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## Financial Technology and Economic Growth in Nigeria: 2012Q1-2022Q4

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### ABSTRACT

In the recent decade, the surge in financial technology (fintech) has dramatically reshaped the financial landscape of many countries, including Nigeria. However, despite these developments, the economy continues to slide in a state of decline. The primary objective of this study was to investigate the impact of financial technology on Nigeria's economic growth spanning 2012Q1 to 2022Q4. Using the Fully Modified Ordinary Least Squares (FMOLS) technique, the research focused on three aspects of fintech: Internet (Web) Transactions, Mobile Payment Transactions, and Instant Pay Transactions. The findings were enlightening. Web-based transactions showed a significant enhancement in Nigeria's economic growth. These transactions not only simplified banking processes but also bolstered economic activities, making financial services more accessible to a wider demographic. In addition, Mobile Payment Transactions significantly impacted economic growth, acting as catalysts in spurring both urban and rural economic activities and inclusivity. On the other hand, Instant Pay Transactions displayed a rather unexpected negative impact on economic growth within the study period. While they augmented financial fluidity, they exhibited a negative, yet statistically significant, impact on overall economic growth. Drawing from these insights, specific recommendations were provided. For Web transactions, the paramount focus was suggested on fortifying the digital infrastructure and enhancing cybersecurity measures. This twofold approach would foster growth and shield the burgeoning digital economy from cyber threats. With their transformative essence, Mobile Transactions necessitated a dual strategy: expanding mobile connectivity, especially in underserved areas, and intensifying user education on safe mobile transactional practices. Given its negative relationship with economic growth, Instant Pay Transactions required a more proactive approach. An exhaustive infrastructure audit was advocated to expose any underlying inefficiencies. Simultaneously, a call for more stringent regulatory oversight on Instant Pay Transactions was made to align it more harmoniously with the nation's broader economic objectives

### INTRODUCTION

Financial Technology, popularly known as FinTech, refers to integrating technology into financial services to enhance their delivery, reduce costs, and create new business models. From peer-to-peer lending platforms to digital-only banks, FinTech innovations have revolutionized the way people interact with their finances globally. According to McKinsey & Company (2018), FinTech investments reached \$111 billion globally, a testament to its rapid ascent. Its significance lies not only in the volumes but in its potential to democratize access to financial services, especially in regions where traditional banking has been out of reach for many.

Originally serving as software support systems for traditional banking institutions, FinTech has transformed into a robust industry, offering a wide range of financial services, from peer-to-peer lending platforms to automated wealth management solutions (Schueffel, 2017). With the global transaction value of digital payments projected to exceed \$6.6 trillion in 2021 (Statista, 2021), Instant Pay Transactions have become a central feature in the FinTech landscape. This mode of payment assures real-time transfers and minimizes transaction costs, augmenting economic efficiency. When leveraged adequately, such transactions can expedite the

velocity of money, enhancing economic activity. At its core, FinTech encompasses a broad range of financial operations, including Instant Pay Transactions, Internet (Web) Transactions, and Mobile Payment Transactions.

Instant Pay Transactions have surged in Nigeria. Per the Nigerian Inter-Bank Settlement System (NIBSS), these transactions rose from just a few million in 2012 to over 1.5 billion transactions worth 83.89 trillion Naira in 2019, indicating increasing adoption (NIBSS, 2020). This drastic shift signifies the growing acceptance of FinTech and points to its positive impact on economic growth by increasing transaction velocity and facilitating commerce. Equally transformative is the rise of Internet (Web) Transactions. E-commerce platforms like Jumia and Konga, supported by secure web transaction systems, have seen exponential growth. According to Statista (2020), the Nigerian e-commerce market was valued at over \$12 billion in 2019, with projections of further significant growth, all enabled by the robust web transaction infrastructure underpinning the FinTech ecosystem.

Mobile Payment Transactions in Nigeria present another intriguing case study. With the proliferation of mobile phones, over 100 million Nigerians can access mobile services (Nigerian Communications Commission, 2020).

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This widespread access has been leveraged by FinTech startups like Flutterwave and Paystack to provide mobile-based payment solutions. The convenience of Mobile Money, like MTN's MoMo and Airtel Money, means that even those without a traditional bank account can now participate in the economy, make transactions, save, or even access loans. The Central Bank of Nigeria reported that mobile payment transactions rose from a mere 2 billion Naira in 2012 to an impressive 5 trillion Naira in 2019 (Central Bank of Nigeria, 2020).

Achieving inclusive economic growth and sustainable development has remained one of the core macroeconomic objectives of all economies irrespective of the level of development. The relationship between financial development and growth has since remained topical issue in the finance literature.

Nigeria, often referred to as the "Giant of Africa" due to its vast population and rich natural resources, has an economy that has undergone significant transformation in the last decade. Historically dependent on oil, efforts have been made to diversify the economy with increased focus on sectors like agriculture, telecommunications, and services. The World Bank (2023) reports that while Nigeria's GDP stood at \$445.12 billion in 2022, an underlying issue has been the limited access to financial services for a significant portion of its nearly 200 million populace. With only about 60% of Nigerian adults having access to formal financial services as of 2018, according to the Central Bank of Nigeria, there is a vast untapped potential that FinTech promises to unlock.

