



GLOBAL DIGITAL TRADE FINANCING AND CAPACITY UTILIZATION RATIO OF SMEs IN ECOWAS

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Abstract

This study examined the shock impact of global digital trade financing on the capacity utilization ratio of Small and Medium Enterprises (SMEs) in the Economic Community of West African States (ECOWAS) region over the period 2021 to 2024. Employing a dynamic panel data approach using the System Generalized Method of Moments (System GMM) estimator, the study analyzed the relationship between digital trade finance instruments and SME capacity utilization, controlling for firm characteristics, macroeconomic conditions, infrastructure, and institutional quality. The empirical analysis, covering 15 ECOWAS member countries with 58 observations in the differenced equation and 101 unbalanced system observations revealed that, the System GMM estimator is appropriate for this dynamic panel analysis, with the J-statistic of 0.072623 confirming the validity of the instrument set. The most robust finding is the statistically significant positive effect of changes in digital standby letters of credit on changes in SME capacity utilization with a coefficient of 0.395921 ($p = 0.0000$), indicating that, a one unit increase in digital standby letter of credit adoption is associated with approximately 0.396 units increase in SME capacity utilization. The analysis also revealed significant dynamic adjustment processes, with the coefficient on the lagged differenced dependent variable of -0.272646 ($p < 0.01$) confirming that, approximately 27.26% of any deviation in the rate of change is corrected within one year. However, the level equation results indicated that, most digital trade finance variables do not exhibit statistically significant long-run equilibrium effects. The study concluded that, while digital trade finance holds significant theoretical potential to enhance SME capacity utilization, its effects in the ECOWAS region are instrument-specific and primarily realized through short-run dynamic adjustments rather than long-run equilibrium relationships. Based on the findings, it was recommended amongst others that, financial technology companies and commercial banks should expand the availability and accessibility of dynamic discounting platforms, while addressing the operational challenges that may reduce capacity utilization.

Keywords:

Capacity utilization, Digital trade, ECOWAS, Financing, SMEs, System GMM.

1. INTRODUCTION

The intersection of global digital trade financing and Small and Medium Enterprises (SMEs) capacity utilization has emerged as a critical area of inquiry in development economics and international business research. Digital trade financing encompasses the application of financial

technologies, blockchain solutions, digital platforms, and innovative payment systems to facilitate trade transactions, reduce information asymmetries, and improve access to working capital for SMEs (Gomber et al., 2017; Mohan & Kapur, 2015). Capacity utilization ratio, defined as the extent to which an enterprise employs its productive capacity, serves as a fundamental indicator of operational efficiency, competitiveness, and growth potential (Coelli et al., 2005; Färe et al., 1994). In the ECOWAS region, where SMEs constitute approximately 90% of all businesses, employ about 60% of the workforce, and contribute significantly to GDP across member states (ECOWAS Commission, 2022; African Development Bank, 2023), understanding the relationship between digital trade finance and capacity utilization is of paramount importance for regional economic development and poverty reduction.

Despite the growing body of research on digital finance and SME performance, significant debates and contentions persist in the empirical literature. The most prominent debate concerns the magnitude and direction of the relationship between digital trade finance and SME capacity utilization. A group of scholars argues that digital trade finance significantly enhances SME capacity utilization by improving access to working capital, reducing transaction costs, and enabling better inventory management and production planning (Liu et al., 2025; Zhou, 2024; Kusi et al., 2021; Olawale & Adebayo, 2022). Conversely, a competing group contends that the effects of digital trade finance on SME performance are modest, contingent on complementary factors, and may involve short-term adjustment costs that offset immediate benefits (Fawcett et al., 2021; Sinkovics et al., 2021; Grover & Kar, 2022). A second area of contention concerns the role of firm characteristics and capabilities in mediating the relationship, with some scholars arguing for uniform benefits while others emphasize heterogeneous effects depending on firm size, age, sector, and digital literacy (Amiti & Weinstein, 2011; Bricongne et al., 2012; Paravisini et al., 2015; Berman et al., 2012). A third area of disagreement concerns the importance of contextual factors, including institutional quality, regulatory frameworks, and digital infrastructure, in shaping the effectiveness of digital trade finance (Beck, 2013; Kusi et al., 2021; Olawale & Adebayo, 2022). The current study addresses these gaps by employing the System GMM estimator to examine both the short-run dynamics and long-run equilibrium relationships between digital trade finance and SME capacity utilization in the ECOWAS region.

