0.015	0.021	0.027	0.032	0.043	0.050	0.059	0.065	0.071
INF	0.003	0.001	-0.002	-0.003	-0.007	-0.009	-0.012	-0.014	-0.016
Observation	87	87	87	87	87	87	87	87	87
Panel 4	**10th**	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
Regressors	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**	**Quantile**
SME_INCL_2	-0.304	-0.291	-0.280	-0.273*	-0.260**	-0.246**	-0.236*	-0.222	-0.217
GDPPC	4.105	3.016	2.020	1.458	0.341	-0.909	-1.801	-2.965	-3.433
PSC	0.051	0.053	0.054*	0.055**	0.057*	0.059*	0.060***	0.062**	0.063**
INF	-0.003	-0.005	-0.007	-0.008	-0.010	-0.012	-0.014	-0.016	-0.017
Observation	78	78	78	78	78	78	78	78	78

Source: Authors' composition using xtqreg command in STATA 17.

Note: Coefficients (standard errors) are outside (inside) the parentheses. ***, **, and * denote the statistical significance at 1%, 5% and 10%, respectively.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This study investigated the impact of financial inclusion of SMEs on financial stability across 11 countries in the SSA region using country level data from 2005 to 2019. Results from the baseline model, that is, the fixed effects estimation with Driscoll and Kraay standard errors and the fixed effect panel quantile regression model conform with the excessive financial inclusion theory (Morawetz, 1908) and confirm that financial inclusion of SMEs (proxied by SME depositors with commercial banks) negatively impacts financial stability (proxied by bank credit to bank deposits and a composite indicator, respectively) in SSA countries. Specifically, the fixed effect panel quantile regression model shows that financial inclusion of SMEs jeopardizes financial stability as SSA countries attain higher levels of financial stability.

Based on the study's findings, three crucial policy recommendations can be made. First, banks in the SSA region should enhance and diversify their deposit base. This will reduce their idiosyncratic risk, stabilize earnings streams, and improve lending resilience. Second, financial stability assessments that form part of macroprudential policies of financial sector regulators such as central banks should include frameworks for assessing the degree of a bank's vulnerability to panic-based bank runs. This would allow for a better assessment of the financial sector's vulnerabilities especially as financial services and products are extended to the previously underserved households and businesses. Third, financial sector regulators should encourage higher efficiencies in the financial institutions and keep close monitoring of capital adequacy levels to ensure they meet regulatory requirements.

This study was conducted on 11 SSA countries due to the lack of relevant data across a larger number of countries in the region. The unavailable data has limited the scope of our study and thus the overall outcome. Future studies can look to improve on our study findings when relevant data becomes available across a greater number of countries.

Appendix

A1: Empirical Studies on the Impact of Financial Inclusion of SMEs on Financial Stability

Author	Region/Country	Study Period	Method	Impact of Financial Inclusion on Financial Stability
Jungo *et al.,* (2022)	46 SSA and 31 LAC countries	2005 - 2018	FGLS model	(+)
Hakimi *et al.,* (2022)	112 banks from 10 MENA countries	2004 - 2017	System GMM	(+)
Neaime and Gaysset (2018)	8 MENA countries	2002 - 2015	GMM and GLS	(+)
Amatus and Alireza (2015)	35 SSA countries	2004-2011	Dynamic GMM model	(-)
Naceur *et al.,* (2019)	98 countries	1980–2016	Dynamic panel logit model	(-/+)
Operana (2016)	Philippines	2002:4 - 2015:4	Reduced form VAR	(+)

Note: (+); (-) and (+/-) represent positive, negative, and mixed impacts of financial inclusion on financial stability, respectively.

A2: List of 11 sub-Saharan African countries used in this study.

No.	Country
1	Angola
2	Burundi
3	Cameroon
4	Chad
5	Comoros
6	Equatorial Guinea
7	Guinea
8	Madagascar
9	Namibia
10	Republic of Congo
11	South Sudan

A3: *Description of Variables*

Variables	Symbol	Transformation	Data Sources
Bank credit to bank deposits (%)	$FINSTAB\_1$	Percentage	World Bank Global Financial Development Database (GFDD)
Bank Z-scores / distance to default	$FINSTAB\_2$	Natural log	GFDD
Liquid assets to deposits & short-term funding (%)	$FINSTAB\_3$	Percentage	GFDD
Financial stability indicator	$FINSTAB\_PCA$	Natural log	GFDD
SME deposit accounts with commercial banks	SME_INCL_1	Natural log	International Monetary Fund (IMF) Financial Access Survey (FAS)
SME depositors with commercial banks	SME_INCL_2	Natural log	FAS
GDP per capita	$GDPPC$	Natural log	World Bank World Development Indicators (WDI)
Private credit by deposit money banks to GDP (%)	PSC	Percentage	GFDD
Inflation, consumer prices (annual %)	INF	Percentage	WDI

A4: Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
FINSTAB_1	157	64.98605	28.30067	6.708983	154.8505
FINSTAB_2	96	2.605222	0.473431	1.258219	3.423253
FINSTAB_3	98	41.96838	20.3081	9.238362	108.2813
FINSTAB_PCA	94	6.55E-09	1.424411	-4.53459	3.581041
SME_INCL_1	145	9.856198	1.405531	4.60517	13.11011
SME_INCL_2	127	9.763813	1.422074	4.521789	12.35715
GDPPC	158	7.210216	1.038674	5.59893	9.562584
PSC	157	14.25434	14.85393	0.4294444	70.894
INF	161	11.91807	34.71074	-8.97474	379.9996

Source: Authors' compilation in STATA 17

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