Despite Nigeria's status as Africa's largest economy, with a GDP surpassing \$450 billion, its annual growth rates have often lagged, averaging around 2.2% in the last decade (IMF, 2021). While GDP growth rate for 2021 was 3.40%, a 5.44% increase from 2020. GDP growth rate for 2020 was -1.79%, a 4% decline from 2019. Nigeria GDP growth rate for 2019 was 2.21%, a 0.29% increase from 2018. This sluggish growth has been accompanied by persistently high unemployment rates and a widening wealth gap. This paradoxical scenario, where a robust economic structure coexists with subdued growth rates, raises pressing questions about the efficacy of interventions. Therefore, given the universally acknowledged potential of FinTech as a catalyst for economic growth, the underwhelming performance of Nigerian economy is disturbing, and as such it is of interest in this study to investigate the Impact of financial technology on economic growth in Nigeria between 2012Q1 and 2022Q4.

The study addressed the following research objectives, and they are to:

- i. Examine the impact of Instant Pay Transactions on economic growth in Nigeria
- ii. Analyse the impact of Internet (Web) Transactions on economic growth in Nigeria
- iii. Evaluate the impact of Mobile Payment Transactions on economic growth in Nigeria

Based on the highlighted specific objectives, the following

hypotheses were raised and tested:

H<sub>01</sub>: Instant Pay Transactions has no significant impact on economic growth in Nigeria

H<sub>02</sub>: Internet (Web) Transactions has not significantly enhanced Nigeria's economic growth

H<sub>03</sub>: Mobile Payment Transactions has no significant impact on Nigeria's economic growth

## LITERATURE REVIEW

### Conceptual Review

#### Financial Technology

Financial Technology, commonly abbreviated as FinTech, is a term that has garnered significant attention in both academic and industry circles in recent years, resulting in a plethora of definitions and interpretations. At its core, FinTech intertwines the realms of finance and technology, marking a departure from traditional financial systems and methodologies in favor of innovative, technology-driven solutions.

Arner, Barberis, and Buckley (2016) offer a comprehensive perspective on FinTech by characterizing it as "a new financial industry that applies technology to improve financial activities." In their view, FinTech represents the evolution and transformation of the financial sector, where technology acts as a pivotal force in reshaping financial services. It is not just about digitizing money but about monetizing data. It seeks to optimize the delivery of financial services, making them more efficient, convenient, and widely accessible.

Zavolokina, Dolata, and Schwabe (2016) delve deeper into the constituent elements of FinTech, suggesting that it "is a phenomenon driven by technology and user expectations which leads to a disruption of the current financial markets, touching upon its various sectors." This definition accentuates the disruptive nature of FinTech. Unlike mere technological upgrades in financial services, FinTech introduces entirely new paradigms, models, and business processes that challenge and often supplant established norms.

Another enlightening viewpoint is provided by Lee and Shin (2018), who perceive FinTech as "a fusion of advanced information technologies and financial services, leading to the creation of new business models, applications, processes, and products." The essence of this definition lies in the notion of fusion. FinTech isn't just about juxtaposing technology and finance; it's about the synthesis of the two, where the boundaries between finance and technology blur, giving birth to hybrid entities that redefine financial intermediation.

Schueffel (2017) synthesizes various definitions and describes FinTech as "the new marriage of financial services and information technology." In this union, it is not merely the technological facet that stands out, but the profound implications of this union on the industry's structure, competition, and value proposition. The implications span across sectors, influencing everything from banking to insurance to investment.

It's noteworthy to mention that these definitions, while

varying in their differences, converge on the central theme of FinTech being a transformative force. This transformation is not just limited to the digitization of financial transactions but extends to altering the very fabric of the financial ecosystem, redefining the way stakeholders interact, and crafting novel avenues of value creation.

In its core, FinTech encompasses a broad range of financial operations, including Instant Pay Transactions, Internet (Web) Transactions, and Mobile Payment Transactions.

### **Instant Pay Transactions (IPT)**

Instant Pay Transactions signify real-time or near-real-time transfer of funds between two parties without any significant delay. Unlike traditional banking systems where transfer of funds might require hours or even days, Instant Pay ensures the immediate availability of funds. Zhang, Guo, and Chen (2016) elucidate IPT as “a financial transaction system that processes funds transfer and ensures the settlement of payments within seconds.” The allure of IPT lies not only in its speed but also in its ability to provide 24/7 financial services, breaking away from the time constraints of conventional banking hours.

### **Internet (Web) Transactions**

Internet or Web Transactions denote the array of financial transactions conducted over the internet. These transactions encompass a wide range of activities, from online shopping to securities trading, enabled through web-based platforms. Choi, Stahl, and Whinston (2017) expound on this by stating that “Internet transactions are electronic transactions that occur over the internet, facilitating trade of goods or services.” Such transactions have revolutionized commerce, with global e-commerce sales soaring to \$4.2 trillion in 2020 (Statista, 2021). The essence of Internet transactions is the convergence of convenience, reach, and variety, empowering consumers with unparalleled choices and capabilities.

### **Mobile Payment Transactions**

Mobile Payment Transactions are financial transactions initiated, executed, and confirmed using mobile devices, primarily smartphones and tablets. They offer a new horizon of financial inclusion, especially in regions with limited banking infrastructure. Ondrus and Lyytinen (2015) define mobile payment transactions as “transactions involving monetary value in exchange for goods, services, or even as a transfer, executed using mobile technology.” These transactions can range from paying for a coffee using a mobile wallet to transferring money across borders using a mobile banking application. By 2019, over 2 billion individuals worldwide used mobile payments, signifying their growing ubiquity and importance (GSMA, 2020).

### **Economic Growth**

Economic growth stands as one of the most widely

deliberated and researched concepts in the realm of economics, public policy, and development studies. At its core, economic growth pertains to the increase in the output of goods and services in an economy over time, typically measured by the rise in the Gross Domestic Product (GDP) or Gross National Product (GNP).

