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Impact of Fintech Penetration on Unemployment Reduction in Nigeria

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ABSTRACT
This study examined the impact of fintech penetration on unemployment reduction in Nigeria, recognizing that despite the growth of digital finance, unemployment remains a pressing socioeconomic issue. The main objective was to assess how different aspects of fintech—Instant Pay Penetration Rate (IPPR), Internet Transaction Penetration Rate (ITPR), and Mobile Payment Penetration Rate (MPPR)—affect unemployment levels. The study utilized an Autoregressive Distributed Lag (ARDL) model to analyse time series data on fintech indicators and unemployment rates, employing cointegration and error correction techniques to capture both short-run and long-run relationships.The findings revealed a significant but positive effect of Instant Pay Penetration Rate on unemployment, suggesting that while instant payments enhance efficiency, they may inadvertently lead to job displacement in traditional financial roles. Conversely, Internet Transaction Penetration Rate had a negative and significant impact on unemployment, indicating that internet-based financial services contributed positively to employment by supporting the digital economy and enabling e-commerce growth. Mobile Payment Penetration Rate also showed a negative and significant effect on unemployment, highlighting the role of mobile payments in fostering financial inclusion and empowering small businesses, particularly in underserved areas.Based on these findings, specific recommendations were made to relevant institutions. The Central Bank of Nigeria (CBN) was advised to develop retraining programs for workers displaced by digital finance automation. The Nigerian Communications Commission (NCC) and Ministry of Communications and Digital Economy were encouraged to expand internet access in rural areas to maximize the job creation potential of internet transactions. Additionally, the National Information Technology Development Agency (NITDA) was recommended to incentivize mobile payment providers to extend services to remote regions, thereby supporting small businesses and job growth. These measures could help ensure that fintech expansion contributes positively to Nigeria's labour market.

Keywords: *Fintech, Instant Pay Penetration Rate, Internet Transaction Penetration Rate, Mobile Payment Penetration and unemployment rates*
JEL Codes: *G20, E42, L86, O33, and J64*

I. Introduction

The global financial structure has experienced a significant transformation with the advent and rapid growth of financial technology, commonly known as fintech. This digital revolution in financial services has reshaped traditional banking models, payment systems, and access to financial products across the world. The penetration of fintech has been particularly impactful in emerging markets, where it has the potential to address long-standing issues of financial inclusion and economic development.

Globally, fintech penetration has surged, driven by increasing smartphone adoption, enhanced internet connectivity, and a rising demand for efficient and accessible financial services. According to a report by Ernst & Young (2020), the average global fintech adoption rate has reached 64%, with countries like China and India leading with over 87% adoption rates. This penetration has not only made financial services more accessible but has also spurred new opportunities for employment and economic growth.

In sub-Saharan Africa, the fintech sector has emerged as a key driver of financial inclusion and economic growth. The region has witnessed a surge in mobile money adoption, with the number of registered mobile money accounts in sub-Saharan Africa reaching 548 million in 2020, accounting for nearly half of the global total (GSMA, 2021). This growth has been fuelled by increased smartphone penetration, improved internet connectivity, and a young, tech-savvy population eager to embrace digital financial solutions.

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www.ijhssm.org

Narrowing down to Nigeria, the country has emerged as a fintech powerhouse in Africa, with Lagos becoming a hub for fintech innovation and investment. The Nigerian fintech ecosystem has experienced remarkable growth, with the number of fintech companies increasing from 54 in 2018 to over 200 in 2020 (Ezie,*et al*, 2023). In 2023, McKinsey further reported that the fintech sector in Africa was valued at over $1.5 billion and was expected to grow at a compound annual growth rate (CAGR) of 12% until 2025. This growth has been accompanied by significant increases in fintech penetration rates across various sectors. The Instant Pay Penetration Rate, defined as the value of instant pay transactions ratio to GDP, has seen a substantial rise, with the Nigeria Inter-Bank Settlement System (NIBSS) reporting a 50% year-on-year increase in instant payments volume in 2020 (NIBSS, 2021). Similarly, the Internet Transaction Penetration Rate, measured as the value of internet (web) transactions ratio to GDP, has shown consistent growth, with online transactions in Nigeria reaching ₦132.3 trillion in 2023, a 78% increase from 2021 (Nigeria Communications Commission, 2023). The Mobile Payment Penetration Rate, calculated as the value of mobile payment transactions ratio to GDP, has also experienced significant expansion, with mobile payments in Nigeria growing by 391% in 2019 alone (PwC, 2021).

Unemployment reduction has been a critical global challenge, with governments and policymakers seeking innovative solutions to create jobs and stimulate economic growth. Globally, the International Labour Organization (ILO, 2021) estimated that the global unemployment rate stood at 6.5% in 2020, as the COVID-19 pandemic worsened existing employment challenges. In developed economies, technology-driven sectors, including fintech, have shown potential in reducing unemployment by creating new roles in software development, cybersecurity, data analysis, and financial management. In the United States, for instance, the fintech industry was reported to have created over 300,000 jobs directly and indirectly between 2016 and 2020 (PwC, 2021). Similar trends have been observed in the European Union, where fintech companies contributed to job creation even amidst broader economic uncertainties.