The question becomes does global digital trade financing affect capacity utilization of SMEs in Nigeria? Thus, the objectives of the study are to; analyzed the relationship between digital trade finance instruments and SME capacity utilization, controlling for firm characteristics, macroeconomic conditions, infrastructure, and institutional quality in ECOWAS from 2021 to 2024. Having examined the introduction of the study, the remaining sections of this paper is segmented, literature review, methodology, results and discussion, conclusion and recommendations.

2. LITERATURE REVIEW

2.1 Theoretical Literature

The theoretical foundations linking digital trade finance to SME capacity utilization draw from multiple frameworks. The financial accelerator theory (Bernanke et al., 1999; Gertler & Gilchrist, 2018) posits that financial market imperfections amplify the effects of shocks on real economic activity through their impact on firms' balance sheets and access to credit. Digital trade finance addresses these imperfections by reducing information asymmetries, lowering

transaction costs, and providing alternative credit assessment mechanisms that enable SMEs to access working capital and investment finance (Klapper & Singer, 2017; Demirgüç-Kunt et al., 2018). The resource-based view (Barney, 1991; Teece et al., 1997) suggests that digital capabilities and financial resources constitute valuable, rare, and difficult-to-imitate resources that enable SMEs to achieve competitive advantage through improved capacity utilization and operational efficiency. The technology acceptance model (Davis, 1989; Venkatesh et al., 2003) provides insights into the adoption determinants of digital trade finance among SMEs, highlighting the roles of perceived usefulness, perceived ease of use, social influence, and facilitating conditions in shaping adoption decisions.

2.2 Empirical Review

Empirical evidence from various developing regions demonstrates that digital finance significantly enhances SME performance through multiple channels. Studies in Sub-Saharan Africa have shown that mobile money and digital payment systems increase SME access to credit, improve working capital management, and enhance operational efficiency (Jack & Suri, 2014; Aker & Mbiti, 2010; Kpodar & Andrianaivo, 2011). Research in South Asia has documented that digital lending platforms and fintech solutions reduce information asymmetries and expand credit access for previously unbanked SMEs (Allen et al., 2016; Beck & Guiso, 2019; Karim & Rahman, 2022). Studies in Latin America have found that digital trade finance platforms reduce transaction costs and improve supply chain integration for SMEs (Billon & Lera-Lopez, 2022; Dabla-Norris et al., 2010; Ferrer et al., 2015). In the Middle East and North Africa, research has demonstrated that blockchain-based trade finance solutions reduce documentation times and improve cash flow management for exporting SMEs (Alshebami et al., 2023; Al-Jabri & Sohail, 2022; Hassan & Lu, 2021). However, the application of these findings to the ECOWAS context requires careful consideration of regional specificities, including significant infrastructure deficits (Aker & Mbiti, 2010; Ofori & Asongu, 2021), fragmented regulatory environments (Cunningham & Lien, 2021; Hackett & Stein, 2022), digital literacy gaps (Ali et al., 2018; Syed & Hassan, 2023), and the prevalence of informal economic activities (Fafchamps, 2004; Beck & Cull, 2014).

3. METHODOLOGY

The System Generalized Method of Moments (GMM) estimator is particularly appropriate for this study for several compelling methodological reasons. First, the System GMM approach addresses the fundamental challenge of dynamic panel data analysis, where the inclusion of the lagged dependent variable as a regressor creates correlation with the error term due to unobserved firm-specific effects (Arellano & Bond, 1991; Blundell & Bond, 1998).

The capacity utilization ratio of SMEs exhibits strong persistence over time, the System GMM estimator handles this persistence by using lagged levels as instruments for the differenced equation and lagged differences as instruments for the levels equation (Arellano & Bover, 1995).

Second, the System GMM approach addresses the potential endogeneity of digital trade finance variables, which may be jointly determined with SME capacity utilization due to reverse causality, omitted variable bias, or measurement error (Baum et al., 2003; Windmeijer, 2005). Third, the System GMM approach addresses the panel-specific characteristics of the ECOWAS

data, including the relatively short time dimension (2021-2024) and the moderate cross-section dimension (15 ECOWAS member countries), performing well in panels with moderate time.

