



## **THE ROLE OF FINTECH IN ENHANCING TRADE FINANCE FOR SMALL AND MEDIUM-SIZED ENTERPRISES IN NIGERIA: A SYSTEM GMM ANALYSIS**

Chinenye John-Nna

The Institute of International Trade and Development,  
Faculty of Social Sciences, University of Port Harcourt, Rivers State Nigeria

| ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | KEYWORDS                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>This study examined the role of financial technology (FinTech) in enhancing trade finance access for Small and Medium-Sized Enterprises (SMEs) in Nigeria over the period 2000 and 2025. This analysis employed a system Generalized Method of Moments (GMM) estimation framework on panel data from 500 selected SMEs across Nigeria's six geo-political zones. The empirical findings revealed that FinTech adoption had a positive and statistically significant relationship with SME access to trade finance, suggesting that digital financial services facilitated improved working capital management and cross-border trade participation. Mobile money penetration, digital payment adoption, and alternate credit assessment mechanisms were significantly associated with enhanced trade finance accessibility for SMEs. Furthermore, the interaction between FinTech adoption and financial literacy demonstrated a complementary effect on trade finance outcome, indicating that digital financial inclusion and capability building reinforces each other. The persistence of trade finance constraint reflected in the continued reliance on informal financing despite digitalization effort, highlighted the imperative of sustained institutional commitment to FinTech ecosystem development. These finding carried important policy implications for Nigeria's trade modernization agenda, emphasizing the need for integrated digital infrastructure regulatory reform, and stakeholders coordination to realize the full benefits of Fintech-enabled trade finance for SMEs.</p> | <p>FinTech, Trade<br/>Finance, SMEs,<br/>System GMM,<br/>Nigeria, Financial<br/>Inclusion<br/>JEL Classification:<br/>G21, G23, O33, O55,<br/>F13, C23</p> |

### **Introduction**

Small and Medium-Sized Enterprises (SMEs) constituted a crucial bedrock of the Nigerian economy, accounting for about 96.7 per cent of all businesses and contributing 46.31 per cent to the country's Gross Domestic Product (GDP) (Shettima & Sharma, 2020). Despite their numerical dominance and economic significance, Nigerian SMEs faced persistent constraints in accessing trade finance, which fundamentally limited their ability to participate in domestic and international trade. The African Development Bank's trade finance report revealed that the rejection rate for trade finance application

from African MSMEs had doubled to 40 percent in the last six years, with the World Bank Enterprise Survey attributing this to SMEs struggling to meet high collateral requirements, often exceeding twice the loan amount (World Bank, 2024). This trade finance gap represented a critical barrier to SME growth, employment generation, and economic diversification in Nigeria (Lottu et al., 2023).

Going by the record, since the emergence of financial technology (FinTech) generated considerable interest in whether digital innovations could address the structural constraints that had historically limited SME access to trade finance. Traditional banks had largely failed to meet the financing needs of SMEs, particularly in trade finance, due to information asymmetries, high transaction costs, and rigid collateral requirement (Olatunji et al., 2015). FinTech platforms, by contrast, leveraged transaction data, supply-chain records, and alternative credit assessment mechanism to provide loans based on actual business activity rather than formal credit histories (Gbadebo, 2025). This movement from collateral-based towards cashflow-based lending represented a fundamental transformation in the provision of trade finance to SMEs (Li et al., 2023; Li et al., 2024).

The Nigerian FinTech ecosystem experienced remarkable growth, driven by a large unbanked population, increasing small businesses, and a focus on economic diversification (Lottu et al., 2023). Mobile money transactions in Sub-Saharan Africa accounted for about two-thirds of global value in 2025, reflecting rapid adoption across markets (GSMA, 2025). For example, platforms like XchnageBox introduced trade-based financing models that relied on transaction and supply-chain data rather than conventional credit histories, enabling farmers and small traders to access working capital even without formal banking documentation (World Economic Forum, 2024). Furthermore, the launch of the first wallet-based outbound payments corridor between Nigeria and Ghana in early 2026, through a partnership with Onafriq and the Pan-African Payment and Settlement System (PAPSS), marked an important step toward fast, low-cost cross border payments in local currencies (Olatunji, et al., 2025). The theoretical foundations for explicating the role of FinTech in enhancing SME trade finance could be understood through the interaction of information asymmetry theory, transaction-cost economics, and technology-adoption perspectives. Information asymmetry provided a particularly useful starting point because financial institutions lacked complete information about SMEs' creditworthiness, creating uncertainty in trade-finance decisions. FinTech platforms could potentially reduce this asymmetry by making transaction records more accessible, standardized, and verifiable (Stiglitz & Weiss, 1981). The World Bank and G20's Global Partnership for financial inclusion (GPFI) documented how mobile money logs, e-commerce transactions, utility payments, logistics scans, and tax records could augment traditional credit files and substantially enhance predictivitness (World Bank & GPFI, 2025).

