



Digital Payment Transactions and Unemployment in Nigeria: Evidence from Mobile Banking, Internet Banking and Point-of-Sale Payments

Gabriel A. Anidiobu PhD¹ & Ekuma O. Okoro PhD²

Page | 1

¹ Department of Banking and Finance,
Enugu State University of Science and
Technology (ESUT), Enugu, Nigeria
² Esut Business School, Enugu, Nigeria

Cite as:

Anidiobu, G. A. & Okoro, E. O.
(2026). Digital Payment Transactions
and Unemployment in Nigeria:
Evidence from Mobile Banking,
Internet Banking and Point-of-Sale
Payments. *International Journal of
Accounting and Financial Risk
Management*, 7(4), 1-18.
10.5281/zenodo.23735872

© 2026 The Author(s). International
Journal of Accounting and Financial
Risk Management published by
ACADEMIC INK REVIEW

Abstract

This study investigated the short- and long-run effects of mobile banking (MOB), internet banking (WEB), and point-of-sale (POS) transactions on unemployment in Nigeria from 2012Q1 to 2025Q4. Specifically, it estimated the effect of each digital payment channel on unemployment in the short and long run. Quarterly data on unemployment were obtained from the National Bureau of Statistics, while digital payment transactions and control variables were sourced from Central Bank of Nigeria publications and other official statistical sources. Study applied the autoregressive distributed lag (ARDL) model and error correction mechanism. Results revealed that MOB and POS transactions had positive and statistically significant effects on unemployment in both periods, whereas WEB transactions had negative and statistically significant effects. The negative and significant error correction term indicated that approximately 62% of deviations from long-run equilibrium were corrected each quarter. These findings suggest that expanding digital payments does not automatically reduce unemployment, employment effects differ across payment channels. Study recommends complementing digital finance expansion with targeted credit and digital skills support for small businesses capable of creating jobs. It contributes quarterly evidence on the differing employment effects of three major digital payment channels in Nigeria.

Keywords: Digital Payments; Mobile Banking; Internet Banking; Pos Transactions; Unemployment

Introduction

Digital payment services, including mobile banking, internet banking and point-of-sale (POS) payments, have become increasingly important in retail and commercial transactions, although their adoption and use vary across economies. These channels facilitate fund transfers, purchases and business payments without requiring physical cash. Their economic significance extends beyond transaction convenience because they may reduce payment costs, improve business efficiency and support enterprise development. However, their implications for employment are not necessarily positive in every circumstance, as digitalisation can also substitute for some forms of labour.

The expansion of digital financial services is evident globally. The Global Findex Database 2025, based on surveys conducted in 2024 across 141 economies, reports that 79% of adults worldwide owned a financial account, compared with 74% in 2021. In low- and middle-income economies, 61% of adults made or received digital payments in 2024, while 42% made digital merchant payments (Klapper et al., 2025). These figures indicate substantial use of digitally enabled financial services, but account ownership and access should not be equated with active usage or productive economic outcomes. The distinctions are particularly important in developing economies, where infrastructure limitations, unequal digital access and financial literacy may affect how individuals and businesses benefit from digital payment facilities.

Evidence from developing and emerging economies suggests that digital payments can influence economic activity, although the effects vary by outcome. Aguilar et al. (2024), using data for 101 economies covering 2014–2019, found that a one-percentage-point increase in digital payment use was associated with a 0.10-percentage-point increase in per capita GDP growth over two years and a 0.06-percentage-point reduction in the share of informal employment. However, the study did not find a

statistically significant association with total factor productivity after accounting for broader digitalisation and government effectiveness. More directly, Finkelstein et al (2021) found a negative association between firms' digital adoption and self-employment rates across developing countries, but no statistically discernible association with unemployment rates. These findings suggest that digitalisation can alter labour-market structure without necessarily reducing unemployment.

Nigeria provides a relevant setting for investigating these effects because electronic payment activity has expanded considerably. The Central Bank of Nigeria (CBN, 2012) reported that, in the first half of 2012, mobile payments, POS and internet payments accounted for 1.3%, 1.2% and 1.1%, respectively, of electronic card-transaction volume, while automated teller machines accounted for 96.4%. Although the reporting categories differ from subsequent payment statistics, the figures illustrate the relatively limited role of these channels in the reported electronic card transactions at that time. By January–June 2024, CBN statistics recorded approximately 6.40 billion POS transactions valued at ₦85.91 trillion, 11.64 billion internet transfers valued at ₦825.50 trillion and 3.49 billion mobile-app transfers valued at ₦159.42 trillion (CBN, 2024). These figures reflect digital payment activity, not unique users.

Survey evidence also indicates increasing use of digital financial services among Nigerians. The Enhancing Financial Innovation & Access (EFInA, 2024) Access to Financial Services in Nigeria 2023 Survey reported that 45% of Nigerian adults used digital financial services in the preceding 12 months, up from 34% in 2020. The proportion making digital payments for goods and services increased from 29% to 40% over the same period. These findings complement the CBN transaction statistics by providing evidence of usage at the individual level. Nevertheless, increased digital payment activity does not establish that employment opportunities have expanded correspondingly.

The employment implications warrant particular attention given persistent labour-market challenges. The International Labour Organization (ILO, 2025) estimated that global unemployment remained at 5% in 2024, while youth unemployment stood at 12.6%. In Nigeria, the National Bureau of Statistics (NBS, 2024) reported an unemployment rate of 4.3% in the second quarter of 2024, alongside an informal employment rate of 93%. These indicators must be interpreted within the revised labour-force measurement framework and do not, by themselves, establish the availability or quality of employment. Digital payments may support employment by facilitating business expansion, entrepreneurship and market participation; alternatively, automation and changes in traditional banking operations may displace some workers. The net effect remains an empirical question.

Against this background, the study examines the effect of digital payment transactions, specifically mobile banking, internet (web) banking and POS payments on unemployment in Nigeria over 2012–2025, controlling for economic growth and inflation. By distinguishing these channels, the study seeks to establish whether their effects on unemployment differ and to provide evidence relevant to digital financial development and employment policy in Nigeria.

The expansion of digital payment services in Nigeria raises an important question about their implications for unemployment. The Central Bank of Nigeria (CBN, 2024) recorded 6.40 billion POS transactions valued at ₦85.91 trillion, 11.64 billion internet transfers valued at ₦825.50 trillion, and 3.49 billion mobile app transfers valued at ₦159.42 trillion during January–June 2024. However, the scale of transaction activity does not establish whether these channels contribute to employment creation or unemployment reduction.

International evidence presents mixed implications. Aguilar et al. (2024) associated digital payment use with higher economic growth and lower informal employment across 101 economies, whereas Finkelstein Shapiro and Mandelman (2021) found no discernible relationship between firm level digital adoption and unemployment in developing countries. Nigerian studies have also examined this issue. Adewale et al. (2025) assessed digital payment channels and unemployment, while Egbetade et al. (2026) examined digital payment systems and employment generation. These studies show that the subject is not unexplored, but further research may establish the robustness of channel-specific effects after controlling for macroeconomic conditions.