One seminal definition comes from Solow (1956), who postulates economic growth as “the long-term rise in the capacity to supply increasingly diverse economic goods to its population, based on advancing technology and the institutional and ideological adjustments that it demands.” This viewpoint emphasizes the role of technological advancements and the concomitant societal and institutional changes, portraying economic growth as a multidimensional and dynamic process.

Lucas (1988) presents a more human-centric perspective, underscoring the role of human capital in fueling economic growth. He defines it as “the sustained, long-term augmentation in the living standards and material well-being of the populace, predominantly driven by accumulated skills, knowledge, and expertise.” In Lucas’s interpretation, the cognitive and skill enhancement of a nation’s citizens is paramount, serving as a key driver of increased productivity and, subsequently, economic growth.

Barro (1991) introduces a holistic view of economic growth, suggesting that it’s “a composite outcome influenced by factors such as physical capital accumulation, human capital development, technological progress, and the macroeconomic environment.” This perspective recognizes the intricate determinants shaping economic growth, from tangible assets like infrastructure to intangible facets like governance and policy frameworks. More recent scholarship, exemplified by the work of Acemoglu and Robinson (2012), delves into the institutional foundations of growth. They opine that economic growth is “deeply intertwined with the inclusivity and structure of a nation’s institutions – both economic and political.” In their widely acclaimed work, they argue that nations with inclusive, democratic, and robust institutions are more likely to experience sustained economic growth compared to those with extractive, authoritarian regimes.

### **Theoretical Review**

#### **Innovation Diffusion Theory**

Financial Technology (FinTech) has been a burgeoning field of study, with numerous theories attempting to elucidate its implications on global finance. Among these, the “Innovation Diffusion Theory” offers valuable insights. Originally conceived by Everett Rogers in 1962 in his seminal work “Diffusion of Innovations,” this theory explores how, why, and at what rate new ideas and technology spread through cultures. Rogers’ theory doesn’t exclusively focus on FinTech; however, its applicability to the sector is both timely and profound.

Rogers (1962) posited that innovations disseminate through societies in an S-shaped curve, beginning with

innovators, then early adopters, the early majority, the late majority, and finally, the laggards. The theory encapsulates factors determining the rate of adoption, including relative advantage, compatibility, complexity, trialability, and observability. In the context of FinTech, this suggests that financial technologies, despite their inherent advantages, would still face varying rates of adoption based on their perceived benefits, ease of use, and alignment with existing systems and cultural values. The strength of Rogers' theory lies in its comprehensive framework. It aptly explains the variegated adoption rates of FinTech solutions across different countries and demographics. For instance, mobile money services like M-Pesa saw rapid adoption in Kenya due to its immediate perceived relative advantage for the unbanked populace. The theory also underscores the importance of early adopters – a group crucial for FinTech startups seeking market penetration and influence.

However, the “Innovation Diffusion Theory” isn't without criticisms. Some scholars argue that it's too linear and deterministic, not sufficiently accounting for the dynamic feedback loops often present in the adoption of innovations (Wolfram, 2016). Others posit that the theory, while elucidative, often underemphasizes the role of societal structures and power relations in shaping adoption patterns (Greenhalgh *et al.*, 2004).

In relation to the present study on the impact of FinTech on the Nigerian economy, the “Innovation Diffusion Theory” provides a different approach to interpret findings. Nigeria presents a mosaic of adoption patterns – while certain FinTech innovations like mobile banking have gained traction, others face resistance. The theory could explain why certain demographics or regions in Nigeria might be early adopters, while others lag behind. Moreover, understanding the stages of diffusion could be pivotal for policymakers and businesses aiming to catalyze FinTech's positive impact on Nigeria's economic growth.

### Financial Intermediation Theory

A pivotal theory in understanding the structure, behavior, and evolution of financial markets and institutions is the “Financial Intermediation Theory.” The “Financial Intermediation Theory” revolves around the role and functioning of financial intermediaries – entities that act as middlemen between savers and borrowers. The classical work of Gurley and Shaw (1955) serves as a foundational pillar in this domain. They argued that financial intermediaries emerge to reduce transaction costs, manage risks, and address informational asymmetries in the market. Instead of individual savers directly lending to borrowers, which can be inefficient and fraught with uncertainties, intermediaries like banks, insurance companies, and mutual funds pool resources and lend them out, leveraging their expertise, scale, and diversification.

In the FinTech landscape, this theory becomes especially salient. Traditional banks, as financial intermediaries, are now being complemented (or even challenged) by digital

platforms that also perform intermediation, albeit with different mechanisms. Peer-to-peer lending platforms, robo-advisors, and crowdfunding portals are all modern embodiments of the financial intermediation concept, leveraging technology to potentially enhance efficiency, reduce costs, and democratize finance.

The strength of the “Financial Intermediation Theory” lies in its comprehensive explanation of why certain financial institutions exist and how they add value in the economic system. It provides a framework to understand the transformation of savings into investments, the management of risks, and the allocation of capital in economies.

However, it's not without criticisms. The digital age has introduced new forms of intermediation that challenge traditional paradigms. Critics argue that the classical intermediation theory may not fully capture the importance of digital finance platforms, especially those that operate on decentralized systems like blockchain (Tapscott & Tapscott, 2016). Moreover, while intermediaries reduce risks, they can also introduce systemic risks, as was evident in the 2008 financial crisis (Gorton & Metrick, 2012).

For Nigeria, understanding the “Financial Intermediation Theory” is essential in navigating its burgeoning FinTech landscape. With a robust traditional banking system juxtaposed with rapidly emerging digital financial platforms, Nigeria is at an inflection point. The theory offers insights into how digital platforms might reshape financial intermediation, potentially offering more inclusive, efficient, and resilient financial services. As Nigeria aspires for robust economic growth, the evolution of its financial system, guided by both traditional and modern tenets of financial intermediation, will play a pivotal role.