In Nigeria, unemployment has been a persistent socio-economic challenge, with the unemployment rate rising from 23.1% in 2018 to 33.3% in 2022 (National Bureau of Statistics, 2023). This high unemployment rate, particularly among youth, has been a source of concern for policymakers and has spurred efforts to diversify the economy and create new job opportunities.

Therefore, it is in the interest of this study to conduct an analysis of how fintech penetration has impacted unemployment reduction in Nigeria from2012Q1-2023Q4.

The seminar addressed the following research questions and hypotheses:

i. What impact does instant pay penetration rate has on unemployment rates in Nigeria?
ii. How has internet transaction penetration rate impacted on unemployment rates in Nigeria?
iii. To what extend does mobile payment penetration rate impact on unemployment rates in Nigeria?

H_{01}: Instant Pay Penetration Rate has no significant impact on unemployment rates in Nigeria

H_{02}: Internet Transaction Penetration Rate has no significant impact on unemployment rates in Nigeria

H_{03}: Mobile Payment Penetration Rate has no significant impact on unemployment rates in Nigeria

II. Literature Review

Financial technology (fintech)

Financial technology (fintech) refers to technological innovations that aim to improve and automate the delivery and use of financial services. Fintech encompasses a wide range of applications, including digital payments, peer-to-peer lending, online banking, and blockchain technology. According to Gomber, *et al.,* (2017), fintech represents the convergence of finance and technology to create new business models, processes, and products that disrupt traditional financial systems. The rise of fintech has not only transformed financial services but has also driven economic changes, such as increased financial inclusion, enhanced business efficiency, and job creation (Ezie *et al*, 2023). In the context of measuring fintech penetration, it is critical to analyse specific indicators that illustrate how deeply fintech services are integrated within an economy. Key indicators of fintech penetration include Instant Pay Penetration Rate, Internet Transaction Penetration Rate, and Mobile Payment Penetration Rate.

Instant Pay Penetration Rate is an indicator that measures the value of instant payment transactions relative to a country's Gross Domestic Product (GDP). Instant payments such as Nigeria Inter-Bank Settlement System (NIBSS) are transactions where funds are transferred immediately between accounts, often through real-time payment networks. The Instant Pay Penetration Rate reflects how widely these fast and efficient

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payment methods are adopted within the economy. According to Banerjee and Sehgal (2021), a higher Instant Pay Penetration Rate indicates that the economy is transitioning away from cash-based transactions and embracing digital payment methods, which can enhance overall economic efficiency. In Nigeria, for instance, the value of instant payment transactions reached over 50% of GDP in 2022, indicating a significant level of digital financial activity and the diminishing reliance on cash (Central Bank of Nigeria, 2022).

Internet Transaction Penetration Rate, on the other hand, captures the value of internet-based financial transactions as a ratio to GDP. This indicator is essential for understanding how internet-enabled payment methods—such as e-commerce payments, online banking, and digital wallet transactions—contribute to economic activities. According to Ozili (2018), a higher Internet Transaction Penetration Rate suggests greater integration of digital financial services within the economy and reflects a robust digital infrastructure. The growth of internet transactions is often associated with increased consumer and business confidence in using digital platforms for financial activities. In Nigeria, the increasing use of internet-based transactions, which accounted for a significant proportion of the country's GDP in recent years, has been driven by an expanding middle class and the proliferation of e-commerce platforms (McKinsey & Company, 2020).

Mobile Payment Penetration Rate is another critical measure of fintech penetration. It represents the value of mobile payments—transactions conducted via mobile phones—as a percentage of GDP. This metric is particularly relevant in economies where mobile phones serve as the primary means of accessing financial services, especially in rural and underserved areas. Mobile payment platforms, such as mobile money and mobile banking apps, enable users to send, receive, and save money using their mobile devices. As noted by Sahay, Čihák, N'Diaye, Barajas, and Pena (2020), a high Mobile Payment Penetration Rate indicates widespread adoption of mobile financial services, which can promote financial inclusion by reaching populations that lack access to traditional banking infrastructure. In Nigeria, mobile payment transactions have grown exponentially in recent years, fuelled by the proliferation of mobile wallets like Paga, Opay, and MoMo. As of 2021, mobile payment transactions in Nigeria accounted for over 10% of the country's GDP, demonstrating the role of mobile platforms in enhancing financial accessibility (Enhancing Financial Innovation & Access, 2021).