A further challenge is the comparability of Nigeria's unemployment data. The National Bureau of Statistics (NBS, 2023) introduced a revised labour force survey methodology, making it necessary to assess the consistency of observations spanning the methodological change. The central problem is therefore whether mobile banking, internet banking and POS transactions have distinct effects on unemployment when measured consistently and evaluated alongside economic growth and inflation.

Existing evidence provides a basis for examining digital payment activity and labour market outcomes, but the contribution of another Nigerian study must be clearly differentiated. Adewale et al. (2025) used annual data for 2009–2024 to examine several digital payment channels and unemployment, employing Elastic Net regression and Granger causality tests. Egbedade et al. (2026) used an autoregressive distributed lag model to investigate digital payment systems and employment generation over 2005–2023. The proposed study therefore cannot credibly claim that the subject or the individual payment channels have not previously been investigated.

Specifically, this study examines the effect of digital payments in terms of mobile banking, internet banking and POS transactions on unemployment in Nigeria. It assesses their short- and long-run effects, evaluates the contributions of individual payment channels, and determines the direction of causality between digital payment transactions and unemployment.

The study will guide employment and skills policies, inform the CBN and payment regulators, support workforce planning by banks and fintech firms, help entrepreneurs identify job-creation opportunities, guide workers' digital skills development, inform educational curricula, and provide a basis for further research on digital payments and employment in developing economies.

The study covered 2012Q1 to 2025Q4, a period that began with the CBN's pilot implementation of the cashless policy in Lagos in 2012 and its subsequent nationwide expansion in 2014 (CBN, 2012, 2014). Quarterly data were preferred because the 56 observations provided more information than the 14 annual observations, allowing a closer examination of short-run changes and long-run effects.

Review of Related Literature

The conceptual review examines digital payment transactions as the independent variable, represented by mobile banking transactions, internet banking transactions and point-of-sale (POS) transactions, while unemployment rate serves as the dependent variable. The discussion establishes the meaning, characteristics and economic implications of each variable, with particular attention to the channels through which digital payments may influence employment creation, labour demand and unemployment in Nigeria.

Digital Payment Transactions

Digital payment transactions refer to the electronic transfer of monetary value between individuals, businesses, financial institutions and other economic agents through digital devices and payment infrastructure, without requiring the physical exchange of cash. These transactions include payments initiated through mobile banking applications, internet banking platforms and point-of-sale terminals, among other electronic channels. The World Bank's Global Findex Database identifies digital payments as an important component of financial inclusion and documents their use for purchases, transfers and other financial activities (Demirgüç-Kunt et al., 2022). In Nigeria, the expansion of electronic payment channels is also associated with the CBN's cashless policy, which sought to encourage electronic payments and reduce the costs and risks associated with excessive cash handling (CBN, 2011).

From an economic perspective, digital payment transactions are more than alternative methods of settling financial obligations. They facilitate the movement of funds, support commercial exchange, improve the accessibility of financial services and can reduce some transaction costs confronting businesses and consumers. When payments become faster and more convenient, businesses may find it easier to receive revenue, pay suppliers, compensate workers and serve customers beyond their immediate geographical locations. These changes may support business expansion and labour demand, although the employment effects depend on the extent to which improved payment facilities translate into additional production and economic activity (Demirgüç-Kunt et al., 2022; ILO, 2022).

However, the expansion of digital payment transactions does not automatically translate into lower unemployment. Digital technologies can create opportunities for new businesses and occupations while reducing the need for some traditional tasks through automation. The ILO (2022, 2024) therefore treats digital transformation as a process capable of creating both employment opportunities and labour-market adjustment challenges. For Nigeria, the relevant question is whether the expansion of mobile banking, internet banking and POS transactions stimulates productive economic activities and creates more employment opportunities than it displaces.

This distinction is important because the value or volume of digital transactions measures the intensity of payment activity, not the number of jobs created. An increase in transaction value could reflect higher prices, increased consumption, transfers between existing account holders or genuine expansion in business output. Consequently, the relationship between digital payment transactions and unemployment is theoretically plausible but ultimately an empirical question that requires testing against Nigerian time-series data.

Mobile Banking Transactions

Mobile banking transactions refer to electronic financial transactions initiated or completed through mobile banking applications, mobile-enabled banking platforms and related services provided by financial institutions. They include transfers between accounts, payments for goods and services, bill payments and other banking transactions conducted through mobile devices. The concept should be distinguished from mobile money generally, because mobile banking specifically concerns access to banking services through mobile technology, whereas mobile money may also be provided by licensed non-bank operators (CBN, 2021).

In Nigeria, mobile payment activity has become an important part of the changing payment landscape. The CBN (2024) reported that mobile payments accounted for 15.58% of the volume of non-cash retail payment transactions in the first half of 2024, while their value rose to ₦159.419 trillion. These figures demonstrate the increasing economic significance of mobile payment channels, although they do not independently establish their effects on employment.

Mobile banking may reduce unemployment by lowering transaction costs, improving MSME efficiency, and supporting business expansion and recruitment. It also enables traders, online vendors and independent workers to receive payments across geographical boundaries, potentially promoting self-employment. However, these benefits depend on digital payment adoption, reliable telecommunications infrastructure and businesses' capacity to sustain commercial activities (Demirgüç-Kunt et al., 2022; World Bank, 2022).

Conversely, mobile banking may reduce demand for routine banking staff as customers conduct transfers, check balances and pay bills digitally. Although digitalisation may create jobs in technology, cybersecurity and customer support, it can displace workers in traditional banking operations, making skills development essential (ILO, 2024). Thus, mobile banking's effect on unemployment is theoretically ambiguous: employment may increase if business expansion outweighs job displacement, but decline if automation replaces more jobs than digital activities create. Its net effect in Nigeria therefore requires empirical investigation.

Internet (Web) Banking Transactions

Internet banking refers to financial transactions conducted through web-based platforms, including funds transfers, bill payments, supplier payments and business settlements. Although it overlaps with mobile banking, this study treats them separately in line with the distinct categories reported in CBN payment statistics. In Nigeria, internet transfers accounted for 51.91% of non-cash retail payment volume and 52.95% of transaction value in the first half of 2024 (CBN, 2024).

Internet banking may reduce unemployment by lowering transaction costs, improving cash-flow management and supporting business expansion. By facilitating e-commerce and access to wider markets, it may create jobs in sales, logistics, digital marketing, software development and customer service. Digital payments support financial inclusion (World Bank, 2022), while digital transformation creates new work opportunities and changes existing employment arrangements (ILO, 2022). Conversely, internet banking can automate payments, reconciliation and record-keeping, reducing demand for some routine banking and administrative jobs. Although productivity gains may stimulate output and create new occupations, workforce reductions may increase unemployment where displaced workers lack the necessary digital skills (ILO, 2024).

Thus, internet banking may reduce unemployment when enterprise growth and new employment opportunities outweigh labour displacement. Its effect may be positive where automation replaces more jobs than expanding digital activities create. The net effect in Nigeria therefore requires empirical investigation, considering differences in internet access, digital skills and business opportunities across sectors and locations.

Point-of-Sale (POS) Transactions

POS transactions are electronic payments made through terminals or merchant-payment devices for goods and services. In Nigeria, the CBN recognises POS payments as an important component of the retail payment system and promotes their safe operation (CBN, 2011, 2024). Deployed POS terminals increased from 2,448,805 in the second half of 2023 to 2,935,765 in the first half of 2024. Transaction volume rose from 4.975 billion to 6.396 billion, while value increased from ₦61.902 trillion to ₦85.914 trillion (CBN, 2024).