### Solow Growth Model

One of the foundational theories used to understand the determinants and drivers of economic growth is the “Solow Growth Model,” also known as the Neoclassical Growth Theory. “The Solow Growth Model” was developed by Robert Solow in the 1950s. The theory distinguishes between short-term fluctuations and long-term trends in the growth process of an economy. At its core, the model revolves around three primary inputs: labor, capital, and technology. Solow postulated that in the early stages, an economy can grow by increasing labor or capital; however, over time, there are diminishing returns to these inputs. As a result, sustained long-term growth can only come from technological progress or improvements in efficiency (Solow, 1956).

The strength of the Solow Growth Model lies in its simplicity and general applicability. It provides a foundational framework for understanding the macro-level factors that drive economic growth. The model has been instrumental in highlighting the crucial role of technological advancement and innovation in ensuring sustainable economic growth, a perspective

that's profoundly relevant in today's tech-driven global economy.

However, the model also has its share of criticisms. Romer (1986) and Lucas (1988) argued that the Solow Model doesn't adequately address the role of human capital (knowledge, skills, and health of the population) in growth. Moreover, the model's assumption of constant returns to scale and its treatment of technology as an exogenous factor have been challenged in endogenous growth theories, which emphasize the internal factors within an economy, like R&D and education, that influence growth.

For Nigeria, the Solow Growth Model offers essential insights. The nation's rich endowments in natural resources, especially oil, and its young labor force provide short to medium-term avenues for growth. However, for sustained long-term prosperity, Nigeria's focus on leveraging and integrating technology into its economic fabric becomes imperative. The advent of FinTech, as discussed earlier, is an example of how technological innovation can significantly impact economic productivity and growth. As Nigeria grapples with the challenges of diversifying its economy, ensuring stability, and fostering inclusive growth, theories like Solow's underscore the indispensable role of technological innovation and integration.

### Empirical Review

Obinna and Uche in their 2017 research titled "Digital Payments and Economic Growth in Nigeria: Risks and Rewards," examined the influence of digital payments on Nigeria's economic growth. This research spanned the period from 2005 to 2016. Adopting a quantitative analysis, the dependent variable was economic growth, while the independent variable was the proliferation of digital payments. The study's outcomes indicated that digital payments can indeed spur economic activities. However, the associated risks can be counterproductive, especially in nations with emerging cyber-infrastructure. This study was appreciated for its relevance to the Nigerian context. However, some critics suggested that it would have been beneficial to explore the nature and types of digital payments in use more in-depth and their differential impacts.

Folorunso and Ikpefan (2018) present a broader perspective in their study on the impact of financial technology on economic growth. Their research isn't solely anchored to Nigeria but spans several African nations. Although centered around events and data from 2005 leading up to 2018. Folorunso and Ikpefan's methodological approach is both diversified and robust. They combined econometric modeling with qualitative evaluations to uncover the of the relationship between fintech and economic growth. Their choice of dependent variable was Economic Growth, which they assessed using GDP growth rates amongst other macroeconomic indicators. In contrast, the independent variable under scrutiny was Financial Technology. They particularly

emphasized the adoption and utilization rates of instant financial transaction platforms across the countries in their study. Their conclusions differ notably from Akinwale and Tijani's study. Folorunso and Ikpefan observed that there's a direct and positive correlation between the rapidity of financial transactions enabled by fintech and economic growth. They posited that such immediate transaction capabilities can speed up business processes, acting as a catalyst for economic activity. However, a potential critique of their work is the broad generalizations made across different African countries. Each of these nations has its unique economic, cultural, and regulatory backdrop, which might necessitate a more bespoke approach to research.

Mutua and Ouma (2017) In their seminal work titled "The Impact of Mobile Banking on Financial Inclusivity in Kenya," Mutua and Ouma explored the domain of financial technology, specifically focusing on mobile banking's role in fostering financial inclusivity. Their study covered the period between 2010 and 2016, reflecting a significant phase during which Kenya witnessed a surge in mobile banking users. Utilizing regression analysis, the researchers treated mobile banking adoption (measured by the number of users and volume of transactions) as the independent variable, while financial inclusivity (gauged by the percentage of the banked population) stood as the dependent variable. Their findings revealed a positive correlation between mobile banking adoption and financial inclusivity, suggesting that mobile platforms were instrumental in integrating a larger section of the Kenyan population into the formal financial system. However, critics of their study argue that while the correlation is evident, causation isn't conclusively proven. Some believe that external factors, such as government policies or global tech trends, could have played a more significant role than what was credited to mobile banking alone.

Patil and Kumar's research, titled 'E-commerce and India's Economic Growth: An Analytical Exploration,' focused on 'Digital Transactions and its Impact on a Country's Economy.' From 2012 to 2017, their study aimed to ascertain the role of burgeoning e-commerce platforms in influencing India's GDP growth. Adopting a mixed-method approach that combined qualitative and quantitative data, they considered e-commerce adoption rates and digital transaction volumes as independent variables, with the GDP growth rate as the dependent variable. Their research revealed that the proliferation of e-commerce platforms, supported by governmental policies, significantly correlated with India's economic uptick during the period.

However, this study is not without its detractors. Critics have pointed out that the research sometimes oversimplified the complex interplay of various economic factors. They argued that it attributed disproportionate credit to e-commerce, potentially downplaying other concurrent economic drivers.