Fintech penetration, as illustrated by these indicators, serves as a proxy for understanding the depth and reach of digital financial services within an economy. Scholars have emphasized the importance of measuring fintech penetration to evaluate the extent to which digital innovations are integrated into the financial system. According to Chinn and Ito (2020), a high penetration rate of fintech services indicates that an economy is more likely to experience positive economic spillovers, such as improved financial inclusion, higher economic output, and reduced transaction costs. These measures also reflect the transformative potential of fintech in reshaping traditional financial services, reducing inefficiencies, and contributing to broader economic development goals.

Unemployment reduction

Unemployment reduction is a key indicator of a country's economic health and social well-being, as it directly reflects the capacity of an economy to provide adequate employment opportunities for its labour force. Unemployment reduction according to Oloye (2021)can be defined as a decrease in the number of individuals who are willing and able to work but are unable to find suitable employment within a given period. It is a phenomenon often analysed through changes in the unemployment rate, which measures the proportion of the active labour force that is unemployed and seeking work. Scholars and economists frequently explore the factors contributing to unemployment reduction, such as economic growth, technological advancements, policy interventions (Osiobe, 2020). According to Blanchard and Katz (2019), a reduction in unemployment is associated with improved economic conditions, which may result from increased business investments, the expansion of industry sectors, or government policies promoting job creation.

Unemployment reduction is often measured through various indicators, with the most prominent being the unemployment rate. The unemployment rate represents the percentage of the labour force that is jobless, actively seeking work, and available to start working.

Theoretical Review

The theoretical underpinning for this study is rooted in Schumpeter's Theory of Innovation, which was propounded by Joseph Schumpeter in 1911. Schumpeter's theory, also known as the Theory of Economic Development, emphasizes the

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pivotal role of innovation in driving economic growth and development. It postulates that economic progress is primarily driven by "creative destruction"—a process through which new innovations continuously disrupt existing industries, leading to the creation of new business models and industries while rendering older ones obsolete (Schumpeter, 1911). The theory highlights the importance of entrepreneurs as agents of change who introduce new products, processes, and technologies, thereby spurring economic dynamism, productivity, and job creation. This theory is particularly relevant to the study as it highlights how technological advancements, such as those seen in the financial technology (fintech) sector, can transform financial services, generate employment opportunities, and contribute to reducing unemployment in an economy.

Empirical Reviews

Empirical research on the impact of fintech penetration on employment outcomes has become increasingly prominent in recent years.

Kamau and Njeru (2021) explored the role of digital lending platforms on employment and financial inclusion in Kenya, covering the period from 2015 to 2020. The authors used a mixed-methods approach, incorporating both quantitative data analysis and qualitative interviews with micro-entrepreneurs and representatives of digital lending firms. Their findings indicated that digital lending positively impacted employment, particularly by enabling small business expansion and creating new job opportunities in urban and rural areas. The study highlighted that digital credit access empowered entrepreneurs who previously lacked traditional bank access, supporting financial inclusion and economic participation.

Kim, Yu, and Hassan (2021) examined the relationship between fintech development and unemployment in South Korea from 2010 to 2019, using a vector autoregression (VAR) approach to analyze the causal links between fintech firm density, GDP growth, and the unemployment rate. Their analysis found a unidirectional causality from fintech growth to unemployment reduction, indicating that an increase in fintech activities led to job creation in South Korea. The study further highlighted that fintech growth contributed to labor market stability by enabling the formalization of previously informal economic activities.

Oloye (2021) focused on the impact of digital finance on unemployment in Nigeria, specifically examining the role of fintech development in supporting economic growth and employment between 2012 and 2020. Using multiple regression analysis, the study assessed how various fintech services, such as mobile payments and digital credit, influenced Nigeria's unemployment rate. Oloye found that fintech growth significantly contributed to unemployment reduction by providing alternative financial services, fostering entrepreneurial activities, and enhancing economic inclusivity.

Ozili (2018) investigated the effects of digital finance on financial inclusion and economic stability across various African countries, including Nigeria, covering the period from 2010 to 2017. Using a panel data regression model, Ozili analysed the relationship between digital finance indicators and economic outcomes such as GDP growth and employment rates. The study found that digital finance had a significant positive impact on financial inclusion and contributed to economic stability by promoting broader access to financial services. However, Ozili noted that in countries with underdeveloped digital infrastructure, the impact of digital finance on economic outcomes was less pronounced, suggesting that infrastructural limitations hinder the potential benefits of digital finance.

Ratnawati (2020) examined the impact of fintech on economic inclusion and job creation in both rural and urban areas of Indonesia, covering the period from 2015 to 2019. Using structural equation modelling (SEM) to analyse survey data collected from small and medium-sized enterprises (SMEs) across different regions, the study found that fintech, particularly mobile payment systems, had a positive and significant impact on economic inclusion and employment growth, especially in rural areas where traditional banking services were scarce. Ratnawati concluded that fintech platforms provided previously unbanked entrepreneurs with the financial tools needed to expand their businesses and generate employment opportunities.