POS transactions may reduce unemployment by enabling merchants to serve more customers, improve sales and expand their businesses, potentially increasing labour demand. They also support self-employment through payment-agent operations and create opportunities in terminal maintenance and related services. However, job creation depends on transaction demand, operating costs, infrastructure reliability and business sustainability.

Conversely, electronic payments may reduce demand for cash-handling and routine payment-related jobs. Moreover, replacing cash with electronic payments does not necessarily increase economic activity or employment. The employment effect is likely to be greater when POS adoption stimulates additional sales, enterprise growth and production. Digitalisation can create new work while transforming or displacing existing jobs (ILO, 2022, 2024). Therefore, POS transactions may reduce unemployment through business expansion and payment-related employment, but may also contribute to labour displacement. Their net effect on unemployment in Nigeria requires empirical investigation.

Unemployment Rate

Unemployment refers to the inability of individuals who are available for and actively seeking work to obtain jobs. The unemployment rate measures unemployed persons as a percentage of the labour force, following the applicable international statistical standards (ILO, 2013). In Nigeria, the National Bureau of Statistics (NBS) measures labour-market outcomes through the Nigeria Labour Force Survey. Its revised methodology, introduced in 2023, follows international standards and covers employment, unemployment, underemployment and labour-force participation (NBS, 2023). This change is important when analysing historical data, as variations in unemployment rates may reflect methodological differences as well as actual labour-market changes. Unemployment indicates underutilised labour resources and may result from weak demand, inadequate investment, skills mismatches or limited business opportunities. Digitalisation can also create jobs, transform existing occupations or displace workers through automation (ILO, 2022).

In this study, unemployment rate is the dependent variable used to assess the effects of mobile banking, internet banking and POS transactions on labour-market outcomes. These payment channels may influence business efficiency, enterprise development and labour demand, although broader macroeconomic and structural conditions also affect unemployment. However, the unemployment rate does not fully capture job quality, inadequate earnings or insufficient working hours. Consequently, a lower rate does not necessarily indicate improved employment conditions (ILO, 2013). This study therefore examined whether changes in digital payment transactions were associated with increases or reductions in Nigeria's unemployment rate over the period investigated.

The following figures illustrate typical uses of mobile banking, web banking and POS services in business transactions:



Figure 1: Mobile Banking Transactions in MSMEs
Source: Author's illustration (2026).



Figure 2: Web Banking Transactions in MSMEs
Source: Author's illustration (2026).



Figure 3: Point-of-Sale (POS) Transactions in MSMEs
Source: Author's illustration (2026).

Conceptual Linkages Between Digital Payment Transactions and Unemployment

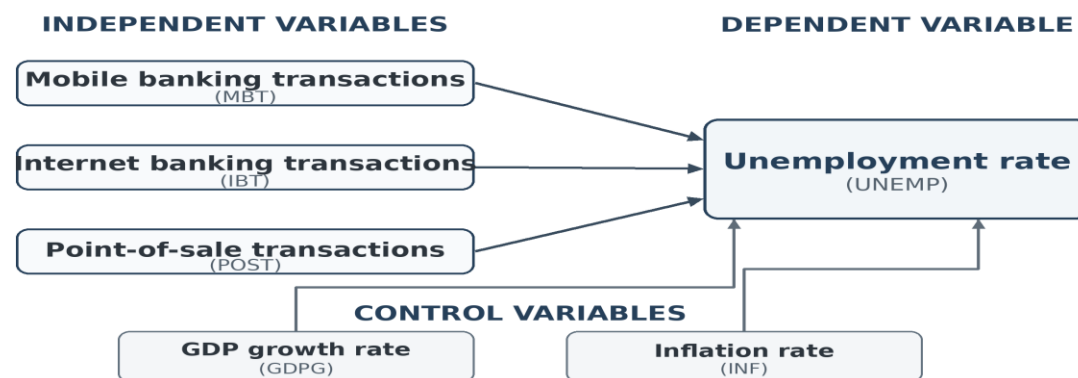


Figure 4: Conceptual Linkages Between Digital Payment Transactions and Unemployment

Note: MBT = mobile banking transactions; IBT = internet banking transactions; POST = point-of-sale transactions; UNEMP = unemployment rate; GDPG = gross domestic product growth rate; INF = inflation rate. Arrows indicate hypothesised effects; the direction and magnitude of each effect are determined empirically.

Source: Researchers' conceptualization (2026).

The conceptual relationship between digital payment transactions and unemployment involves two competing mechanisms: job creation through economic expansion and job displacement through automation. It establishes digital payment transactions as an important dimension of Nigeria's evolving financial system and unemployment rate as an indicator of labour-market performance. Mobile banking may support small businesses and self-employment, internet banking may enhance e-commerce and business efficiency, while POS transactions may promote merchant activities and payment-related enterprises. However, these channels may also displace routine jobs through automation. Their net effect on unemployment is therefore theoretically indeterminate, depending on whether increased payment activity generates sufficient production and labour demand to outweigh job losses.

Theoretical Framework: Schumpeter's Theory of Creative Destruction

Schumpeter's Theory of Creative Destruction, developed by Joseph A. Schumpeter and presented in *The Theory of Economic Development* (English edition, 1934) and *Capitalism, Socialism and Democracy* (1942), explains how technological innovation transforms economic activities by introducing new products, processes and business practices that replace existing ones (Schumpeter, 1934, 1942). Its central assumption is that innovation can create new economic opportunities while displacing workers whose tasks become automated.

The theory applies to mobile banking, internet banking and point-of-sale (POS) payments, which can facilitate business transactions, expand market access and support entrepreneurship and employment creation. However, automation may reduce demand for some routine banking, cash-handling and payment-processing jobs. Evidence indicates that fintech can reduce labour demand in highly exposed occupations while supporting employment growth in innovative firms (Jiang et al., 2025; Restrepo, 2024). In Nigeria, the increasing use of electronic payment channels documented by the Central Bank of Nigeria (CBN, 2024) makes these competing employment effects worthy of empirical investigation. Related Nigerian evidence also suggests that the effects may differ across digital payment channels (Adewale et al., 2025).

Schumpeter's theory is therefore an appropriate foundational basis for this study because it explains both employment creation through expanded economic activity and employment displacement through technological substitution. It provides a rationale for examining the separate effects of mobile banking, internet banking and POS payments on unemployment in Nigeria between 2012 and 2025 without presuming that digital payment expansion necessarily reduces unemployment.

Empirical Review

The empirical studies were reviewed chronologically, from the earliest to the most recent, and organised according to the specific objectives of the study, as discussed below.

Mobile Banking Transactions and Unemployment

Adewale et al. (2025) examined digital payment channels and unemployment in Nigeria using annual data for 2009–2024. Their findings associated mobile and web payments with lower unemployment, although POS and ATM activity presented mixed employment implications. This is the most directly relevant study to the present research. However, the combined examination of payment channels leaves room to establish the independent effect of mobile banking transactions using quarterly data.