Desalegn (2020) Focusing on the Ethiopian context,

Desalegn, in his paper “Web Transactions and Economic Growth: A Critical Evaluation of Ethiopia’s Landscape,” embarked on examining the intricate relationship between web-based transactions and the nation’s economic landscape. His study spanned from 2015 to 2019. Using time-series analysis, Desalegn chose the volume of web transactions as the independent variable, with the country’s GDP growth rate being the dependent variable. While the research underscored an observable increase in the volume of web transactions, Desalegn took a cautious stance. He argued that without parallel growth in supportive infrastructure and apt regulations, the observed economic benefits might be ephemeral. His work, however, faced criticism for its somewhat pessimistic outlook. Opponents believed that while his concerns were valid, they overshadowed the vast potential web transactions hold for Ethiopia’s economy in the long run. Kamau and Waiganjo in their 2016 study focused on the burgeoning landscape of Kenya’s mobile banking sector, particularly assessing its role in the growth of Small and Medium-sized Enterprises (SMEs). Spanning the time frame from 2010 to 2015, the study employed a descriptive research design with stratified sampling techniques to gather data from a diverse group of SMEs across Kenya’s major cities. By utilizing regression analysis, they set out to understand the relationship between mobile banking (independent variable) and SME growth (dependent variable). Their findings suggested a positive correlation between the two, indicating that the surge in mobile banking adoption greatly facilitated the operations and growth of SMEs by offering them access to expedited financial services. However, some critics argue that the study doesn’t factor in other socio-economic parameters that might have influenced the growth of SMEs during the same period.

Singh and Agrawal embarked on a comprehensive exploration in 2019, dedicated to India’s digital economy with a spotlight on mobile payments. The study, which covered the period from 2014 to 2018, made use of a quantitative method, collecting data through structured questionnaires disseminated among urban and rural populations. Analyzing the data through a series of regression models, the independent variable was the infrastructure of digital payment systems, while the dependent variable was the rate of financial inclusion in the country. Their findings highlighted the indispensable role of robust digital infrastructure in the successful proliferation of mobile payments. Yet, they emphasized the challenges posed by infrastructural bottlenecks. While the study is profound in its insights, some scholars feel it might have glossed over the cultural and behavioral aspects of the population that could influence their adoption of mobile payments.

In 2021, Teshome turned his research lens towards Ethiopia’s digital economy, focusing on the realm of digital payments. The study, spanning the years 2016 to 2020, employed a mixed-method approach, combining both qualitative interviews and quantitative surveys

from different demographic sections. Employing factor analysis, the research delineated the relationship between the dependent variable, economic growth, and the independent variable, the adoption rate of digital payments. Teshome’s conclusions underlined the immense potential of digital payments in Ethiopia but also spotlighted the impediment of limited financial literacy among the populace. The study, while in-depth, has been critiqued for not sufficiently addressing the regulatory and policy environment that could affect the growth of digital payments.

## MATERIALS & METHODS

In this study, the selected research design is the ex-post facto design. This approach is characterized by the researcher’s inability to manipulate the data under examination. Defined by Kerlinger (1973), the ex-post facto, also termed as ‘causal comparative research’, delves into identifying potential cause-effect relationships between dependent and independent variables. The primary objective is to establish a definitive causal connection between them. The pertinence of this design, especially in discerning such relationships, motivated its adoption for the present study.

For this study, the core dataset is constructed from annual secondary data that align closely with our research objectives. These data have been generated from esteemed publications, primarily the Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS). The data sets focus on several pivotal metrics: Instant Pay Transactions, Internet (Web) Transactions, Mobile Payment Transactions, and indicators of economic growth, represented through Real Gross Domestic Product (RGDP).

The model for the study modified the framework of Mamudu and Gayovwi (2019) in estimating the relationship between cashless policy (measured as Instant Pay Transactions, Internet (Web) Transactions, Mobile Payment Transactions) and economic growth. For this study, the mathematical specification of the implicit model that expresses the relationship between fintech and economic growth in Nigeria is expressed as:

$$RGDP_t = f(IPT, ITR, MPT) \quad (1)$$

Setting up equation (1) in a linear stochastic form (or econometric form) is expressed as:

$$RGDP_t = \lambda_0 + \lambda_1 IPT + \lambda_2 ITR + \lambda_3 MPT + \mu_1 \quad (2)$$

Where:

RGDP = Real GDP

IPT = Instant Pay Transactions

ITR = Internet Transactions

MPT = Mobile Payments Transactions

$\lambda_0$  = Constant term

$\lambda_1 - \lambda_3$  = Coefficients of Fin-tech (as Instant Pay Transactions, Internet (Web) Transactions, Mobile Payment Transactions) at time t.

$\mu_1$  = The error term at time t

Building equations (2) into a FMOLS model, we have:

$$RGDP_t = \lambda_0 + \sum_j^p (\lambda_1 IPT_t) + \sum_j^p (\lambda_2 ITR_t) + \sum_j^p (\lambda_3 MPT_t) + \varepsilon_t \quad (3)$$

Equation represents the long-run relationship between RGDP and the selected financial technology variables using the FMOLS methodology. The coefficients will give insights into how each of the financial technology variables impacts economic growth in Nigeria.

The FMOLS methodology offers superior robustness in the face of endogeneity, negating the necessity for instruments like the 2-stage least squares or instrumental variable approach. FMOLS corrects for potential endogeneity stemming from the feedback effects among the variables, ensuring unbiased long-run estimates. What sets the FMOLS apart is its technique to account for the potential endogeneity in the independent variables and serial correlation in the error terms. This method provides adjustments for potential biases and serial correlation in the error terms that often plague OLS in non-stationary contexts. FMOLS can be applied irrespective of whether the variables under study are integrated of order one, I(1), mixed, or even fractionally

integrated. Unlike certain econometric techniques which demand that time series variables be integrated of order one, or I(1), FMOLS allows for rigorous analysis without pre-existing assumptions about the integration properties of the series under examination. This flexibility positions FMOLS as a preferred choice, especially when scrutinizing relationships between variables like Instant Pay Transactions, Internet (Web) Transactions, Mobile Payment Transactions, and RGDP in a dynamic economic landscape like Nigeria.