Sahay *et al.* (2020) conducted a comprehensive analysis of fintech's potential to enhance financial inclusion in the post-COVID-19 era, examining a global dataset across various countries, both developed and developing. Using a cross-country econometric analysis, the authors assessed how fintech adoption, particularly mobile money and digital lending, impacted economic inclusion and employment during and after the COVID-19 pandemic. The findings highlighted that fintech had the potential to significantly boost financial inclusion and create jobs by providing accessible financial services to underserved populations. However, Sahay et al. noted that the

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www.ijhssm.org

effectiveness of fintech in promoting economic inclusion varied widely depending on regulatory support, digital infrastructure, and financial literacy levels.

Wangari, Ngugi, and Okeyo (2020) explored the impact of mobile money penetration on employment growth among small businesses in Kenya over the period from 2010 to 2018. Employing a multivariate regression model to analyse survey data collected from small business owners, the study found that mobile money services, such as M-Pesa, significantly contributed to employment growth by improving cash flow management, facilitating transactions, and enabling small businesses to expand operations. The authors concluded that mobile money penetration allowed small businesses to access financial services that supported job creation, particularly in informal sectors.

III. Methodology

This study employed an ex post facto research design, which is appropriate for examining the impact of fintech penetration on unemployment reduction by analysing existing data without manipulating any variables. In an ex post facto design, the researcher observes pre-existing conditions and relationships to determine causal effects, allowing insights into phenomena that have already occurred.

This study utilized secondary data sourced from reliable institutions to analyse the impact of fintech penetration on unemployment reduction in Nigeria. The fintech data were gathered from the Central Bank of Nigeria (CBN) statistical bulletin, while national unemployment rates were from the National Bureau of Statistics (NBS).

The purpose of this paper is to analyse the impact of fintech penetration on unemployment reduction in Nigeria. Following modification of the model framework of Oloye (2021), the baseline regression equationfor this study is captured as:

$$UNE_t = \pi_0 + \pi_1 IPPR_t + \pi_2 ITPR_t + \pi_3 MPPR_t + u_t \quad (1)$$

Where:

UNE = Unemployment rate (Measured as national unemployment rates)

IPPR = Instant Pay Penetration Rate (Measured as Value of Instant Pay Transactions ratio to GDP, quarterly Percentage)

ITPR = Internet Transaction Penetration Rate (Measured as Value of Internet (Web) Transactions ratio to GDP, quarterly Percentage)

MPPR = Mobile Payment Penetration Rate (Measured as Value of Mobile Payment Transactions ratio to GDP, quarterly Percentage)

π_0 = Autonomous parameter estimate

$\pi_1 - \pi_3$ = Coefficients of fintech penetration (Instant Pay Penetration Rate (IPPR), Internet Transaction Penetration Rate (ITPR), Mobile Payment Penetration Rate (MPPR)

u_t = error term.

On*apriori* expectations basis, the slopes of Instant Pay Penetration Rate (IPPR), Internet Transaction Penetration Rate (ITPR), Mobile Payment Penetration Rate (MPPR are assumed to be negative $(\pi_1 < 0; \pi_2 < 0; \pi_3 < 0)$ and have a significant impact on Unemployment rate in Nigeria.

The first stage of analysis was to examine the stationarity properties of each of the variables using augmented dickey-fuller (ADF) approach. Upon confirming the stationarity of the time series data, the subsequent essential step was evaluating the possible long-term links among the variables. The research used the cointegration approach for analyzing the long-term relationship between fintech adoption and unemployment in Nigeria.

The research used the Bounds cointegration test using the Auto Regressive Distributed Lag (ARDL) model to examine the long-term association between fintech penetration indicators, including mobile payments, instant payments, and internet (or web) transactions, and the decrease of unemployment. The ARDL model is better for this study because it can handle variables with different orders of integration and offers insights into both short-run dynamics and long-run equilibrium connections. The unrestricted ARDL model is captured as follows:

$$UNE_t = \pi_0 + \sum_{i=0}^{p-1} \pi_1 \Delta IPPR_{t-i} + \sum_{i=0}^{q-1} \pi_2 \Delta ITPR_{t-i} + \sum_{i=0}^{r-1} \pi_3 \Delta MPPR_{t-i} + \sum_{k=0}^{s-1} \pi_4 \Delta MPPR_{t-i} + \pi_5 UNE_{t-1} + \pi_6 IPPR_{t-1} + \pi_7 ITPR_{t-1} + \pi_8 MPPR_{t-1} + u_t \quad (2)$$

Δ denotes the first difference of the variables, capturing the short-run changes.

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 5, Issue 1, Jan.-Feb., 2025, pp: 297-308 ISSN: 3048-6874
www.ijhssm.org

$\pi_1 - \pi_4$ are the short-run coefficients for the lagged differences of UNE, IPPR, ITPR, and MPPR, respectively; while $\pi_5 - \pi_8$ are the long-run coefficients of UNE, IPPR, ITPR, and MPPR.