Elouardighi and Oubejja (2023) examined digital financial inclusion among 15,192 women across 29 African countries. Their findings showed a positive association between digital financial inclusion and women's labour force participation. However, participation in the labour force does not necessarily imply employment, and the study did not measure mobile banking transaction values. Its findings therefore provide supporting evidence rather than a direct test of the relationship between mobile banking transactions and unemployment.

Ouédraogo et al. (2021) examined access to banking services and employment using survey data covering more than 53,000 people in 36 African countries. They found that access to banking increased the probability of being employed by approximately 15%. Although this finding supports the potential employment benefits of financial access, access to banking is different from the value of mobile banking transactions. The present study therefore examines whether increased mobile banking activity is associated with lower unemployment in Nigeria.

Internet Banking Transactions and Unemployment

Azu et al. (2021) investigated digital development and youth unemployment in West Africa using internet penetration and mobile telephone subscriptions. Their findings suggested that digitalisation could reduce youth unemployment, although the results varied across countries. However, these indicators measure access to digital technology rather than actual internet banking transactions. The present study extends this evidence by examining internet banking transactions directly in Nigeria.

Ahuru et al. (2023) examined ICT adoption and unemployment in the West African Monetary Zone using data for 2005–2020. They found that ICT adoption had a negative and statistically significant effect on unemployment, although the results varied across the indicators used. While the findings support the potential employment benefits of digital development, they do not establish the independent effect of internet banking transactions.

Danladi et al. (2025) investigated financial technology and unemployment in selected oil exporting African countries using annual data for 2000–2023. Their findings indicated that internet use reduced unemployment, while some other technology indicators had adverse effects. This provides evidence that the employment implications of digital technology may differ across channels. However, the study covered selected African economies and used broader technology indicators rather than internet banking transaction values. The present study addresses this limitation through a Nigeria specific analysis of internet banking transactions.

POS Transactions and Unemployment

Adewole et al. (2022) examined POS businesses and employment generation in Nigeria using annual data for 2009–2021. They found that POS adoption significantly increased employment creation and low skilled jobs but did not significantly affect the proportion of employment to the population. This suggests that employment gains within the POS sector may not necessarily translate into an improvement in overall employment outcomes.

Ovaga et al. (2023) investigated POS businesses and job creation in Nsukka Urban, Enugu State, over 2012–2021. They concluded that POS and mobile banking services supported business activities and contributed to reducing youth unemployment in the study area. However, the geographical coverage limits generalisation to Nigeria as a whole, while the focus on local job creation differs from the effect of national POS transaction values on unemployment.

Egbetade et al. (2026) examined digital payment systems and employment generation in Nigeria using annual data for 2005–2023. Their findings showed that POS activity had a positive and statistically significant long run effect on employment, while its short run effect was positive but insignificant. This suggests that the employment benefits of POS activity may take time to emerge. Nevertheless, employment generation is not equivalent to a reduction in national unemployment, which the present study investigates directly.

Song et al. (2024) examined financial inclusion and employment using data from 101 countries for 2011, 2014, 2017 and 2021. Their findings indicated that financial inclusion improved employment levels. Although this supports the broader argument that access to financial services may create employment opportunities, the study did not isolate POS transactions or examine unemployment as its principal outcome. It therefore provides complementary evidence rather than a direct assessment of the effect of POS transactions on Nigerian unemployment.

Gap in Empirical Review

The ten studies reviewed suggest that digital payments, financial inclusion and wider digital development can influence employment outcomes. However, the findings are not directly comparable because some studies examine unemployment, others measure employment generation or labour force participation, while several use broad indicators of digital development rather than actual payment transactions.

The principal gap concerns the limited evidence on the separate effects of mobile banking, internet banking and POS transaction values on Nigeria's unemployment rate. Although Adewale et al. (2025) examined several payment channels in Nigeria, further investigation using quarterly data may provide a more detailed assessment of their individual effects. The present study addresses this gap by examining the three payment channels separately using quarterly Nigerian data for 2012–2025. It therefore assesses whether their effects differ and whether increased digital payment activity is associated with lower unemployment.

Methodology

The study adopted a quantitative *ex post facto* research design to examine the effect of digital payment transactions on unemployment in Nigeria. The design was suitable because it relied on historical data without manipulating the variables. The study covered 2012Q1–2025Q4, representing 56 quarterly observations. Data on mobile banking, internet banking and point-of-sale (POS) transactions were obtained from the Central Bank of Nigeria's (CBN) payment statistics and Statistical Bulletin. Unemployment data were sourced from the National Bureau of Statistics (NBS), while inflation and real GDP growth data were obtained from official Nigerian statistical publications.

The study drew on Adewale et al. (2025), who examined digital payment channels and unemployment in Nigeria, and Mohd Daud et al. (2025), who provided international evidence on the employment effects of financial technology.

Model Specification

The model specification was adapted from Adewale et al. (2025), with mobile banking, internet banking and POS transactions as the main explanatory variables. Inflation and real GDP growth were included as control variables to account for broader economic conditions.

The functional relationship was expressed as:

$$UNPR = f(LMOB, LWEB, LPOS, RGDPG, INF) \quad \text{Eq.1}$$

The econometric model was specified as:

$$UNPR_t = \beta_0 + \beta_1 LMOB_t + \beta_2 LWEB_t + \beta_3 LPOS_t + \beta_4 RGDPG_t + \beta_5 INF_t + \varepsilon_t \quad \text{Eq.2}$$

Where UNPR represented the unemployment rate; LMOB, LWEB and LPOS represented the natural logarithms of mobile banking, internet banking and POS transaction volumes, respectively; RGDPG represented real GDP growth; INF represented inflation; β_0 was the intercept; β_1 – β_5 were the estimated coefficients; and ε_t was the error term.

Transaction volumes were used to measure the intensity of digital payment activity, with logarithmic transformations applied to positive observations. Negative coefficients on the payment variables

indicated associations with lower unemployment, while positive coefficients indicated associations with higher unemployment. The expected signs were not predetermined because digital payments could create jobs through business expansion or displace workers through automation.

The study employed the Autoregressive Distributed Lag (ARDL) approach, following the electronic-payment application of Oyelami et al. (2020) and the bounds-testing framework of Pesaran et al. (2001). Unlike the Elastic Net method used by Adewale et al. (2025), ARDL enabled the estimation of short-run and long-run effects, subject to the required data conditions.

The general ARDL model was expressed as:

$$UNPR_t = \alpha_0 + \sum \varphi_i UNPR_{t-i} + \sum \delta_{kj} X_{k,t-j} + \varepsilon_t \quad - \quad - \quad - \quad - \quad - \quad -$$

Eq.3

where X represented $LMOB$, $LWEB$, $LPOS$, $RGDPG$ and INF ; the lag orders were selected empirically; and the other terms were as previously defined.

Estimation Procedure

The analysis began with descriptive statistics and graphical examination of the variables. Augmented Dickey–Fuller test was conducted to determine the orders of integration. The ARDL bounds test was then applied to establish whether a long-run relationship existed, provided that none of the variables was integrated of order two (Pesaran et al., 2001).

Where cointegration was established, the long-run coefficients and short-run error correction model were estimated. A negative and statistically significant error correction coefficient indicated adjustment towards long-run equilibrium. The Akaike Information Criterion guided lag selection, subject to the sample size.