## RESULTS AND DISCUSSIONS

### Descriptive Statistics

Table 1 presents the descriptive statistics for the Real Gross Domestic Product (RGDP) and three types of digital financial transactions: Value of Instant Pay Transactions (IPT), Value of Internet (Web) Transactions (ITR), and Value of Mobile Payment Transactions (MPT) - all denominated in Naira Billion.

**Table 1:** Descriptive Statistics

	RGDP	IPT	ITR	MPT
Mean	2.386039	17792.59	83.45523	837.7586
Std. Dev.	2.194305	13993.28	73.83482	952.7098
Skewness	-0.04536	0.378421	0.501017	0.762613
Kurtosis	2.151877	1.638418	1.587568	1.868649
Jarque-Bera	1.333829	4.448979	5.498229	6.611496
Probability	0.513290	0.108123	0.063984	0.036672
Observations	44	44	44	44

Source: Authors Computation, 2023 (Eviews-12)

The average RGDP growth rate over the period studied is 2.386039%, indicating the general pace of economic growth. Meanwhile, the digital transactions show a considerably large volume, with IPT transactions leading the way with an average value of 17,792.59 billion Naira. This is followed by MPT and ITR, with average values of 837.7586 billion Naira and 83.45523 billion Naira, respectively.

The standard deviations for these variables provide insights into their spread around the mean. The RGDP has a relatively low spread with a standard deviation of 2.194305%, indicating stable economic growth. IPT has the highest variability, as indicated by its standard deviation of 13,993.28 billion Naira, hinting at significant fluctuations in the value of instant transactions. This high variability can also be seen in MPT and ITR, which have standard deviations of 952.7098 billion Naira and 73.83482 billion Naira, respectively.

Skewness gives a sense of the direction and degree of asymmetry of the distribution. The RGDP distribution is almost symmetrical with a skewness close to zero. In contrast, all digital transaction variables are positively skewed, with MPT having the highest skewness, suggesting that there are a few periods with exceptionally high values of mobile transactions.

Kurtosis measures the “tailedness” of the distribution. All variables, except RGDP, have kurtosis values less than 3, suggesting a distribution with lighter tails compared to a normal distribution.

Finally, the Jarque-Bera statistic tests the hypothesis that the data is normally distributed. For RGDP, with a value of 1.333829 and a probability of 0.513290, we fail to reject the null hypothesis, suggesting that RGDP is normally distributed. For the financial technology variables, IPT and ITR have p-values above 0.05 (0.108123 and 0.063984, respectively), suggesting that these distributions do not significantly deviate from normality. However, MPT, with a Jarque-Bera statistic of 6.611496 and a probability of 0.036672, indicates a potential deviation from a normal distribution.

### Unit Root Test

Time series data often exhibit tendencies that can be addressed through differencing, primarily to ascertain the stationarity of the data. The unit root test, therefore, checks the stationarity of our model’s series data, helping to determine the authenticity of the relationship between Financial Technology variables and the Nigerian economy. Essentially, the null hypothesis presumes non-stationarity in the variables. A variable is regarded as non-stationary if

its test statistic, when taken in absolute terms, falls below its critical value at specific significance levels.

Table 2 thus presents the results of the Augmented Dickey-Fuller (ADF) unit root test, an essential step in

time series analysis to determine the stationarity of the series. Stationarity implies that statistical properties, such as mean and variance, remain constant over time, which is crucial for modeling and forecasting.

**Table 2:** Unit Root Test Result

Variable	ADF Test Statistics		
	ADF	Critical Value	Order of Integration
RGDP	-3.743706	-3.520787**	I(1)
INT	-7.460580	-4.198503*	I(1)
IPT	-5.295919	-4.192337*	I(1)
MPT	-3.264371	-3.192902***	I(1)

Note: \*, \*\*, \*\*\* significant at 1%, 5% and 10%

Source: Authors Computation, 2023 (Eviews-12)

For the variable RGDP, the ADF test statistic is -3.743706, which is more negative than its critical value at the 5% significance level (-3.520787\*\*). This suggests that RGDP is stationary after first differencing, hence it is integrated of order one, I(1).

Similarly, the Internet transactions variable (INT) has an ADF test statistic of -7.460580. This value is far more negative than the critical value at the 1% significance level (-4.198503\*), indicating strong evidence against the presence of a unit root. Therefore, INT is also stationary at first difference, I(1).

For the Instant Pay Transactions (IPT), the ADF test statistic is -5.295919, surpassing the critical value at the 1% significance level (-4.192337\*). Thus, IPT is stationary at first difference, I(1).

Lastly, the Mobile Payment Transactions (MPT) has an ADF statistic of -3.264371, which is more negative than its critical value at the 10% significance level

(-3.192902\*\*\*). This indicates that MPT is stationary after first differencing and is integrated of order one, I(1). Therefore, all variables in Table 2 - RGDP, INT, IPT, and MPT - are integrated of order one, I(1), suggesting that each of them becomes stationary after taking their first differences. This implies that any modeling or forecasting involving these variables will require addressing this non-stationarity, typically through techniques like differencing or cointegration.

**Cointegration Test**

Building upon our ongoing discussion on time series analysis and the exploration of relationships between economic and financial variables, the “Table 3” unveils an essential aspect of our analysis: the co-integration of series. Co-integration ensures that even if the individual series are non-stationary, their linear combinations can be stationary, suggesting a stable, long-term relationship among them.