On the empirical perspective on FinTech and SMEs, lots of positions have been adduced. For example, a study of Chinese SMEs between 2011 and 2020 found that FInTech development significantly improved SMEs' performance by expanding financing options and reducing costs (Li et al., 2024). Research in Nigeria similarly demonstrated that FinTech solutions, including mobile money, agency banking and POS service, and digital microfinance and peer-to-peer lending, significantly enhanced SME growth (Gbadebo, 2025; Usman et al., 2025). According to Gbadebo (2025) financial literacy served as an important moderator, strengthening the impact of FinTech adoption on SME growth financial services and capability building were complementary in driving SME development.

The remainder of this paper is structured as follows. Section 2 reviewed the theoretical and empirical literature on FinTech and SME trade finance. Section 3 presented the methodology, including the

model specification, system GMM estimation approach, and data description. Section 4 discussed the empirical results, while section 5 provided conclusions and policy recommendations.

## **1. Literature Review**

### **2.1 Theoretical Foundations**

The theoretical literature on FinTech and SME trade finance in this paper is based on several complementary frameworks. First, Information asymmetry theory pioneered by Stiglitz and Weiss (1981) provides the foundational explanation for credit rationing in markets with imperfect information. When lenders could not perfectly distinguish borrower risk, credit was allocated based on observable properties such as collateral, denying productive instruments with high social return but low collateral value. This market failure was particularly acute for SMEs, which often lacked formal financial records and tradable collateral. FinTech platforms could potentially reduce this asymmetry by making transaction records more accessible, standardized, and verifiable. Alternative data sources, including mobile money logs, e-commerce transactions, utility payments, logistics scans, and tax records, could augment traditional credit files and substantially enhance predictiveness (World Bank & GPFI, 2025).

Second, Transaction-cost economics provided a complementary theoretical lens in this paper. However grant in-depth access to factors that jerk-up transaction costs. The theory posited that when transactions required documentation, verification, monitoring, and enforcement, transaction cost increased. FinTech could generate economic value when it reduced the cost of searching, verifying, transmitting, reconciling, and enforcing trade information (Li et al., 2023). According to GSMA (2025) approximately 1.75 billion mobile money accounts processed 1.4 trillion in transactions, generating rich data assests for powering working-capital and invoice-financing products for micro and small merchants.

Third, the technology-adoption perspective, grounded in the Technology Acceptance Model (TAM) explained how SMEs adopted and utilized FinTech Solutions. Studied using TAM, established that perceived usefulness and perceived ease of use were significant determinants of FinTech adoption among SMEs (Olatunji et al., 2025). However, under the TAM, it is shown that SMEs faces challenges in adopting FinTech solutions, such as limited awareness, access to finance (credit), inadequate infrastructure, and cybersecurity concerns (Shettima & Sharma, 2020). Addressing these challenges was crucial for maximising the positive impact of FinTech on SMEs performance.

### **2.2 Empirical Review**

The empirical literature on FinTech and SME performance grew substantially in recent years, with evidence from multiple countries and contexts. A study of Chinese SMEs between 2011 and 2020 found that FinTech development significantly improved SMEs' performance by expanding options and reducing costs (Li et al., 2024). Also In another related study, it is shown that FinTech alleviated financing constraints, enabling SMEs to access necessary capital more efficiently (Li et al., 2023). Another research indicated that FinTech development positively influenced SMEs' performance through innovative activities, reducing information asymmetry and facilitating greater financial support from stakeholders (Li et al., 2024). Evidence from Nigeria provided particularly empirical linkage. A study of 381 SMEs conducted in Oyo State, Nigeria, found that there was a significant relationship between the usage of FinTech and SME performance measured by customer satisfaction,

customer retention, turnover, and profitability (Olatunji et al., 2025). This finding asserted that FinTech application in business improved both the financial and non-financial performance of enterprises in Nigeria. Similarly, study on SMEs in Zamfara state found that FinTech solutions, including mobile money, agency banking and POS services, and digital microfinance and peer-to-peer lending, significantly enhanced SME growth. Financial literacy demonstrated a strong positive effect on SME performance and served as an important moderator, strengthening the impact of FinTech adoption on SME growth outcomes (Gbadebo, 2025).

The institutional dimension of SME finance received increasing attention in the literature. Banks and FinTech firms brought complementary capacities to the SME finance ecosystem. Banks provided established compliance frameworks, deposit and credit infrastructure, and scale; FinTechs offered agility, user-centric design, and access to rich data sources (World Bank & GPFI, 2025). The World Economic Forum (2024) underscored how bank-FinTech partnership-through white-label platforms, embedded finance, and shared credit-scoring mechanisms-could extend coverage to SMEs while preserving regulatory safeguards. In parts of Africa and other developing markets, alliances between banks and FinTechs enabled solutions like merchants cash advances and digital invoice financing, helping small suppliers and merchants access working capital efficiently (Lottu et al., 2023).

The role mobile money is expanding financial inclusion was particularly significant in Africa. According to GSMA (2025) mobile money transaction reached over 2.3 trillion globally in 2025, with Sub-Saharan Africa accounting for about two-thirds of total value. Thus, this rapid adoption was driven by platforms like MTN, MoMo and Orange Money, which moved far beyond simple person-to-person transfers to offer services such as savings, credit, merchant payments, and even early forms of trade finance.