The empirical model is specified as follows:

First Equation (Levels):

$$\begin{aligned} \text{SMEscapcityutilization} = & C(1) + C(2)\text{smescapcityutilization}(-1) + C(3)\text{digitalsblc} + \\ & C(4)\text{defitradeinance} + C(5)\text{dynamicdiscounting} + C(6)\text{firmage} + C(7)\text{firmsize} + \\ & C(8)\text{gdpgrowth} + C(9)\text{inflation} + C(10)\text{internetpenetration} + C(11)\text{regulatory} @ \\ & D(\text{smescapcityutilization}(-2)) D(\text{digitalsblc}(-1)) D(\text{defitradeinance}(-1)) \\ & D(\text{dynamicdiscounting}(-1)) D(\text{firmage}(-1)) D(\text{firmsize}(-1)) D(\text{gdpgrowth}(-1)) D(\text{inflation}(-1)) \\ & D(\text{internetpenetration}(-1)) D(\text{regulatory}(-1)) \end{aligned} \quad (1)$$

Second Equation (Differences):

$$\begin{aligned} D(\text{SMEscapcityutilization}) = & C(12) + C(13)D(\text{smescapcityutilization}(-1)) + \\ & C(14)D(\text{digitalsblc}) + C(15)D(\text{defitradeinance}) + C(15)D(\text{dynamicdiscounting}) + \\ & C(15)D(\text{firmage}) + C(15)D(\text{firmsize}) + C(15)D(\text{gdpgrowth}) + C(15)D(\text{inflation}) + \\ & C(15)D(\text{internetpenetration}) + C(15)D(\text{regulatory}) @ \text{smescapcityutilization}(-2) \text{digitalsblc}(-1) \\ & \text{defitradeinance}(-1) \text{dynamicdiscounting}(-1) \text{firmage}(-1) \text{firmsize}(-1) \text{gdpgrowth}(-1) \\ & \text{inflation}(-1) \text{internetpenetration}(-1) \text{regulatory}(-1) \end{aligned} \quad (2)$$

The coefficient on digital standby letters of credit (*digitalsblc*), digital trade finance (*defitradeinance*), dynamic discounting (*dynamicdiscounting*), firm age and firm size is expected to be positive. GDP growth is expected to have a positive coefficient, as macroeconomic growth creates opportunities for SMEs. But inflation is expected to have a negative coefficient, as it creates uncertainty and erodes purchasing power. Internet penetration and regulatory environment are expected to have positive coefficients.

4. RESULTS AND DISCUSSION

4.1 System GMM Estimation Results

Table 1 presents the System GMM estimation results for SME capacity utilization in the ECOWAS region. The System GMM estimator, developed by Arellano and Bover (1995), is appropriate for this dynamic panel analysis, with the J-statistic of 0.072623 confirming the validity of the instrument set as proposed by Hansen (1982). The most robust finding is the statistically significant positive effect of changes in digital standby letters of credit on changes in SME capacity utilization, with a coefficient of 0.395921 and a probability value of 0.0000 (Roodman, 2009). This indicated that, a one unit increase in the adoption of digital standby letters of credit is associated with approximately 0.396 units increase in SME capacity utilization, providing strong empirical evidence that this specific digital trade finance instrument enhances SME operational performance (Liu, Ma, & Huang, 2025; Zhou, 2024).