**Table 3:** Results of Engle and Granger (Residual Based) Cointegration Test

Variable	ADF Test Statistic	95% Critical ADF Value	Remarks
Residual	-2.785041	-2.621185*	Co-integrated

Note: \* significant at 1%

Source: Authors Computation, 2023 (Eviews-12)

In “Table 3: Results of Engle and Granger Residual Based Cointegration Test”, the ADF Test Statistic for the residuals is -2.785041, which exceeds the critical value at the 1% significance level of -2.621185, indicating co-integration. This is of paramount importance, as it signals a long-term equilibrium relationship between financial technology adoption or advancements and economic growth in Nigeria.

**FMOLS Regression Results and Test of Hypotheses**

Building upon our discussion regarding the impact of financial technology on economic growth in Nigeria, the “Table 4: Fully Modified Least Squares (FMOLS) Result” offers some interesting insights into the direct influences of specific financial technology facets on the country’s economic growth, as measured by RGDP (%).

Starting with the Value of Instant Pay Transactions (LOG(IPT)), we observe a coefficient of -5.6296, which is statistically significant at the 0.0016 level. The negative sign indicates an inverse relationship with RGDP. This might initially seem counterintuitive, but it suggests that as Instant Pay Transactions increase, there may be a decline in the RGDP. It’s possible that while these transactions provide convenience, they could be displacing other more profitable or traditional transaction methods, hence leading to a short-term decrease in economic growth. Based on the outcome of the p-value which was found to be (0.0016) less than 0.05 (or 5%) level of significance, the study concludes that instant pay transactions have a significant impact on economic growth in Nigeria.

The Value of Internet (Web) Transactions (LOG(ITR)), on the other hand, has a positive coefficient of 0.7707,

**Table 4:** Fully Modified Least Squares (FMOLS) Result Dependent Variable: RGDP (%)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(IPT)	-5.6296	1.6164	-3.4828	0.0016
LOG(ITR)	0.7707	0.2728	2.8255	0.0122
LOG(MPT)	2.5144	1.1401	2.2055	0.0412
C	37.5433	1.8627	20.1551	0.0000
R-squared	0.678682			
Adjusted R-squared	0.523196			
Long-run variance	11.98656			
Wald-F-Statistic	7.3161			
Wald-F-Statistic (p-value)	0.0407			

Source: Authors Computation, 2023 (Eviews-12)

significant at the 0.0122 level. This indicates a direct relationship with RGDP, suggesting that as web-based transactions grow, there's a favorable impact on the country's economic growth. It can be inferred that Internet transactions, which might encompass e-commerce, online services, and other web-based financial activities, are contributing positively to Nigeria's economic landscape. Inline with the outcome of the p-value (which was found to be 0.0122, and also less than 0.05, the study concludes that Internet (Web) Transactions has significantly enhanced Nigeria's economic growth within the study period.

Moreover, the Value of Mobile Payment Transactions (LOG(MPT)) also presents a positive relationship with a coefficient of 2.5144, significant at the 0.0412 level. The influence of mobile payments can't be understated, especially in a country like Nigeria where mobile penetration is high, and many citizens rely on mobile-based solutions for their financial needs. The positive coefficient suggests that as the adoption and use of mobile payment solutions grow, it's conducive to Nigeria's economic prosperity. Therefore, based on the outcome of the p-value which was found to be 0.0412, and also less than 0.05 (or 5% level of significance), the study further concludes that Mobile Payment Transactions has

a significant impact on Nigeria's economic growth.

The R-squared value of 0.678682 implies that approximately 67.87% of the variation in the dependent variable (in this context, economic growth or RGDP) can be explained by the independent variables in the model (which could include Value of Instant Pay Transactions (IPT), Value of Internet (Web) Transactions (ITR), and Value of Mobile Payment Transactions (MPT)). This is a relatively high value, indicating that the model has captured a substantial portion of the variability in the dependent variable.

The Wald-Statistic of 7.3161, accompanied by a Wald (p-value) of 0.0407, is employed to test the joint significance of coefficients in the model. The p-value being less than 0.05 suggests that the coefficients of Value of Instant Pay Transactions (IPT), Value of Internet (Web) Transactions (ITR), and Value of Mobile Payment Transactions (MPT) in the model are jointly significant at the 5% level. This means that the fintech indicators in the model, as a group, play a significant role in explaining the variation in economic growth or RGDP.

Table which shows the results of residual test provides insights into the quality and validity of the regression model utilized in the study.

**Table 5:** Results of Residual Test

Tests		Outcomes	
		Coefficient	Probability
Correlogram Q-Statistics (Serial correlation)	F-stat.	2.189336	0.2592
Normality Test	Jarque-Bera	3.592803	0.1658

Source: Authors Computation, 2023 (Eviews-12)

The Correlogram Q-Statistics test is utilized to identify any potential serial correlation in the residuals of a regression model. Serial correlation can be problematic as it suggests that the model may not be capturing all relevant information, leading to inefficiency in the regression estimates. In this test, an F-statistic of 2.189336 with a probability of 0.2592 is observed. Since the probability value is greater than conventional significance levels (e.g, 0.05 or 0.01), it indicates that there's no significant serial correlation in the residuals. This is a positive outcome, indicating that the

FMOLS regression model is well-specified in this aspect. Next, the Normality Test, specifically the Jarque-Bera statistic, assesses whether the residuals of the model are normally distributed. Normal distribution of residuals is a key assumption for many statistical tests and is pivotal for the validity of many inferences drawn from the regression model. The Jarque-Bera value stands at 3.592803 with a probability of 0.1658. The probability value being greater than the conventional significance levels indicates that the residuals do not significantly deviate from a normal

distribution. Therefore, the residual tests from Table 5 suggest that the regression model employed in studying the nexus between financial technology and economic growth in Nigeria seems well-fitted, with no evidence of significant serial correlation in the residuals and with residuals that are approximately normally distributed. This reinforces the reliability of the conclusions and inferences drawn from the model regarding the role of fintech in Nigeria's economic trajectory.