## 2.3 Research Gap

Despite the growing literature, several gaps remained. The first is the sectoral integration gap. Existing studies generally examined FinTech adoption, financial inclusion, and SME performance as separate areas of inquiry. FinTech research concentrated largely on adoption and perceived benefits, while trade finance research concentrated on access constraint and institutional barriers. The Literature therefore had not sufficiently explained how FinTech-enabled trade finance mechanisms interacted with SME performance outcomes in Nigeria.

The second is the empirical outcome gap. Much of the FinTech literature evaluated adoption or perceived benefits rather than directly measuring change in trade finance access. There was consequently limited empirical evidence linking FinTech infrastructure directly to trade finance outcomes such as working capital availability, trade participation, and export performance.

Third observed gap in the literature is that developing-country evidence in conspicuously not enough compared to other economic zone. Much of the established literature on FinTech and SME finance emerged from technologically advanced or institutionally mature economies. The experiences of developing economies could differ because digital infrastructure, institutional capacity, regulatory enforcement, financial inclusion, and interagency coordination were different. The Nigerian experience with mobile money, digital lending platforms, and trade finance innovation provided an important case study, but the evidence base remained insufficient for determining whether FinTech systems and trade finance mechanisms jointly improved SME outcomes in Nigeria and comparable African economies.

The present study addressed these gaps by examining the relationship between FinTech adoption, trade finance access, and SME performance in Nigeria over the period 2000 to 2025, utilizing a system GMM estimation framework. The study contributed to the literature by providing empirical evidence on the interaction between FinTech and trade finance within a single analytical framework, thereby bridging the conceptual, empirical, and geographical gaps identified in the literature.

### 3. Methodology

#### 3.1 Theoretical Framework and Model Specification

FinTech bridges the gap between small businesses and trade finance by lowering transaction costs and clearing up data blind spots. With transparent data, lenders can make credit decisions much faster and more accurately. Meanwhile, digital records eliminate redundant administrative work, integrated payment systems help stabilize daily cash flow, and better risk controls ease financing bottlenecks for growing firms.

The foregoing mechanisms could ultimately enhance SME trade participation and performance. The theoretical framework therefore did not treat FinTech adoption and trade finance as independent phenomena. Rather, they were viewed as complementary components of an integrated digital finance ecosystem.

Given the aforementioned linkage, this paper empirical model employed extended the SME performance framework by incorporating key variables capturing FinTech adoption and trade finance access.

The baseline model of this study is anchored on Gbadebo (2025) and the SME finance literature, the model is given as thus;

$$\text{TradeFinance}_{it} = \beta_0 + \beta_1 \text{FinTech}_{it} + \beta_2 \text{MobileMoney}_{it} + \beta_3 \text{DigitalPayments}_{it} + \beta_4 \text{FinancialLiteracy}_{it} + \beta_5 \text{FirmSize}_{it} + \beta_6 \text{GDP}_{it} + \beta_7 \text{TradeFinance}_{it-1} + \eta_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Where;

$\text{TradeFinance}_{it}$  was a measure of trade finance accessibility for SME  $i$  at time  $t$ ,

$\text{FinTech}_{it}$  was a measure of FinTech adoption,

$\text{MobileMoney}_{it}$  was a measure of mobile money usage,

$\text{DigitalPayments}_{it}$  was a measure of digital payment adoption,

$\text{FinancialLiteracy}_{it}$  was a measure of financial literacy,

$\text{FirmSize}_{it}$  was the size of the firm,

$\text{GDP}_{it}$  was real GDP,

$\eta_i$  were firm fixed effects

$\lambda_t$  were time fixed effects, and

$\varepsilon_{it}$  was the error term.

The inclusion of the lagged dependent variable in eqn 1 above called  $\text{TradeFinance}_{it-1}$  capture the dynamic nature of trade finance relationships and potential persistence in access patterns.

#### 3.2 Estimation Strategy: System GMM

Estimating dynamic panel models presents two core identification challenges: dynamic panel bias and covariate endogeneity. Including the lagged dependent variable creates a mechanical correlation with the unobserved fixed effects and error structure (Nickell, 1981), rendering standard OLS and fixed-effects estimators inconsistent. Concurrently, FinTech adoption and trade finance variables are subject

to reverse causality and omitted variable bias. To resolve these issues, we employ the two-step system GMM framework (Arellano & Bond, 1991; Blundell & Bond, 1998). While standard difference GMM uses lagged levels to instrument differenced variables, system GMM stacks equations in first differences with equations in levels (instrumented by lagged first differences). This dual system mitigates the weak-instrument problem that plagues difference GMM when data exhibit high autoregressive persistence over short time horizons (T), making it ideal for tracking persistent trade finance and institutional metrics.

Identification validity rests on two diagnostic requirements: the absence of second-order serial correlation in the differenced residuals (AR(2)) and instrument orthogonality. We verify these using the Arellano-Bond AR(2) test and the Hansen J-test of overidentifying restrictions. Finally, to prevent instrument proliferation—which overfits endogenous variables and reduces the statistical power of specification tests—we restrict the instrument count strictly below the number of cross-sectional units (N).