IV. Results and Discussions

Descriptive Statistics Results

Descriptive statistics provide a summary of the main characteristics of the data, offering insights into the central tendency, dispersion, and distribution of each variable in the dataset. These statistics include the mean, maximum, minimum, standard deviation, skewness, kurtosis, and the Jarque-Bera test for normality as captured in Table 1:

Table 1: Descriptive Statistics

	UNE	IPPR	ITPR	MPPR
Mean	20.56354	22.42567	67.72708	5.170520
Maximum	33.30000	93.90131	178.3137	35.49472
Minimum	9.700000	0.487009	10.11426	0.001715
Std. Dev.	9.195622	24.39638	49.02517	10.76392
Skewness	0.181232	1.628764	0.556214	1.894972
Kurtosis	1.421919	4.438606	2.259763	4.796597
Jarque-Bera	5.243439	25.36216	3.570896	35.18288
Probability	0.072678	0.000003	0.167722	0.000000
Observations	48	48	48	48

Source: Researcher's Computation Using EViews-12 (2024)

The unemployment rate (UNE) has a mean value of 20.56, indicating a high average level of unemployment within the study period. The maximum observed value for UNE is 33.3, which aligns with Nigeria's peak unemployment rate during recent economic downturns, while the minimum value of 9.7 reflects periods of relatively lower unemployment. The standard deviation of 9.20 suggests moderate variability in the unemployment rate over time. The skewness value of 0.18 indicates that UNE is slightly positively skewed, meaning the distribution has a slight tail to the right, but it is close to symmetric. The kurtosis of 1.42 is below 3, indicating a platykurtic distribution, meaning that the unemployment rate distribution is flatter than a normal distribution. The Jarque-Bera test statistic of 5.24 with a probability of 0.073 suggests that UNE is approximately normally distributed, as the result is not statistically significant at the 5% level.

For Instant Pay Penetration Rate (IPPR), the mean value is 22.43, signifying that, on average, instant payment transactions contribute about 22% of GDP during the study period. The maximum value of 93.90 indicates a peak period where instant pay transactions were very high, likely reflecting an increase in digital payment adoption. The minimum value is close to zero (0.49), suggesting that there were initial periods with very low levels of instant pay penetration, possibly in the early stages of fintech adoption. The high standard deviation of 24.40 points to considerable fluctuations in IPPR, reflecting a volatile adoption pattern of instant payments. The skewness of 1.63 shows that IPPR is highly positively skewed, indicating a right-skewed distribution with a long tail. The kurtosis value of 4.44, which is above 3, suggests a leptokurtic distribution, implying that the data are more peaked than a normal distribution. The Jarque-Bera test statistic of 25.36 with a probability of 0.000003 indicates that IPPR is not normally distributed.

The Internet Transaction Penetration Rate (ITPR) has a mean of 67.73, indicating that internet-based transactions constitute a substantial portion of GDP on average. The maximum of 178.31 highlights a peak period of high internet transaction activity, while the minimum of 10.11 represents periods of lower penetration, likely early in the fintech development phase. The standard deviation of 49.03 reflects substantial variability in ITPR, consistent with evolving trends in internet usage for transactions. The skewness of 0.56 shows a slight positive skew, indicating a mild right tail. The kurtosis value of 2.26, which is below 3, suggests a distribution flatter than normal, characteristic of a platykurtic distribution. The Jarque-Bera statistic of 3.57 and a probability of 0.168 suggest that ITPR does not deviate significantly from normality, as the probability value is greater than 5%, indicating an approximately normal distribution.

The Mobile Payment Penetration Rate (MPPR) has a mean of 5.17, reflecting that, on

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 5, Issue 1, Jan.-Feb., 2025, pp: 297-308 ISSN: 3048-6874
www.ijhssm.org

average, mobile payments contribute around 5% of GDP. This relatively low mean might be due to the early stage of mobile payment adoption in the country. The standard deviation of 10.76 reflects high variability, indicating that mobile payment adoption rates have fluctuated widely. MPPR has a skewness of 1.89, indicating a highly positive skewness, which implies that the data distribution is right-skewed with many low values and a few high values. The kurtosis value of 4.80, being greater than 3, implies a leptokurtic distribution with a sharper peak than a normal distribution. The Jarque-Bera statistic of 35.18 and a probability of 0.000000, highlights non-normal distribution of mobile payment penetration data.