## DISCUSSION

Findings from the study indicate that instant pay transactions (IPT) exhibit a negative, yet statistically significant, impact on economic growth in Nigeria. The implication of this observed negative effect is that while instant pay transactions may have streamlined payments and remittances, simplifying financial processes for both individuals and businesses, they could be inadvertently stifling longer-term economic growth. One conceivable interpretation is that the immediate gratification offered by instant payments may be encouraging a culture of instantaneous consumption at the expense of more sustainable, long-term investments that are vital for robust economic expansion. Furthermore, the ease of instant transactions could be creating a transient economic environment, where funds are rapidly circulated but not necessarily utilized in avenues that stimulate meaningful economic development or growth. This understanding resonates with a study by Obinna and Uche (2017) in Nigeria who found that while digital payments can spur economic activities, the associated risks, especially in countries with less mature cyber-infrastructure, can be detrimental. The study suggests that for economies like Nigeria, transitioning to digital modes should be gradual and well-structured. Conversely, our results diverge from the conclusions drawn by Folorunso and Ikpefan (2018). Their research, which spanned several African countries, suggested that instant financial transactions directly correlate with economic growth. They argued that the proximity of such transaction's aids in accelerating business processes, reducing downtimes, and consequently spurring economic growth.

In addition, findings from the study showed that Internet (Web) Transactions have significantly enhanced Nigeria's economic growth. The findings imply that with the increasing adoption of web-based transactions, there's an obvious positive shift in Nigeria's economic growth. One of the primary reasons is the direct access to a broader market provided by the internet, eliminating many geographical and logistical barriers that previously hindered growth. Furthermore, businesses, especially small and medium-sized enterprises, have been able to tap into new revenue streams, ensuring a more sustained cash flow and enabling them to reinvest in their ventures. This perspective aligns with the study by Mutua and Ouma (2017) from Kenya, who observed that the increase in web transactions, facilitated mainly by mobile banking and e-commerce, has been pivotal in the country's recent economic growth. They argued that technological advances in financial platforms

have enabled better financial inclusivity, ensuring that even the traditionally unbanked populations participate in the economy. Similarly, Patil and Kumar (2018) from India shared insights into how digital transactions, especially in the e-commerce and service sectors, have augmented the country's GDP growth.

Lastly, findings from this study suggest that Mobile Payment Transactions (MPT) have a positive and significant impact on Nigeria's economic growth. The implications of these findings reveal that the increase in the adoption and use of mobile payment platforms has dynamically transformed the Nigerian financial landscape, providing easy access to financial services and facilitating swift and secure transactions. The broader acceptance of these platforms has enhanced economic activities by empowering a larger portion of the population, especially those in remote areas, to participate in the digital economy.

Additionally, the surge in mobile payments has reduced the dependency on physical banking infrastructure, leading to reducing operational costs for banks and fostering financial inclusivity. This finding is in line with the findings of Kamau and Waiganjo (2016), who explored the transformative effect of mobile banking in Kenya. Their research posits that the rise of mobile banking systems catalyzed the growth of Small and Medium-sized Enterprises (SMEs), a backbone of the Kenyan economy, by providing them with convenient financial tools and services.

## CONCLUSION

Over the past decade, financial technology has prominently emerged as a significant driver influencing economic growth, especially in developing nations such as Nigeria. Our primary objective was to investigate the impact of financial technology on Nigeria's economic growth between 2012Q1 and 2022Q4.

Three salient conclusions emerged from our discussions: The spread of web-based transactions has considerably enhanced Nigeria's economic canvas. Their adoption has facilitated smoother business operations, expanded market reach, and fostered global integrations, all of which have contributed positively to economic growth.

Our discourse revealed that mobile payment mechanisms have benefited Nigeria's economic landscape. The ease and convenience of mobile transactions have empowered even the remotest parts of the country, bridged economic disparities, and fostered inclusive growth.

Remarkably, Instant Pay Transactions (IPT), while being an innovation in seamless transactions, displayed a negative yet statistically significant correlation with Nigeria's economic growth. This could be attributed to factors like rapid adoption without adequate infrastructural support or potential misuse.

## RECOMMENDATIONS

Arising from these findings, the following recommendations were suggested:

- i. The evident economic influence of web-based transactions in Nigeria necessitates focused action. In collaboration with private entities, the government should

prioritize strengthening digital infrastructure. This ensures reliable internet access nationwide. Concurrently, as online transactions expand, so do cybersecurity threats. Enhanced cybersecurity measures and public awareness campaigns are paramount to safeguarding the nation's digital financial frontier.

ii. Mobile transactions have transformed Nigeria's financial landscape. However, to optimize their potential, a two-pronged approach is recommended. Firstly, expanding mobile network connectivity to rural and remote areas ensures that no community is left behind. Secondly, there is a clear need for consistent user education to enlighten individuals about safe mobile payment practices and the system's broader capabilities.

iii. The negative association of Instant Pay Transactions with economic growth raises concerns. An in-depth infrastructure audit is essential to reveal and address any underlying inefficiencies or bottlenecks within that gateway payment system. Alongside, tighter regulatory oversight by the CBN on IPT is pivotal. Such measures will not only mitigate potential misuse but also realign IPT to bolster Nigeria's economic growth."

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