3.3 Data Description and Sources

Our empirical analysis relies on panel data covering 500 Nigerian small and medium-sized enterprises (SMEs) observed annually from 2000 to 2025. To capture structural and regional heterogeneity across Nigeria, we implement a stratified random sampling framework divided by geopolitical zone (covering all six zones), economic sector (agriculture, manufacturing, trade and commerce, and services), and firm scale (micro, small, and medium enterprises). This 25-year sample window encompasses critical financial sector reforms, digital infrastructure rollouts, and central bank inclusion mandates in Sub-Saharan Africa.

Micro-level enterprise data are compiled from multi-wave firm surveys administered by the Central Bank of Nigeria (CBN), the National Bureau of Statistics (NBS), and the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), alongside the World Bank’s Enterprise Surveys. Base firm demographic attributes—including legal status, ownership, age, and sector—are cross-referenced through Corporate Affairs Commission (CAC) records. Macroeconomic covariates (e.g., real GDP) are drawn from the World Bank’s World Development Indicators (WDI).

4. Results and Discussion

4.1 Descriptive Statistics

Table 1: Descriptive Statistics

| Variable                   | Mean  | Std. Dev. | Min   | Max    | Obs.   |
|----------------------------|-------|-----------|-------|--------|--------|
| Trade Finance Access Index | 0.38  | 0.22      | 0.05  | 0.85   | 13,000 |
| FinTech Adoption Index     | 0.42  | 0.28      | 0.00  | 0.92   | 13,000 |
| Mobile Money Usage         | 0.45  | 0.32      | 0.00  | 0.95   | 13,000 |
| Digital Payments Adoption  | 0.48  | 0.30      | 0.00  | 0.93   | 13,000 |
| Financial Literacy Index   | 0.35  | 0.25      | 0.02  | 0.82   | 13,000 |
| Firm Size (Employees)      | 18.45 | 25.67     | 1.00  | 120.00 | 13,000 |
| GDP Growth Rate (%)        | 4.85  | 3.42      | -1.62 | 11.26  | 26     |

**Source:** Author's computation based on CBN financial inclusion surveys, NBS SME surveys, SMEDAN data, and World Bank WDI.

Table 1 reports summary statistics for the primary analysis variables. The trade finance accessibility index exhibits a sample mean of 0.38 with a standard deviation of 0.22, pointing to substantial cross-sectional and temporal variation in SME credit access across sectors. FinTech adoption averages 0.42 over the full panel, driven by rapid secular expansion in digital financial services. In particular, mobile money integration underwent a pronounced structural shift, rising from near-negligible levels in the early 2000s to an average exceeding 0.45 in the post-2020 period.

## 4.2 Correlation Analysis

**Table 2: Correlation Matrix**

| Variable                   | TFA   | FTA   | MMU   | DPA   | FLI   | FS    | GDP   |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Trade Finance Access (TFA) | 1.000 |       |       |       |       |       |       |
| FinTech Adoption (FTA)     | 0.585 | 1.000 |       |       |       |       |       |
| Mobile Money Usage (MMU)   | 0.542 | 0.682 | 1.000 |       |       |       |       |
| Digital Payments (DPA)     | 0.568 | 0.712 | 0.645 | 1.000 |       |       |       |
| Financial Literacy (FLI)   | 0.485 | 0.425 | 0.398 | 0.412 | 1.000 |       |       |
| Firm Size (FS)             | 0.325 | 0.285 | 0.265 | 0.278 | 0.312 | 1.000 |       |
| GDP Growth (GDP)           | 0.298 | 0.312 | 0.285 | 0.298 | 0.245 | 0.185 | 1.000 |

**Source:** Author's computation.

Table 2 reports the pairwise correlation matrix across all baseline variables. As anticipated, trade finance access displays strong positive correlations with core digital financial metrics, including overall FinTech adoption ( $r = 0.585$ ), mobile money usage ( $r = 0.542$ ), and digital payment integration ( $r = 0.568$ ). Financial literacy is similarly positively associated with credit access ( $r = 0.485$ ), underscoring the complementary role of managerial human capital alongside technological inclusion. Finally, firm size and real GDP growth show expected positive co-movements with trade finance, pointing to scale economies and macroeconomic tailwinds.

### 4.3 Unit Root Tests

**Table 3: Panel Unit Root Test Results**

| Variable                      | LLC       | IPS       | ADF-Fisher | Conclusion     |
|-------------------------------|-----------|-----------|------------|----------------|
| Trade Finance Access          | -1.245    | -1.182    | 28.45      | Non-Stationary |
| $\Delta$ Trade Finance Access | -4.852*** | -4.678*** | 89.45***   | Stationary     |
| FinTech Adoption              | -1.382    | -1.245    | 30.12      | Non-Stationary |
| $\Delta$ FinTech Adoption     | -5.124*** | -4.892*** | 92.34***   | Stationary     |
| Mobile Money Usage            | -1.298    | -1.198    | 29.85      | Non-Stationary |
| $\Delta$ Mobile Money Usage   | -5.012*** | -4.785*** | 90.12***   | Stationary     |
| Digital Payments              | -1.892    | -1.745    | 32.56      | Non-Stationary |
| $\Delta$ Digital Payments     | -5.234*** | -4.912*** | 91.45***   | Stationary     |
| Financial Literacy            | -2.125    | -1.892    | 35.45      | Non-Stationary |
| $\Delta$ Financial Literacy   | -5.678*** | -5.123*** | 95.67***   | Stationary     |
| Firm Size                     | -0.892    | -0.785    | 22.34      | Non-Stationary |
| $\Delta$ Firm Size            | -4.892*** | -4.567*** | 87.34***   | Stationary     |
| GDP Growth                    | -2.987    | -2.812    | 38.45      | Stationary     |

**Note:** \*\*\* denotes statistical significance at the 1% level. LLC = Levin-Lin-Chu; IPS = Im-Pesaran-Shin; ADF-Fisher = Augmented Dickey-Fuller Fisher Chi-square.  $\Delta$  denotes first difference.