Table 1: System GMM IS Appropriate

System: SYS_GMM				
Estimation Method: Generalized Method of Moments				
Date: 02/09/26 Time: 21:04			Sample	2021 2024
Included observations: 58				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	17.64533	61.77759	0.285627	0.7759
C(2)	0.203273	1.950370	0.104223	0.9172
C(3)	0.442428	0.937666	0.471839	0.6382
C(4)	0.001163	0.004094	0.284132	0.7770
C(5)	0.947724	1.610399	0.588502	0.5577
C(6)	-1.612978	5.659532	-0.285002	0.7763
C(7)	-0.016084	0.137906	-0.116627	0.9074
C(8)	0.940267	1.280117	0.734516	0.4646
C(9)	0.969566	2.336190	0.415020	0.6792
C(10)	0.244939	0.801884	0.305455	0.7608
C(11)	-0.067806	0.236085	-0.287209	0.7746
C(12)	0.027821	0.054584	0.509686	0.6116
C(13)	-0.272646	0.016258	-16.76983	0.0000
C(14)	0.395921	0.035158	11.26125	0.0000
C(15)	-1.28E-05	0.000141	-0.090856	0.9278
Determinant residual covariance		5.427770	J-statistic	0.072623
Equation: SMESCAPCITYUTILIZATION=C(1) + C(2)*SMESCAPCITYUTILIZA				
TION(-1)+ C(3)*DIGITALSBLC + C(4)*DEFITRADEFINANCE + C(5)				
*DYNAMICDISCOUNTING+ C(6)*FIRMAGE + C(7)*FIRMSIZE + C(8)				
*GDPGROWTH + C(9)*INFLATION + C(10)*INTERNETPENETRATION				
+ C(11)*REGULATORY				
Instruments: D(SMESCAPCITYUTILIZATION(-2)) D(DIGITALSBLC(-1))				
D(DEFITRADEFINANCE(-1)) D(DYNAMICDISCOUNTING(-1))				
D(FIRMAGE(-1)) D(FIRMSIZE(-1)) D(GDPGROWTH(-1)) D(INFLATION(				
-1)) D(INTERNETPENETRATION(-1)) D(REGULATORY(-1)) C				
Observations: 43				
R-squared	0.984986	Mean dependent var		12.44705
Adjusted R-squared	0.980294	Durbin-Watson stat		1.684072
Equation: D(SMESCAPCITYUTILIZATION) =C(12) + C(13)				
*D(SMESCAPCITYUTILIZATION(-1)) + C(14)*D(DIGITALSBLC) + C(15)				
*D(DEFITRADEFINANCE) + C(15)*D(DYNAMICDISCOUNTING) + C(15)				
*D(FIRMAGE) + C(15)*D(FIRMSIZE) + C(15)*D(GDPGROWTH) + C(15)				
*D(INFLATION) + C(15)*D(INTERNETPENETRATION) + C(15)				
*D(REGULATORY)				
Instruments: SMESCAPCITYUTILIZATION(-2) DIGITALSBLC(-1)				
DEFITRADEFINANCE(-1) DYNAMICDISCOUNTING(-1) FIRMAGE(-1)				
FIRMSIZE(-1) GDPGROWTH(-1) INFLATION(-1) INTERNETPENETRATI				
ON(-1) REGULATORY(-1) C				
Observations: 58				
R-squared	0.702075	Mean dependent var		0.749828
Adjusted R-squared	0.685524	Durbin-Watson stat		2.457525

Source: Computation from EViews 14

The analysis also reveals significant dynamic adjustment processes in SME capacity utilization. The coefficient on the lagged differenced dependent variable is -0.272646 with a probability value of 0.0000, confirming that changes in capacity utilization exhibit negative autocorrelation, meaning that approximately 27.26% of any deviation in the rate of change is corrected within one year (Arellano & Bond, 1991; Blundell & Bond, 1998; Coelli et al., 2005; Färe et al., 1994). This negative feedback mechanism indicates that capacity utilization rates

are subject to mean-reverting dynamics, reflecting constraints from market demand, productive capacity, and resource availability (Bernard & Jensen, 2004; Roberts & Tybout, 1997). The high explanatory power of the model, with an adjusted R-squared of 0.685524 for the differenced equation, confirms that the System GMM specification captures the key determinants of SME capacity utilization in the ECOWAS region (Greene, 2012; Wooldridge, 2010).

However, the level equation results indicate that, most digital trade finance variables do not exhibit statistically significant long-run equilibrium effects. The coefficient on the lagged dependent variable is 0.203273 with a probability value of 0.9172, suggesting weak persistence in SME capacity utilization when considered in levels, which contrasts with theoretical expectations of positive autocorrelation (Bernard & Jensen, 2004; Roberts & Tybout, 1997). The digital trade finance variable yielded a coefficient of 0.001163 with a probability value of 0.7770, while dynamic discounting produced a coefficient of 0.947724 with a probability value of 0.5577, both statistically insignificant at conventional levels (Baum et al., 2003; Hansen, 1982). The control variables, including firm age, firm size, GDP growth, inflation, internet penetration, and regulatory environment, all failed to achieve statistical significance, suggesting that SME capacity utilization in the ECOWAS region is primarily driven by the adoption of specific digital trade finance instruments rather than by broader macroeconomic or infrastructural factors (Beck et al., 2005; Collier & Gunning, 1999; Fafchamps, 2004).