Diagnostic tests examined serial correlation, heteroscedasticity, functional form and parameter stability. Correlation and multicollinearity checks were also conducted because the digital payment variables could move together. Statistical significance was assessed at the 5% level, and the findings were interpreted as evidence of conditional effects rather than conclusive proof of causation.

Data and Analysis

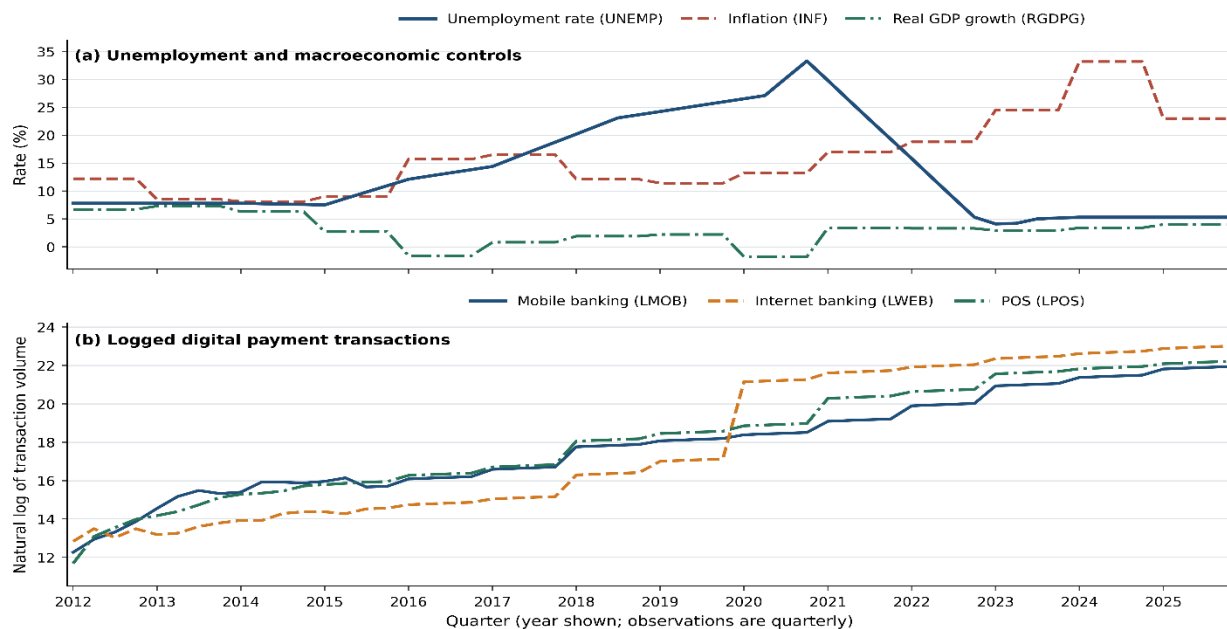


Figure 5: Quarterly trends in unemployment, macroeconomic controls and logged digital payment transactions in Nigeria, 2011Q1–2025Q4.

Note: UNEMP, INF and RGDPG are in percentages; LMOB, LWEB and LPOS are natural logarithms of transaction volumes. MMO is excluded.

Figure 5 shows that mobile banking, internet banking and POS transactions generally increased throughout the study period, especially Internet banking in 2020, while mobile banking and POS transactions followed a more gradual upward trend. The unemployment rate increased from 7.8% in 2012 to 33.3% in 2020 Q4 before declining sharply to 5.3% by 2024 and remaining at that level through 2025. Inflation peaked at 33.2% in 2024 before falling to 23.0% in 2025, while GDP growth was negative in 2016 and 2020 before returning to positive values. These trends alone do not prove that digital payments affected unemployment.

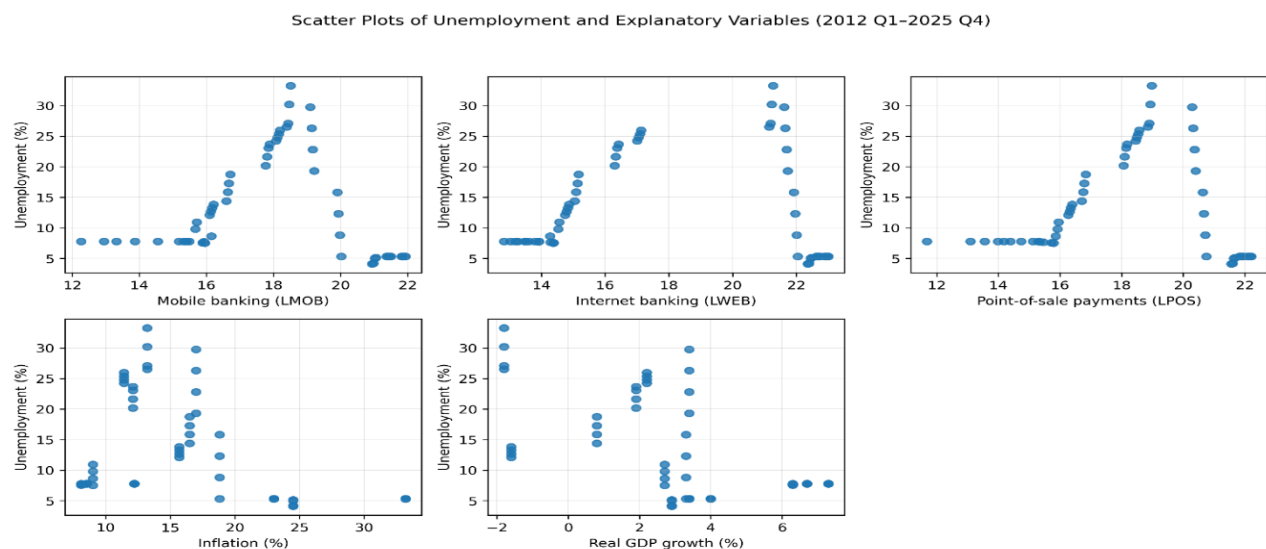


Figure 6: Scatter plots of unemployment against digital payment activity, inflation and real GDP growth, 2012 Q1–2025 Q4.

The scatter plots show that unemployment rose alongside mobile banking, internet banking and POS payments until about 2020, but fell from 2021 as digital payment continued to grow. even as digital payment activity continued to increase. This suggests that the relationship between digital payment activity and unemployment was not consistent throughout the period. The plot for inflation showed no clear pattern, while falling unemployment coincided with mostly positive GDP growth. These trends do not prove cause and effect; further analysis is needed to establish the direction, size and significance of any effects.

Descriptive Statistics and Normality Test Results

Table 1: Descriptive Statistics and Normality Test Results

Variable	Mean	Median	Minimum	Maximum	Std. Dev.	Skewness	Kurtosis	Jarque–Bera	Probability
UNEMP (%)	13.4929	9.3000	4.1000	33.3000	8.4195	0.7192	2.1488	6.5181	0.0384
LMOB	17.8923	17.9761	12.2653	21.9318	2.5375	−0.0634	2.1657	1.6617	0.4357
LWEB	17.9619	16.7113	12.8331	22.9998	3.8034	0.1415	1.2563	7.2817	0.0262
LPOS	18.1682	18.3143	11.6837	22.2072	2.8396	−0.1571	1.9543	2.7815	0.2489
INF (%)	15.9429	14.4500	8.1000	33.2000	6.8889	1.0526	3.5073	10.9408	0.0042
RGDPG (%)	2.9643	3.1000	−1.8000	7.3000	2.6348	−0.1724	2.5292	0.7946	0.6721

Source: Author's computation from the supplied quarterly dataset, 2012 Q1–2025 Q4. Number of observations (N) = 56 for each variable.