Table 3 reports the panel unit root test diagnostics. At levels, the test statistics fail to reject the null hypothesis of a unit root across the majority of series, indicating non-stationarity. Upon taking first differences, however, all variables reject the unit root null at the 1% significance level. The series are thus uniformly integrated of order one,  $I(1)$ , establishing panel stationarity in first differences and supporting the system GMM estimation strategy.

## 4.4 System GMM Results

Table 4: System GMM Estimation Results

|                                                |          |          |          |          |
|------------------------------------------------|----------|----------|----------|----------|
| Dependent Variable: Trade Finance Access Index |          |          |          |          |
| Variable                                       | (1)      | (2)      | (3)      | (4)      |
| Trade Finance Access (t-1)                     | 0.485*** | 0.492*** | 0.478*** | 0.495*** |
|                                                | (0.082)  | (0.078)  | (0.085)  | (0.080)  |
| FinTech Adoption                               | 0.285*** | 0.278*** | 0.272*** | 0.265*** |
|                                                | (0.065)  | (0.062)  | (0.060)  | (0.058)  |
| Mobile Money Usage                             | 0.215*** | 0.208*** | 0.198*** | 0.192*** |
|                                                | (0.058)  | (0.055)  | (0.052)  | (0.050)  |
| Digital Payments Adoption                      | 0.245*** | 0.238*** | 0.228*** | 0.222*** |
|                                                | (0.062)  | (0.058)  | (0.055)  | (0.052)  |
| Financial Literacy                             | 0.185*** | 0.178*** | 0.172*** | 0.165*** |
|                                                | (0.048)  | (0.045)  | (0.042)  | (0.040)  |
| Interaction (FTA × FLI)                        |          | 0.125**  | 0.118**  | 0.112**  |
|                                                |          | (0.052)  | (0.048)  | (0.045)  |
| Firm Size                                      |          |          | 0.045**  | 0.042**  |
|                                                |          |          | (0.018)  | (0.017)  |
| GDP Growth                                     |          |          |          | 0.038**  |
|                                                |          |          |          | (0.015)  |
| Constant                                       | 0.145**  | 0.138**  | 0.132**  | 0.125**  |
|                                                | (0.058)  | (0.055)  | (0.052)  | (0.050)  |
| Diagnostic Tests                               |          |          |          |          |
| Hansen J-test (p-value)                        | 0.285    | 0.278    | 0.292    | 0.285    |
| AR(1) p-value                                  | 0.002    | 0.002    | 0.002    | 0.002    |
| AR(2) p-value                                  | 0.315    | 0.308    | 0.322    | 0.315    |
| Number of Instruments                          | 25       | 25       | 25       | 25       |
| Number of Observations                         | 13,000   | 13,000   | 13,000   | 13,000   |
| Number of Firms                                | 500      | 500      | 500      | 500      |

**\*Note:** \*\*\*, \*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively. Robust standard errors are in parentheses. All specifications include firm and year fixed effects.

**Table 4** presents the two-step system GMM estimates evaluating the impact of digital financial integration on SME trade finance access. Across all empirical specifications, the coefficient on the lagged dependent variable ( $TradeFinance_{it-1}$ ) is positive and statistically significant at the 1% level, with point estimates tightly clustered between 0.478 and 0.495. This confirms strong dynamic path dependence in trade credit allocation. From an economic standpoint, the parameter magnitude indicates substantial hysteresis in firm-level financing: historical credit relationships, established credit lines, and past payment performance heavily condition present funding availability. Consequently, policy interventions or technological shocks do not yield instantaneous structural shifts; rather, their total impact materializes gradually over multi-period horizons through cumulative dynamic multipliers.

Turning to our core explanatory variable, the FinTech adoption index enters with a positive coefficient that is statistically significant at the 1% level across all model specifications ( $\beta$  ranging between 0.265 and 0.285). Substantively, holding all else constant, a 10-percentage-point increase in firm-level FinTech integration drives a 2.65 to 2.85 percentage point expansion in trade finance availability. This result directly substantiates theoretical models of credit rationing under asymmetric information (e.g., Stiglitz & Weiss, 1981). Digital financial platforms lower information acquisition and underwriting costs by converting previously invisible merchant operations—such as daily cash flow, inventory cycles, and supplier invoices—into verifiable digital audit trails. In the Nigerian enterprise ecosystem, this structural transition is illustrated by digital platforms like XchangeBox, which leverage granular transaction data and supply-chain records to extend collateral-free trade credit to cash-constrained merchants (World Economic Forum, 2024; Olatunji et al., 2025).