4.2 Discussion of Findings

The confirmation of a statistically significant positive effect of digital standby letters of credit on SME capacity utilization is a fundamental finding of this study. This finding aligns with the theoretical predictions of the financial accelerator theory (Bernanke et al., 1999; Gertler & Gilchrist, 2018), which posits that financial market imperfections amplify the effects of shocks on real economic activity. Digital standby letters of credit address these imperfections by reducing information asymmetries and providing guarantees that mitigate counterparty risk, enabling SMEs to engage with unfamiliar counterparties and expand their operations (Klapper & Singer, 2017; Demirgüç-Kunt et al., 2018). This finding is consistent with the empirical literature on digital trade finance in developing regions (Liu, Ma, & Huang, 2025; Zhou, 2024; Kusi et al., 2021; Olawale & Adebayo, 2022). The positive and significant effect in the differenced equation, combined with the insignificance of the level effect, suggests that the benefits of digital standby letters of credit are primarily realized through short-run dynamic adjustments rather than through long-run equilibrium relationships (Hall & Khan, 2003; Rogers, 1995; David, 1990). SMEs may experience immediate improvements in capacity utilization when they adopt digital standby letters of credit, but these gains may not persist indefinitely as the effects are incorporated into the equilibrium level of performance.

The significant dynamic adjustment processes revealed by the negative coefficient on the lagged differenced dependent variable confirm that changes in SME capacity utilization exhibit mean-reverting behavior (Arellano & Bond, 1991; Blundell & Bond, 1998). This finding indicates that approximately 27.26% of any deviation in the rate of change of capacity utilization is corrected within one year, reflecting the operation of market forces and policy interventions that return SME performance toward its equilibrium level following a disturbance (Coelli et al., 2005; Färe et al., 1994). The moderate adjustment speed, approximately 27% per period, is consistent with the presence of some rigidities in SME operations and market

conditions in the ECOWAS region (Bernard & Jensen, 2004; Roberts & Tybout, 1997). This pattern may reflect capacity constraints faced by SMEs, where rapid increases in utilization cannot be sustained without corresponding investments in productive capacity (Collier & Gunning, 1999; Fafchamps, 2004; Liu et al., 2020). The lack of statistical significance for most variables in the level equation suggests that the long-run equilibrium relationships between digital trade finance instruments and SME capacity utilization are not strongly pronounced in the ECOWAS region during the sample period (Beck et al., 2005; Beck & Cull, 2014). This finding may reflect the relatively early stage of digital trade finance adoption in West Africa (Ganne, 2018; Chang & Chen, 2020; Mohammed et al., 2025). The heterogeneity in effects across different digital trade finance instruments suggests that interventions should focus on the specific instruments that address the most binding constraints on SME performance (Gomber et al., 2017; Mohan & Kapur, 2015), with digital standby letters of credit serving primarily as risk mitigation instruments (Bernanke et al., 1999; Gertler & Gilchrist, 2018).

5. CONCLUSION AND RECOMMENDATIONS

This study examined the impact of global digital trade financing on SME capacity utilization in the ECOWAS region using a dynamic panel data approach with the System GMM estimator. The empirical analysis yields three important conclusions. First and foremost, digital trade financing, particularly digital standby letters of credit, has significant positive impact on SME capacity utilization, confirming that, increases in adoption generate immediate improvements in operational performance. Secondly, the study revealed important dynamic adjustment processes, with approximately 27.26% of any deviation in the rate of change of capacity utilization corrected within one year, reflecting mean-reverting behavior consistent with capacity constraints and demand volatility. Thirdly, the lack of statistical significance for most level equation variables suggested that, long-run equilibrium relationships are not strongly pronounced. In conclusion, while digital trade finance holds significant theoretical potential, its effects in the ECOWAS region are instrument-specific and primarily realized through short-run dynamic adjustments. The findings underscore the need for policymakers to prioritize the promotion of digital standby letters of credit and design interventions as ongoing programmes to address dynamic adjustment processes.

Based on the findings, the following recommendations were made; First, policymakers should prioritize the promotion of digital standby letters of credit through awareness campaigns, technical assistance, and regulatory reforms. Second, policymakers should design interventions as ongoing programmes rather than one-time initiatives, establishing monitoring and evaluation systems that track SME capacity utilization over multiple periods. Third, policymakers should address infrastructure and regulatory constraints by accelerating the ECOWAS Digital Economy Strategy implementation, expanding broadband access, and harmonizing regulations across member states. Fourth, policymakers should develop targeted policies for MSMEs in digital financial services, reducing regulatory burden and creating predictable environments that encourage digital trade finance adoption. Fifth, financial institutions should expand digital trade finance product offerings with emphasis on digital standby letters of credit, developing user-friendly platforms accessible to SMEs with varying digital literacy. Sixth, SMEs should actively explore digital trade finance opportunities, particularly digital standby letters of credit, and invest in building digital capabilities and maintain consistent usage of digital trade finance instruments to achieve lasting improvements in operational performance.

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