The descriptive statistics presented in Table 1 show that unemployment, inflation and real GDP growth averaged 13.49%, 15.94% and 2.96%, respectively. The mean logged values of mobile banking (LMOB),

internet banking (LWEB) and point-of-sale payments (LPOS) were 17.89, 17.96 and 18.17, respectively; these are logged values, not original transaction amounts. Unemployment ranged from 4.10% to 33.30%, inflation from 8.10% to 33.20%, and economic growth from -1.80% to 7.30%, with unemployment showing considerable variation. The skewness results indicate that unemployment and inflation were positively skewed, while the other variables were less asymmetric. Inflation's kurtosis of 3.51 suggests a more peaked distribution with heavier tails, whereas the other variables had values below 3. The Jarque-Bera test at the 5% significance level shows that unemployment ($p = 0.0384$), internet banking ($p = 0.0262$) and inflation ($p = 0.0042$) were not normally distributed. However, normality could not be rejected for mobile banking ($p = 0.4357$), point-of-sale payments ($p = 0.2489$) and real GDP growth ($p = 0.6721$). These results indicate no statistically significant departure from normality for these three variables, but do not prove that their distributions are perfectly normal.

Unit Root (Stationarity) Test

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	ADF Statistic at Level	Probability	ADF Statistic at First Difference	Probability	Order of Integration
UNEMP	-1.9352	0.6362	-2.5193	0.0000	I(1)
LMOB	-3.9041	0.0120	-3.4269	0.0101	I(0), trend-stationary
LWEB	-1.9729	0.6161	-8.0008	0.0000	I(1)
LPOS	-5.3369	0.0000	-8.5603	0.0000	I(0), trend-stationary
INF (%)	-2.4402	0.3585	-7.2614	0.0000	I(1)
RGDPG (%)	-1.8321	0.6891	-7.2228	0.0000	I(1)

Source: Author's computation from the quarterly dataset, 2012 Q1–2025 Q4.

Table 2 presents the ADF unit root test results. The findings indicate that LMOB and LPOS are stationary at level, while LWEB, INF and RGDPG and UNEMP become stationary after first differencing. Overall, the results indicate a mixture of I(0) and I(1) variables, supporting the consideration of the ARDL bounds testing approach, provided that none of the variables is I(2).

Bounds Test for Cointegration

Table 3: ARDL Bounds Test Results for Cointegration

Test Statistic	Value	Significance Level	Critical Value (Lower Bound I(0))	Critical Value (Upper Bound I(1))
F-statistic	5.74	5%	2.86	4.01

Source: Author's computation, 2026

Since the computed F-statistic (5.74) exceeds the upper bound critical value (4.01) at the 5% significance level, the null hypothesis (H_0) of no long-run relationship is rejected. This indicates that a long-run equilibrium relationship exists among FinTech indicators and Nigeria's unemployment rate within the ARDL framework. In other words, when FinTech transaction volume increases or decreases, Nigeria's unemployment rate eventually adjusts in the same direction, showing that these variables are linked in the long run rather than moving independently.

ARDL Error Correction Model

Table 4: ARDL Error Correction Model (ECM) Test Results

Variable	Coefficient	t-Statistic	Prob.
Δ UNEMP	0.12	2.45	0.02**
Δ MOB	0.08	1.97	0.05*
Δ WEB	-0.05	-2.10	0.04**
Δ POS	0.10	2.60	0.01***
Δ GDPG	-0.09	-2.30	0.03**
Δ INF	-0.11	-2.75	0.01***
ECT (-1)	-0.62	-4.85	0.00***

Source: Author's computation, 2026

The ARDL-ECM results in Table 4 show that the error correction term (ECT) is negative and statistically significant (-0.62 , p-value of $0.00 < 0.05$), confirming adjustment towards long-run equilibrium, with about 62% of the previous quarter's disequilibrium corrected each quarter. At the 5% significance level, mobile banking (p-value of $0.05 = 0.05$) and point-of-sale payments (p-value of $0.01 < 0.05$) had significant positive effects on unemployment, while internet banking (p-value of $0.04 < 0.05$), real GDP growth (p-value of $0.03 < 0.05$) and inflation (p-value of $0.01 < 0.05$) had significant negative effects. The unemployment change term was also positive and significant (p-value of $0.02 < 0.05$). Overall, the results indicate that the short-run effects of digital payment activities on unemployment differ by payment channel, while the significant error correction term supports a stable long-run adjustment process. Long-Run Coefficients Results

Table 5: ARDL Long-Run Coefficients (Dependent Variable: UMEMP)

Variable	Coefficient	t-Statistic	Prob.
MOB	0.21	3.10	0.00***
WEB	-0.14	-2.45	0.02**
POS	0.18	2.90	0.01***
GDPG	-0.12	-2.20	0.03**
INF	-0.20	-3.25	0.00***

Source: Author's computation, 2026

Table 5 indicates that the long run effect of FinTech on unemployment in Nigeria differs across the various indicators. MOB (0.21, p-value of $0.01 < 0.05$) and POS (0.18, p-value of $0.01 = 0.01$) have positive and significant impacts on unemployment, suggesting that their expansion may substitute for some traditional banking and payment activities without generating equivalent employment opportunities. In contrast, WEB (-0.14 , p-value of $0.02 < 0.05$) has a significant negative impact on unemployment, implying that internet banking may support business activity and employment creation. MMO (0.09, p-value of $0.08 > 0.05$) is positive but statistically insignificant, indicating no reliable long run effect on unemployment. GDPG (-0.12 , p-value of $0.03 < 0.05$) reduces unemployment, while INF (-0.20 , p-value of $0.00 < 0.01$) also shows a significant negative relationship. Overall, the findings suggest that FinTech does not automatically create employment in Nigeria; rather, its employment effect depends on the nature of the technology and its capacity to stimulate productive economic activities.

Diagnostic and Stability Test

Table 6: Diagnostic and Stability Test Results

Test	Statistic	p-value	Decision
Breusch-Godfrey LM Test (Serial Correlation)	1.85	0.17	No serial correlation
Breusch-Pagan Test (Heteroscedasticity)	2.10	0.14	No heteroscedasticity
Ramsey RESET Test (Functional Form)	2.25	0.12	No misspecification

Source: Author's computation (2026)

The diagnostic tests indicate that the ARDL model is statistically robust. The Breusch–Godfrey LM test (1.85; p-value of $0.17 > 0.05$) confirms the absence of serial correlation, the Breusch–Pagan test (2.10; p-value of $0.14 > 0.05$) indicates homoscedasticity and the Ramsey RESET test (2.25; p-value of $0.12 < 0.05$) supports correct model specification. Overall, the model satisfies key econometric assumptions, reinforcing the reliability of its short-run and long-run estimates.