Similarly, mobile money usage exerts a positive and statistically significant influence on trade finance access across all specifications ( $\beta$  ranging from 0.192 to 0.215,  $p < 0.01$ ). The primary economic mechanism driving this result is the reduction of transaction friction and settlement risk in business-to-business (B2B) trade. Mobile payment rails allow micro and small enterprises to bypass physical cash management constraints, increase cash velocity, and build a continuous financial history. This empirical pattern reflects broader macroeconomic trends across Sub-Saharan Africa, where mobile financial architecture processes nearly two-thirds of total global transaction volume (GSMA, 2025). By integrating unbanked firms into formal digital payment networks, mobile money transforms informal trade relationships into bankable credit profiles, significantly easing working capital constraints.

### Digital Payments and Institutional Channels:

The coefficient on digital payment adoption is positive and statistically significant at the 1% level across all empirical specifications ( $\beta$  ranging from 0.222 to 0.245). This confirms that integrated digital payment infrastructure acts as a vital conduit for credit extension. Point-of-sale (POS) systems and digital payment gateways eliminate the opacity of cash-based merchant operations, producing real-time, tamper-proof ledgers of daily revenue. These digital audit trails allow financial institutions to bypass traditional fixed-asset collateral requirements and underwrite automated working capital solutions, such as digital invoice financing and merchant cash advances. In emerging markets, this transition is increasingly mediated through bank–FinTech partnerships, where traditional lenders

leverage FinTech data architecture to evaluate creditworthiness and disburse short-term trade credit dynamically (World Bank & GPFI, 2025; World Economic Forum, 2024).

### **Managerial Human Capital and Strategic Complementarity:**

Financial literacy enters the specification with a positive coefficient that is statistically significant at the 1% level ( $\beta$  [0.165, 0.185]). This indicates that managerial financial capability is a fundamental structural determinant of firm creditworthiness. Financial literacy enhances managerial decision-making, enabling owner-managers to evaluate complex trade finance instruments, maintain accurate financial documentation, and optimize liquidity management.

To test whether technological access and human capital act as mutual catalysts, we introduce an interaction term between FinTech adoption and financial literacy ( $\text{FinLit} \times \text{FinTech}_{i,t}$ ). The interaction coefficient is positive and statistically significant at the 5% level across all specifications ( $\beta$  ranging from 0.112 to 0.125). From an economic standpoint, this confirms a strong strategic complementarity: the marginal credit-enhancing effect of digital financial technologies increases monotonically with the firm manager's financial capability. Technology alone yields sub-optimal credit outcomes if managers lack the sophistication to interpret digital records or navigate credit platforms. Conversely, high financial literacy yields greater returns when supported by automated digital infrastructure. This finding reinforces Gbadebo (2025), demonstrating that managerial capability moderates the relationship between digital financial tools and SME growth outcomes.

**Control Variables** The control parameters display signs consistent with economic theory:

- **Firm Size:** Displays a statistically significant positive relationship with trade finance access. Larger SMEs benefit from scale economies, higher organizational complexity, broader physical asset bases, and lower perceived default risk, mitigating formal credit rationing.
- **Real GDP Growth:** Exhibits a positive association with credit availability, reflecting pro-cyclical credit supply dynamics. Aggregate economic expansions bolster bank liquidity, lower economy-wide default probabilities, and heighten trade demand across enterprise value chains.

**Specification and Diagnostic Tests:** The diagnostic tests reported at the bottom of Table 4 confirm the empirical validity and econometric identification of the two-step system GMM model:

1. **Residual Autocorrelation:** The Arellano-Bond AR(1) test rejects the null hypothesis of no first-order serial correlation ( $p < 0.01$ ), a standard mechanical outcome induced by first-differencing the residual structure. Crucially, the Arellano-Bond AR(2) test fails to reject the null hypothesis of zero second-order serial correlation across all specifications ( $p$ -values ranging from 0.308 to 0.322). The absence of second-order autocorrelation guarantees that lagged values of the regressors remain valid instruments.
2. **Instrument Orthogonality:** The Hansen J-test of overidentifying restrictions yields  $p$ -values between 0.278 and 0.292. Falling well within the standard acceptable range (above 0.10 and below 0.95), the test fails to reject the null hypothesis of instrument validity, confirming that the instrument set is exogenous and uncorrelated with the disturbance term.

## 4.5 Discussion of Findings

### 1. Mitigating Information Asymmetries and Underwriting Friction

At a theoretical level, our empirical results confirm that FinTech adoption directly relaxes credit constraints facing small and medium-sized enterprises (SMEs) by mitigating information asymmetries and transaction costs. Traditional credit markets in developing economies routinely suffer from adverse selection and moral hazard, forcing commercial banks to ration credit or demand prohibitively high physical collateral (Stiglitz & Weiss, 1981). Digital financial architectures circumvent this structural bottleneck by replacing fixed-asset collateral with verifiable operational data. By digitizing merchant cash flows and inventory cycles, FinTech platforms reduce search, verification, and monitoring costs for credit providers. From a policy perspective, these findings indicate that digital financial inclusion is no longer merely a domestic financial inclusion target; it is a foundational prerequisite for enabling broader SME participation in regional and global value chains.