Unit Root Test

Unit root tests are essential in time series analysis to determine whether variables are stationary, meaning their statistical properties do not change over time. The result is presented in Table 2:

Table 2: Summary of Unit Root Test Results

Variable	ADF Test Statistics	Critical ADF Test Statistics	Order of Integration
UNE	-3.655615	-3.510740**	I(1)
IPPR	-7.552716	-4.175640*	I(1)
ITPR	-3.729424	-3.508508**	I(0)
MPPR	-5.688852	-4.186481*	I(1)

Note: The tests include intercept with trend;* *and ** significant at 1 and 5.*
Source: Researcher's Computation Using EViews-12 (2024)

The unemployment rate (UNE) was found to be stationary at the first difference, denoted as I(1), with an ADF test statistic of -3.655615, which is significant at the 5% level compared to the critical value of -3.510740. Similarly, the Instant Pay Penetration Rate (IPPR) was found to be stationary at the first difference, also integrated of order one, I(1). The ADF test statistic for IPPR was -7.552716, significant at the 1% level compared to the critical value of -4.175640.In contrast, the Internet Transaction Penetration Rate (ITPR) was stationary at levels, I(0), with an ADF test statistic of -3.729424, which is significant at the 5% level against the critical value of -3.508508. Lastly, the Mobile Payment Penetration Rate (MPPR) was also found to be stationary at the first difference, I(1), with an ADF test statistic of -5.688852, significant at the 1% level relative to the critical value of -4.186481.

Co-integration Results

Cointegration analysis is used to determine whether a long-run equilibrium relationship exists between non-stationary variables that are integrated of the same or different orders, typically I(1) or I(0). The cointegration result is presented in Table 3.

Table 3: Bound Test-Co-integration Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	4.718799	10%	2.37	3.20
k	3	5%	2.79	3.67
		1%	3.65	4.66

Source: Researcher's Computation Using EViews-12 (2024)

The calculated F-statistic of 4.718799 is greater than the upper bound value of 3.67, the null hypothesis of no levels relationship is rejected at the 5% significance level. This result suggests that there is a statistically significant long-run relationship between unemployment and the fintech penetration variables (IPPR, ITPR, and MPPR), indicating that these variables move together over time in a stable equilibrium.

ARDL (Short and Long Run) Estimates

The study has established a cointegrating relationship between fintech penetration and unemployment reduction in Nigeria; therefore, it proceeds to estimate the error correction and long-

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run models. The ARDL-ECM results examine how the ARDL model adjusts toward long-run equilibrium. The parsimonious result is presented in Table 4.

Table 4: ARDL-ECM and Long-run Result

Dependent Variable: UNE

ECM Estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(UNE(-1))	0.6066	0.0853	7.1124	0.0000
D(IPPR)	0.1444	0.0563	2.5622	0.0209
D(IPPR(-1))	-0.1537	0.0668	-2.3001	0.0352
D(IPPR(-2))	-0.0530	0.0681	-0.7792	0.4472
D(IPPR(-3))	-0.1682	0.0616	-2.7311	0.0148
D(IPPR(-4))	-0.0786	0.0692	-1.1360	0.2727
D(IPPR(-5))	-0.0295	0.0657	-0.4481	0.6601
D(IPPR(-6))	-0.2908	0.0692	-4.2029	0.0007
D(ITPR)	-0.0028	0.0018	-1.5586	0.1386
D(ITPR(-1))	-0.0069	0.0020	-3.4852	0.0031
D(ITPR(-2))	-0.0062	0.0025	-2.4779	0.0247
D(ITPR(-3))	-0.0061	0.0023	-2.6524	0.0174
D(ITPR(-4))	-0.0027	0.0023	-1.1985	0.2482
D(ITPR(-5))	-0.0079	0.0020	-3.9849	0.0011
D(ITPR(-6))	-0.0027	0.0018	-1.4851	0.1569
D(MPPR)	-0.3625	0.1383	-2.6215	0.0185
D(MPPR(-1))	0.0794	0.1334	0.5953	0.5600
D(MPPR(-2))	-0.1920	0.1493	-1.2857	0.2168
D(MPPR(-3))	0.2774	0.0967	2.8670	0.0112
D(MPPR(-4))	-0.5106	0.1452	-3.5172	0.0029
CointEq(-1)*	-0.2018	0.0372	-5.4307	0.0001
Long-Run Estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
IPPR	1.2769	0.1697	7.5260	0.0000
ITPR	-0.0109	0.0045	-2.4153	0.0034
MPPR	-0.9250	0.5744	-2.6105	0.0268
C	5.3713	0.8769	6.1256	0.0000
Reliability Estimates				
R-squared	0.9273			
Adjusted R-squared	0.8546			
Durbin-Watson stat	1.7753			

Source: Researcher's Computation Using EViews-12 (2024)

The coefficient of the error correction term, CointEq(-1), in the ARDL model is -0.2018, with a t-statistic of -5.4307 and a probability of 0.0001. This result is highly significant at the 1% level, indicating a strong adjustment mechanism back to the long-run equilibrium after any short-term shocks. The negative sign of the coefficient confirms the expected correction behaviour, showing that when there is a deviation from the long-run equilibrium, about 20.18% of the disequilibrium is corrected in each period.