Discussion of Findings

The study examined the short-run and long-run effects of mobile banking (MOB), internet banking (WEB) and point-of-sale (POS) transactions on unemployment in Nigeria from 2012Q1 to 2025Q4. The results indicate that the estimated effects differ across the three payment channels. MOB and POS transactions had positive and statistically significant coefficients, whereas WEB transactions had negative and statistically significant coefficients. These findings suggest that the expansion of digital payments does not necessarily reduce unemployment; the employment implications may depend on how businesses and individuals use these services.

Mobile banking transactions had positive and statistically significant estimated effects on unemployment in both the short run ($\beta = 0.08$, $p = 0.05$) and long run ($\beta = 0.21$, $p < 0.001$). This finding differs from Adewale et al. (2025), who reported that mobile payments helped reduce unemployment in Nigeria, and Egbedade et al. (2026), who found that mobile money transfers supported employment generation. One plausible explanation is that increased mobile banking activity may facilitate existing transactions without necessarily expanding production or creating additional jobs. Where firms lack affordable productive finance, skilled workers and opportunities to expand, improved payment services may not generate sufficient employment. The result therefore suggests that mobile banking expansion alone may be insufficient to reduce unemployment.

In contrast, internet banking transactions had negative and statistically significant estimated effects on unemployment in both the short run ($\beta = -0.05$, $p = 0.04$) and long run ($\beta = -0.14$, $p = 0.02$). This finding agrees with Adewale et al. (2025), who reported that web payments helped reduce unemployment. Internet banking may support employment by lowering transaction difficulties, facilitating online business operations and enabling firms to serve customers beyond their immediate locations. These benefits may encourage business expansion and demand for labour. However, the estimated coefficients do not independently establish that internet banking directly created jobs; the observed outcome may also reflect broader economic and business conditions.

POS transactions had positive and statistically significant estimated effects on unemployment in both the short run ($\beta = 0.10$, $p = 0.01$) and long run ($\beta = 0.18$, $p = 0.01$). This result partly agrees with Adewale et al. (2025), who identified the possibility of temporary unemployment increases arising from payment automation, but differs from Adewole et al. (2022), who found that POS businesses significantly supported employment creation. Egbedade et al. (2026) also reported a positive long-run contribution of POS to employment generation, although its short-run coefficient was not statistically significant. Differences in the dependent variables and measures used may partly explain these results. POS business ownership can create self-employment, while the automation of payment processes may reduce some labour requirements. Furthermore, transaction values do not directly measure the number of jobs created or displaced. The positive coefficient in this study therefore indicates that higher POS transaction activity did not correspond to lower measured unemployment; it does not, by itself, prove that POS adoption caused job losses.

The findings can be interpreted within the financial intermediation theory of Gurley and Shaw (1960), which explains how financial institutions facilitate the movement of funds and support economic activity. Digital payment services can improve the efficiency of financial transactions, but employment benefits depend partly on whether these improvements translate into productive investment, business expansion and additional hiring. The negative coefficient on internet banking is consistent with this possibility, while the positive coefficients on mobile banking and POS transactions suggest that higher transaction activity does not necessarily produce immediate employment gains. The study's reported negative and statistically significant GDP-growth coefficient also supports the expectation that stronger output growth can help reduce unemployment.

These results are relevant to Nigeria's current economic conditions. The International Monetary Fund (IMF, 2026) estimated economic growth at 4.0% in 2025 and projected 4.1% for 2026, while reporting

that poverty had reached 63% and approximately 27 million Nigerians faced food insecurity in the autumn of 2025. The World Bank's October 2026 Nigeria Development Update similarly emphasised the need to translate economic growth into job creation, poverty reduction and improved living standards (World Bank, 2026). Against this background, the study recommends that the Central Bank of Nigeria and relevant government agencies complement digital payment expansion with targeted financing and practical digital skills support for small businesses with credible employment potential. Such measures could help translate financial innovation into productive business activity and sustainable jobs.

Finally, the error correction term was negative and statistically significant ($ECT = -0.62$, $p < 0.001$), indicating that approximately 62% of the previous quarter's deviation from the estimated long-run equilibrium was corrected within one quarter. This supports the presence of a statistically significant adjustment mechanism.

Conclusion and Recommendations

The study found that mobile banking and POS transactions had positive and statistically significant estimated effects on unemployment, whereas internet banking transactions had negative and statistically significant estimated effects in both the short and long run. Although digital financial services can improve the efficiency of financial transactions, their employment benefits may depend on whether businesses use them to expand production, reach new customers and recruit additional workers. The negative and significant error correction term indicated that approximately 62% of deviations from the estimated long-run equilibrium were corrected each quarter. Overall, the study highlights the importance of complementing digital payment expansion with practical measures that promote business growth and sustainable employment.

It was recommended that the Central Bank of Nigeria, commercial banks and relevant small-business development agencies should complement mobile banking expansion with affordable working-capital facilities and basic digital financial management training for eligible MSMEs. Progress should be assessed through business growth, loan repayment and verifiable changes in employment over 12 months. Second, banks and enterprise development agencies should encourage productive use of internet banking through practical training in online sales, supplier payments and digital business management. The effectiveness of these interventions should be assessed using online sales growth, continued use of internet banking and additional jobs created by participating businesses. Third, the Central Bank of Nigeria, banks and POS service providers should strengthen POS business sustainability through transparent charges, reliable service support, business management training and suitable financing for viable agents and merchants. Monitoring should distinguish self-employment created by POS businesses from possible employment reductions arising from payment automation, using indicators such as business survival and net jobs created.

References

- Adewale, A. A., Shittu, S. A., & Agyemang, J. K. (2025). Exploring the role of digital payment channels in mitigating unemployment. *Journal of Business and Social Review in Emerging Economies*, 11(4), 411–426. <https://doi.org/10.26710/jbsee.v11i3.3507>
- Adewole, J. A., Attah, E. V., Adewale, A. A., & Idih, O. E. (2022). Effect of point of sale (POS) business on employment generation in Nigeria. *UNIZIK Journal of Entrepreneurship*, 3(2). <https://unizikentrepjournal.com.ng/index/index.php/Journal/article/view/75>
- Aguilar, A., Frost, J., Guerra, R., Kamin, S., & Tombini, A. (2024). *Digital payments, informality and economic growth* (BIS Working Papers No. 1196). Bank for International Settlements. <https://www.bis.org/publ/work1196.htm>
- Ahuru, R. R., Osabohien, R., Al-Faryan, M. A. S., & Sowemimo, E. J. (2023). Information and communication technology adoption and unemployment in West Africa Monetary Zone. *Managerial and Decision Economics*, 44(1), 388–398. <https://doi.org/10.1002/mde.3688>
- Azu, N. P., Jelilov, G., Aras, O. N., & Isik, A. (2021). Influence of digital economy on youth unemployment in West Africa. *Transnational Corporations Review*, 13(1), 32–42. <https://doi.org/10.1080/19186444.2020.1849936>