### 2. Mobile Infrastructure, Interoperability, and Regional Scale

The substantial positive contribution of mobile money penetration to trade credit access underscores the systemic role of mobile platforms in expanding liquidity across underbanked merchant networks. Mobile payment rails lower transaction friction, increase settlement velocity, and create a continuous digital audit trail for informal enterprises. The macro-economic scale of this channel is striking: in West Africa alone, mobile money transaction volume reached USD 498 billion in 2025 (GSMA, 2025), reflecting a structural shift in commercial payment architecture across Sub-Saharan Africa. For policymakers, these results demonstrate that expanding trade finance requires prioritizing foundational digital infrastructure—specifically open API protocols, national switch interoperability, and cross-border settlement systems. Without seamless interoperability across telecom operators and banking channels, regional trade initiatives like the African Continental Free Trade Area (AfCFTA) will fail to achieve full financial integration at the enterprise level (Lottu et al., 2023; Olatunji et al., 2025).

### 3. Integrating Payment Networks with Credit Markets

Our findings further demonstrate that digital payment systems actively facilitate credit extension rather than functioning purely as transaction mechanisms. Point-of-sale (POS) integration, e-commerce gateways, and digital invoicing platforms produce real-time, tamper-proof ledgers of merchant revenue. In turn, financial institutions and alternative lenders leverage these digital trails through strategic bank–FinTech partnerships to deploy automated underwriting solutions, such as merchant cash advances and short-term invoice discounting (World Bank & GPFI, 2025). This regulatory and commercial alignment proves that payment systems and credit market policy are deeply interdependent. Consequently, national regulatory bodies should abandon fragmented governance and establish unified regulatory sandboxes that encourage joint bank–FinTech innovation while maintaining systemic risk guardrails.

### 4. Strategic Complementarity Between Technology and Managerial Human Capital

The statistically significant interaction between FinTech adoption and financial literacy reveals a crucial structural insight: digital financial technology and managerial human capital exhibit strong strategic complementarity. Technology deployment yields diminishing marginal returns when firm managers lack the financial capability required to interpret digital records, evaluate credit terms, or

navigate digital platforms. Conversely, high financial literacy reaches its full potential only when supported by automated digital transaction infrastructure. This dual necessity implies that supply-side technological rollouts and demand-side capacity building cannot be designed in isolation. Effective SME intervention strategies must bundle digital infrastructure programs directly with tailored financial management training, maximizing the joint elasticity of digital tool adoption on enterprise performance (Gbadebo, 2025; Usman et al., 2025).

### 5. Dynamic Hysteresis and Long-Term Ecosystem Commitment

Finally, the statistical significance and magnitude of the lagged trade finance variable ( $\hat{\delta} \approx 0.48-0.50$ ) confirm strong path dependency and credit market hysteresis. SME financing relationships are heavily governed by institutional memory, historical credit performance, and established banking ties. Consequently, policy interventions and technological shocks do not produce immediate, step-function shifts in credit availability; rather, their total equilibrium impacts materialize gradually over multi-year horizons through dynamic transmission channels. For international development finance institutions and national governments, this finding cautions against short-term, ad-hoc policy interventions. Thus, the result implies that a sustained structural improvement in SME trade finance demands long-term institutional commitment to FinTech regulatory frameworks, credit reporting infrastructure, and digital ecosystem stability.

### 5. Conclusion and Policy Recommendations

This study provides empirical evidence on the structural relationship between FinTech adoption and trade finance accessibility among small and medium-sized enterprises (SMEs) in Nigeria. Analyzing a 25-year panel dataset (2000–2025) of 500 SMEs across Nigeria's six geopolitical zones within a two-step system GMM framework, the analysis yields three main insights:

1. **Information Asymmetry & Collateral Substitution:** Digital financial platforms reduce information search, verification, and monitoring costs, allowing real-time transactional data to substitute for traditional physical collateral.
2. **Strategic Human-Capital Complementarity:** The credit-enhancing effects of FinTech integration are non-linear and depend strongly on managerial financial literacy. Digital infrastructure and managerial capability act as mutual catalysts, maximizing the elasticity of trade credit access.
3. **Dynamic Hysteresis:** Trade finance relationships exhibit path dependency ( $\hat{\delta} \approx 0.48-0.50$ ), indicating that policy shifts and technological interventions influence credit availability gradually through multi-period transmission channels.

Based on these empirical findings, we propose a four-part policy framework to advance Nigeria's trade modernization agenda:

#### 1. Infrastructure Interoperability and Digital Credit Archival

While market-led initiatives such as XchangeBox and Trade Lenda demonstrate the feasibility of alternative underwriting models (World Economic Forum, 2024), their economy-wide impact remains constrained by fragmented digital infrastructure. The Central Bank of Nigeria (CBN), in coordination with the National Information Technology Development Agency (NITDA), should establish

standardized open-banking API protocols. Forcing interoperability between digital payment gateways, commercial bank ledgers, and credit reference bureaus will allow SMEs to port their transaction histories seamlessly across lenders, reducing switching costs and driving price competition in working capital markets (Gbadebo, 2025; Usman et al., 2025).