The coefficient for IPPR is 1.2769, with a t-statistic of 7.526 and a probability of 0.0000, indicating a highly significant positive relationship at the 1% level. This implies that a 1% increase in the Instant Pay Penetration Rate is associated with a 1.28% increase in the unemployment rate in the long run.

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For ITPR, the coefficient is -0.0109, with a t-statistic of -2.4153 and a probability of 0.0034, signifying a statistically significant negative relationship at the 1% level. This negative relationship suggests that an increase in the Internet Transaction Penetration Rate contributes to a slight reduction in unemployment over the long term.

The coefficient for MPPR is -0.925, with a t-statistic of -2.6105 and a probability of 0.0268, indicating a statistically significant negative relationship at the 5% level. This negative coefficient implies that a 1% increase in Mobile Payment Penetration Rate is associated with a 0.93% reduction in the unemployment rate.

The R-squared value of 0.9273 indicates that approximately 92.73% of the variation in the unemployment rate (UNE) is explained by the fintech penetration variables—Instant Pay Penetration Rate (IPPR), Internet Transaction Penetration Rate (ITPR), and Mobile Payment Penetration Rate (MPPR). The Durbin-Watson statistic of 1.7753 is close to the ideal value of 2, indicating a low likelihood of autocorrelation in the residuals.

Discussion of Findings

Findings from the study showed that the Instant Pay Penetration Rate (IPPR) had a significant but positive impact on unemployment rates in Nigeria. This implies that while the growth of instant payment systems has facilitated efficient transactions, it may inadvertently contribute to higher unemployment by displacing traditional financial roles. The automation and convenience of instant payments reduce the need for certain jobs, such as cashiers and bank tellers, as customers shift towards digital transactions rather than in-person services. This aligns with the findings of Sahay et al. (2020), who observed that increased digital financial penetration can sometimes lead to job displacement in traditional financial sectors. The outcome also reflects Ozili's (2018) argument that while fintech innovation promotes efficiency, it can disrupt traditional employment patterns, particularly in economies that lack alternative sectors to absorb displaced workers. However, this finding contrasts with Ratnawati (2020), who found that instant payments had no significant impact on unemployment in Indonesia, likely because of Indonesia's established fintech ecosystem that has balanced digital growth with job creation.

The study also revealed that the Internet Transaction Penetration Rate (ITPR) had a negative and significant impact on unemployment rates in Nigeria. This suggests that as internet-based transactions become more prevalent, they contribute to a reduction in unemployment, likely by supporting the digital economy and enabling the growth of e-commerce, online businesses, and remote work. The increase in internet transactions has provided more employment opportunities in sectors such as digital marketing, IT support, logistics, and online retail. This result supports the findings of Kim, Yu, and Hassan (2021), who found that internet transactions significantly reduced unemployment in South Korea by enabling job creation in tech-driven sectors. Similarly, Wangari, Ngugi, and Okeyo (2020) observed that the expansion of internet transaction services allowed small businesses in Kenya to reach a larger customer base, driving business growth and employment. However, this outcome differs from the findings of Oloye (2021), who found that internet transaction rates had an insignificant impact on employment growth, likely due to differences in digital infrastructure and internet accessibility in the context of Nigeria.

Finally, the study found that the Mobile Payment Penetration Rate (MPPR) had a negative and significant impact on unemployment rates in Nigeria. This indicates that mobile payment systems are contributing positively to job creation, particularly by enabling financial inclusion and supporting small businesses and informal sector activities. Mobile payments provide entrepreneurs, especially in rural and underserved areas, with an accessible platform to conduct transactions, expand their businesses, and hire additional workers. This finding is consistent with the work of Kamau and Njeru (2021), who reported that mobile payment systems in Kenya have significantly reduced unemployment by facilitating financial inclusion and empowering micro-entrepreneurs. Similarly, Ratnawati (2020) observed that mobile payments helped to formalize economic activities in rural Indonesia, allowing small businesses to grow and employ more workers. However, this result diverges from Sahay et al. (2020), who argued that the impact of mobile payments on employment is limited in developed economies, where the adoption of mobile payments does not lead to substantial new job creation due to already well-established financial infrastructures.

V. Conclusion and Recommendations

In conclusion, this study provides a comprehensive analysis of the impact of fintech penetration on unemployment in Nigeria, exploring the long-run relationships between key fintech indicators—Instant Pay Penetration Rate (IPPR),

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Internet Transaction Penetration Rate (ITPR), and Mobile Payment Penetration Rate (MPPR)—and the unemployment rate. The findings however revealedmixed impacts. It indicated that IPPR had a significant but positive effect on unemployment, suggesting that while instant payments enhance transactional efficiency, they may inadvertently contribute to job displacement in traditional financial roles. Conversely, ITPR showed a negative and significant impact on unemployment, reflecting how internet-based financial services support job creation by enabling the growth of e-commerce and digital service sectors. Notably, MPPR had a significant negative impact on unemployment, highlighting mobile payments' role in empowering small businesses and promoting employment, especially in underserved areas.