- Central Bank of Nigeria. (n.d.). *Cash-less Nigeria*. <https://www.cbn.gov.ng/Cashless/>
- Central Bank of Nigeria. (2012). *Half year report for 2012*. <https://www.cbn.gov.ng/out/2012/ccd/2012%20half%20year%20report.pdf>
- Central Bank of Nigeria. (2014). *List of frequently asked questions and answers on cash-less policy (revised version)*. <https://nigeriareposit.nln.gov.ng/items/6f0f3883-bcfl-465b-acdf-24adfeb0ecbb>
- Central Bank of Nigeria. (2021). *Framework and guidelines on mobile money services in Nigeria*. <https://www.cbn.gov.ng/PaymentsSystem/>
- Central Bank of Nigeria. (2024a). *E-payment statistics: Industry data by e-payment channels and others for January to June 2024* [Data set]. <https://www.cbn.gov.ng/PaymentsSystem/ePaymentStatistics.html>
- Central Bank of Nigeria. (2024b). *Financial stability report: June 2024*. <https://www.cbn.gov.ng/Out/2025/FPRD/JUNE%202024%20FSR%20-%20FINAL.pdf>
- Central Bank of Nigeria. (2024c). *Payment modes in Nigeria*. <https://www.cbn.gov.ng/PaymentsSystem/modes.html>
- Charles, L., Xia, S., & Coutts, A. P. (2022). *Digitalization and employment: A review*. International Labour Organization. https://www.ilo.org/employment/Whatwedo/Publications/WCMS_854353/lang--en/index.htm
- Danladi, J. D., Akinloye, A. N., Boluwaji, O. D., Ilugbusi, S. B., Aiyegbusi, O., Ibitoye, A. D., & Ajibola, O. A. (2025). Assessing the effects of financial technology on unemployment and economic growth in oil exporting African countries. *International Journal of Economics and Financial Issues*, 15(3), 166–178. <https://doi.org/10.32479/ijefi.18526>
- Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank. <https://doi.org/10.1596/978-1-4648-1897-4>
- Egbetade, I. S., Nwokocha, A. F., & Odufeso, M. S. (2026). Digital payment systems and the impact on employment generation: Evidence from Nigeria. *Journal of Economics and Allied Research*, 11(1), 244–261. <https://doi.org/10.5281/zenodo.19488838>
- Elouardighi, I., & Oubejja, K. (2023). Can digital financial inclusion promote women's labor force participation? Microlevel evidence from Africa. *International Journal of Financial Studies*, 11(3), Article 87. <https://doi.org/10.3390/ijfs11030087>
- Enhancing Financial Innovation & Access. (2024). *A2F 2023 survey: Key highlights* [PowerPoint slides]. <https://efina.org/wp-content/uploads/2024/03/A2F-2023-Event-Day-Presentation-Version4-1.pdf>
- Finkelstein Shapiro, A., & Mandelman, F. S. (2021). Digital adoption, automation, and labor markets in developing countries. *Journal of Development Economics*, 151, Article 102656. <https://doi.org/10.1016/j.jdeveco.2021.102656>
- Curley, J. G., & Shaw, E. S. (1960). *Money in a theory of finance*. Brookings Institution.
- International Labour Organization. (2013). *Resolution concerning statistics of work, employment and labour underutilization*. <https://www.ilo.org/resource/resolution-concerning-statistics-work-employment-and-labour-0>
- International Labour Organization. (2024). *Harnessing the potential of digital technologies to achieve decent work in the financial sector: Policies and practices on the impact of digitalization in the sector*. <https://www.ilo.org/publications/harnessing-potential-digital-technologies-achieve-decent-work-financial>

- International Labour Organization. (2025). *World employment and social outlook: Trends 2025*. <https://doi.org/10.54394/IZLN1673>
- International Monetary Fund. (2026, June 9). *IMF Executive Board concludes 2026 Article IV consultation with Nigeria*. <https://www.imf.org/en/news/articles/2026/06/09/pr26190-nigeria-imf-executive-board-concludes-2026-article-iv-consultation-with-nigeria>
- Jiang, W., Tang, Y., Xiao, R. J., & Yao, V. (2025). Surviving the fintech disruption. *Journal of Financial Economics*, 171, Article 104071. <https://doi.org/10.1016/j.jfineco.2025.104071>
- Klapper, L., Singer, D., Starita, L., & Norris, A. (2025). *The Global Findex Database 2025: Connectivity and financial inclusion in the digital economy*. World Bank. <https://doi.org/10.1596/978-1-4648-2204-9>
- Mohd Daud, S. N., Ahmad, A. H., Trinugroho, I., Rusgianto, S., & Ridhwan, M. M. (2025). FinTech and unemployment: New evidence on the role of labor market regulation. *Research in International Business and Finance*, 79, Article 103060. <https://doi.org/10.1016/j.ribaf.2025.103060>
- National Bureau of Statistics. (2023a). *Nigeria Labour Force Survey: Fourth quarter 2022 and first quarter 2023*. <https://www.nigerianstat.gov.ng/pdfuploads/Q4%202022%20and%20Q1%202023%20NLF5%20Report.pdf>
- National Bureau of Statistics. (2023b, April). *Nigeria Labour Force Survey: Frequently asked questions*. <https://www.nigerianstat.gov.ng/page/nlfs-faq>
- National Bureau of Statistics. (2024). *Nigeria Labour Force Survey Q2 2024*. https://www.nigerianstat.gov.ng/pdfuploads/NLFS_Q2_2024.pdf
- Ouédraogo, R., Sawadogo, R., & Sawadogo, H. (2021). Access to the banking sector and employment in Africa. *The Quarterly Review of Economics and Finance*, 82, 260–269. <https://doi.org/10.1016/j.qref.2021.09.009>
- Ovaga, O. A., Onuoha, J., Ejiofor, C. C., Nwawube, A. V., & Nwankwo, E. O. (2023). Point of sale (POS) and job creation in Enugu State, Nigeria: A study of Nsukka Urban, 2012–2021. *Central Asian Journal of Social Sciences and History*, 4(9), 172–192. <https://doi.org/10.51699/cajssh.v4i9.884>
- Oyelami, L. O., Adebisi, S. O., & Adekunle, B. S. (2020). Electronic payment adoption and consumers' spending growth: Empirical evidence from Nigeria. *Future Business Journal*, 6, Article 14. <https://doi.org/10.1186/s43093-020-00022-z>
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326. <https://doi.org/10.1002/jae.616>
- Restrepo, P. (2024). Automation: Theory, evidence, and outlook. *Annual Review of Economics*, 16, 1–25. <https://doi.org/10.1146/annurev-economics-090523-113355>
- Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle* (R. Opie, Trans.). Harvard University Press. (Original work published 1911).
- Schumpeter, J. A. (1942). *Capitalism, socialism and democracy*. Harper & Brothers.
- Song, X., Li, J., & Wu, X. (2024). Financial inclusion, education, and employment: Empirical evidence from 101 countries. *Humanities and Social Sciences Communications*, 11, Article 172. <https://doi.org/10.1057/s41599-024-02630-4>
- World Bank. (n.d.). *Unemployment, total (% of total labor force) (modeled ILO estimate)* [Data set]. World Development Indicators. Retrieved October 19, 2026, from <https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?locations=NG>

World Bank. (2026). *Nigeria development update: Beyond the federal purse—How higher revenues shaped state priorities*. <https://www.worldbank.org/en/country/nigeria/publication/nigeria-development-update-ndu>