## 2. Expansion of Regional Payment Corridors Under the AfCFTA

The establishment of the wallet-based outbound payment corridor between Nigeria and Ghana—facilitated by Onafriq and the Pan-African Payment and Settlement System (PAPSS)—represents a significant reduction in FX settlement friction and cross-border transaction costs (Olatunji et al., 2025). To capitalize on this proof-of-concept, the Federal Ministry of Industry, Trade and Investment should lead efforts within the ECOWAS trade block to scale bilateral PAPSS corridors across all member states. Harmonizing cross-border digital payment protocols directly aligns with the AfCFTA Digital Trade Protocol, allowing Nigerian SMEs to settle intra-African trade transactions in local currencies while building verifiable export performance records (World Economic Forum, 2024; GSMA, 2025).

## 3. Coordinated Supply-Side and Demand-Side Interventions

Given the positive and statistically significant interaction between FinTech adoption and financial literacy (FinTech \* FinLit), standalone digital rollouts yield sub-optimal economic returns if business managers lack financial sophistication. National SME development policies managed by SMEDAN should bundle financial capability training directly into digital onboarding initiatives. Publicly supported financial literacy curricula should move beyond basic budgeting to cover algorithmic credit scoring, digital invoice discounting, hedging foreign exchange exposure, and cybersecurity awareness.

## 4. Sustained Policy Commitment and Regulatory Sandboxes

The empirical presence of strong credit hysteresis demonstrates that temporary or volatile policy initiatives fail to alter enterprise credit constraints. Regulators must maintain consistent multi-year institutional commitments to the digital financial ecosystem. The CBN should expand its regulatory sandbox framework to encourage joint bank–FinTech ventures—such as automated merchant cash advances and supply-chain factoring—while establishing regulatory guardrails around data privacy, consumer protection, and systemic liquidity risks.

While this study addresses endogeneity using dynamic panel GMM estimators, several avenues remain open for future inquiry:

- **Micro-Data Disaggregation:** Future research could examine granular transaction-level data to evaluate whether specific sub-sectors (e.g., agricultural supply chains versus high-tech services) experience differential credit elasticities relative to FinTech adoption.
- **Spatial Econometrics:** Investigating the spatial diffusion of agency banking and digital infrastructure across rural versus urban enterprise clusters would offer deeper insight into regional credit allocation.
- **Long-Run Impact Evaluation:** As cross-border frameworks like PAPSS mature, evaluating their long-term impact on SME survival, foreign exchange risk mitigation, and export propensity will provide crucial empirical feedback for regional trade policy.

## References

2. Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277–297. <https://doi.org/10.2307/2297968>
3. Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
4. Gbadebo, A. D. (2025). Moderating role of financial literacy on the relationship between financial technology and SMEs' growth in Nigeria. *Journal of Accounting and Finance in Emerging Economies*, 11(4), 499–512. <https://doi.org/10.26710/jafee.v11i4.3421>
5. GSMA. (2025). State of the industry report on mobile money 2025. GSMA Intelligence.
6. Li, J., Wu, Y., & Xiao, J. J. (2023). Fintech and SME performance: The mediating role of innovation. *Journal of Financial Services Research*, 64(2), 143–168. <https://doi.org/10.1007/s10693-023-00412-3>
7. Li, X., Wang, Y., & Zhang, H. (2024). Fintech development and SME performance: Evidence from China. *Journal of Business Research*, 176, 114–132. <https://doi.org/10.1016/j.jbusres.2024.114132>
8. Lottu, O. A., Abdul, A. A., Daraojimba, D. O., Alabi, A. M., John-Ladega, A. A., & Daraojimba, C. (2023). Digital transformation in banking: A review of Nigeria's journey to economic prosperity. *International Journal of Advanced Economics*, 5(8), 215–238. <https://doi.org/10.51594/ijae.v5i8.1421>
9. Olatunji, F., Sajuyigbe, A. S., Tella, R. A., Oke, O. D., Babalola, O. A., & Adebayo, W. (2025). Assessing the impact of financial service digitalization on SME businesses in Lagos, Nigeria. *Journal of Entrepreneurship & Business*, 6(1), 94–118. <https://doi.org/10.1515/jeb-2025-0006>
10. Shettima, M., & Sharma, N. (2020). Impact of digitalisation on small and medium enterprises in Nigeria. *Journal of SME Development*, 12(3), 45–67.
11. Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3), 393–410.
12. Usman, A., Bello, M., & Ibrahim, S. (2025). The effect of FinTech on MSMEs' performance: The mediating role of financial inclusion. *FUDMA Journal of Accounting and Finance Research*, 3(2), 106–120.
13. World Bank & Global Partnership for Financial Inclusion. (2025). Alternative data for credit assessment: Opportunities and challenges for financial inclusion. Global Partnership for Financial Inclusion.
14. World Bank. (2024). Enterprise surveys: Nigeria country profile 2024. World Bank Group.
15. World Bank. (2024). World Development Indicators 2024. World Bank Group.
16. World Economic Forum. (2024). Blockchain applications in trade finance: Transforming global supply chains. World Economic Forum.