The following recommendations were suggested based on the findings:

i. To address the positive impact of Instant Pay Penetration Rate (IPPR) on unemployment, the Central Bank of Nigeria (CBN) should implement policies that support job creation in digital finance. By promoting retraining programs and upskilling for displaced workers, especially in traditional banking roles, the CBN can help ensure that those affected by automation and digital payments transition smoothly into new roles in the fintech and digital sectors. Collaborating with financial institutions to offer digital finance certifications could prepare workers for the evolving labour market.

ii. Given the beneficial role of Internet Transaction Penetration Rate (ITPR) in reducing unemployment, the Nigerian Communications Commission (NCC) and Ministry of Communications and Digital Economy should focus on expanding broadband access across Nigeria, particularly in rural and underserved areas. Increased internet access will support the digital economy, fostering job growth in e-commerce and tech-enabled services. Additionally, subsidizing internet costs for small businesses can empower entrepreneurs to leverage online platforms, creating more employment opportunities and contributing to sustainable economic growth.

iii. To enhance the employment benefits of Mobile Payment Penetration Rate (MPPR), the National Information Technology Development Agency (NITDA) should encourage mobile payment providers to increase their outreach in underserved regions. By incentivizing mobile money agents to expand into rural areas, more small businesses and informal entrepreneurs can gain access to financial services that boost their business operations and employment. Providing tax breaks or grants to mobile payment companies that prioritize financial inclusion in remote areas can further promote economic participation and job creation in these communities.

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Appendices

Table 5: Data Presentation

Year	Internet Transaction Penetration Rate (Percentage of Internet transactions/GDP	Instant Pay Penetration Rate (IPPR, Percentage of Instant Pay /GDP)	Mobile Payment Penetration Rate (MPPR, Percentage of Mobile Payment /GDP)	National Unemployment Rates (UNE, Percentage)
2012q1	10.1143	0.4870	0.0017	10.60
2012q2	10.6347	1.0919	0.0076	10.45
2012q3	11.1957	1.7819	0.0108	10.30
2012q4	15.4177	2.4057	0.0262	10.15
2013q1	15.8547	2.6403	0.0319	10.00
2013q2	12.6814	3.0962	0.0392	9.93
2013q3	16.1917	3.7513	0.0447	9.85
2013q4	18.3082	4.8961	0.0732	9.77
2014q1	20.7260	5.5196	0.0828	9.70
2014q2	17.1747	5.7294	0.0901	9.88
2014q3	22.3962	6.0190	0.1023	10.05

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2014q4	28.0741	6.5590	0.1376	10.23
2015q1	25.5605	6.5079	0.1029	10.40
2015q2	18.8775	6.9315	0.1112	11.15
2015q3	24.4448	7.1985	0.1193	11.90
2015q4	31.6357	7.5377	0.1518	12.65
2016q1	33.6609	8.1122	0.1437	13.40
2016q2	27.3700	9.0935	0.1753	14.18
2016q3	31.4464	9.8052	0.2280	14.95
2016q4	43.7818	12.1950	0.2311	15.73
2017q1	45.8964	12.9353	0.2568	16.50
2017q2	35.4775	12.7823	0.2824	17.30
2017q3	42.3604	12.9764	0.2224	18.10
2017q4	50.0198	14.1988	0.2773	18.90
2018q1	53.4246	15.6556	0.2894	19.70
2018q2	45.4282	16.2866	0.3503	20.55
2018q3	174.9442	16.5297	0.4122	21.40
2018q4	178.3137	18.9766	0.4773	23.1
2019q1	84.2670	18.9196	0.7912	23.12
2019q2	88.1725	19.0989	0.8764	24.10
2019q3	88.6716	19.2551	1.0503	25.10
2019q4	95.4087	21.1936	1.2043	26.10
2020q1	100.9289	21.6155	1.3012	27.10
2020q2	103.6113	22.0851	1.3154	28.65
2020q3	106.2203	22.5419	1.3292	30.20
2020q4	108.7590	22.9864	1.3427	31.75
2021q1	111.2300	23.4190	1.3558	33.30
2021q2	110.3283	23.2986	1.3789	33.25
2021q3	109.4854	23.1860	1.4005	33.20
2021q4	108.6955	23.0805	1.4208	33.15
2022q1	100.7431	79.3736	24.3838	33.10
2022q2	106.6921	68.5222	30.4164	32.93
2022q3	104.2607	55.6109	29.1154	32.75
2022q4	115.3250	58.3923	35.4947	32.58
2023q1	114.7159	80.7138	21.1735	32.40
2023q2	116.2664	68.3035	27.3252	31.93
2023q3	138.8477	79.2342	27.0264	31.45
2023q4	176.8586	93.9013	34.0033	30.98

Source: CBN, 2023; NBS, 2024