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# Impact of Financial Technology Adoption on Financial Inclusion and Monetary Policy Effectiveness: A Comparative Study of Nigeria and Brazil (2010-2024)

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**Abstract** **Original Research Article**

Over the past decade and a half, financial technology (fintech) has reshaped financial systems in many emerging economies, promising to expand financial inclusion and potentially alter the transmission of monetary policy. Nigeria and Brazil stand out as large middle-income countries that have combined ambitious digital financial reforms with rapid growth of private fintech ecosystems. This article reviews evidence from 2010 to 2024 to examine how fintech adoption has influenced financial inclusion outcomes and monetary policy effectiveness in both countries. Drawing on an integrative review of academic studies, central bank and international organization reports, and industry analyses, the article first develops a conceptual framework linking fintech, inclusion and monetary transmission. It then compares the evolution of fintech ecosystems, inclusion indicators and credit dynamics in Nigeria and Brazil, highlighting similarities and contrasts in regulatory approaches, business models and public digital infrastructure. The review finds that in both countries, digital payments, mobile channels and platform-based finance have substantially lowered barriers to account ownership and usage, especially among previously underserved groups, although important gaps remain in Nigeria. At the same time, available evidence suggests that, so far, fintech credit remains too small to materially weaken aggregate monetary policy transmission, even as it changes the composition of lenders and borrowers. The article concludes with policy lessons for regulators seeking to harness fintech for inclusive growth while safeguarding monetary policy effectiveness, and identifies avenues for future empirical research.

**Keywords:** financial technology, financial inclusion, monetary policy, fintech credit, Pix, mobile money, Nigeria, Brazil.



## 1. Introduction

### 1.1 Background and problem statement

The diffusion of fintech, defined broadly as technology-enabled financial services delivered by both incumbent institutions and new digital players, has been one of the most salient features of financial sector development in emerging markets since 2010. Globally, account ownership rose from 51 percent of adults in 2011 to 76 percent in 2021, with particularly rapid gains in developing economies, partly driven by digital channels and mobile money (World Bank Group 2023; Global Database, 2021). In Latin America, intensified competition, the spread of smartphones and the rollout of real-time payment systems such as Brazil's Pix have helped push

account ownership above 80 percent in several countries (MENAFN, 2026; Mastercard, 2024). Nigeria has also made significant progress since launching its National Financial Inclusion Strategy (NFIS) in 2012, although it fell short of its 80 percent inclusion target for 2020. (CBN 2013; CBN, 2017; EFInA, 2021).

At the same time, central banks have grappled with how fintech may affect the channels through which monetary policy influences credit conditions and aggregate demand.

Digital lenders, big-tech platforms and marketplace finance may respond differently to policy rate changes than traditional banks, while broader access to formal financial services can, in principle, strengthen interest-rate and credit channels by bringing more households and firms into the transmissive core of the financial system. (Giulio Cornelli et al., 2024; Gambacorta, 2023; Huang et al., 2023). In Brazil, strong credit growth in recent years despite high policy rates sparked debate about whether monetary tightening was losing traction, although International Monetary Fund (IMF) analysis concludes that transmission remains broadly effective, with credit expansion largely driven by income growth and structural shifts including increased financial inclusion and fintech competition (IMF, 2025).

### 1.2 Research questions and objectives

Against this background, this article addresses the following main question: how has fintech adoption between 2010 and 2024 shaped financial inclusion and monetary policy effectiveness in Nigeria and Brazil?

It pursues four specific objectives.

First, to synthesize evidence on the evolution of fintech ecosystems in both countries, including regulatory milestones, dominant business models and public digital infrastructure.

Second, to assess how fintech has affected access to and usage of formal financial services, paying attention to distributional patterns.

Third, to examine the channels through which fintech and broader financial inclusion may interact with monetary policy transmission, drawing on country-specific and cross-country research.

Fourth, to derive comparative lessons for policy makers and central banks in other emerging economies seeking to balance innovation, inclusion and macro-financial stability.

### 1.3 Scope, contribution and structure of the article

The temporal scope runs from 2010 to 2024, covering the period in which Nigeria rolled out its cash-less policy and NFIS and Brazil liberalized its payments sector, launched Pix and advanced an open finance and central bank digital currency (CBDC) agenda. (CBN, 2013; IMF, 2025; CBN, 2017; MENAFN, 2026). The article focuses on retail-oriented fintech (payments, digital accounts, neobanks and digital credit) and their interactions with household and small and medium-sized enterprise (SME) finance; wholesale market infrastructure, algorithmic trading and crypto assets receive only peripheral attention. Conceptually, the article contributes an integrated framework linking fintech adoption, financial inclusion and monetary policy effectiveness in a comparative emerging-market setting. Empirically, it consolidates recent, often dispersed evidence from Nigeria and Brazil as well as global studies on fintech credit and monetary transmission.

The remainder of the article is organized as follows: Section 2 sets out the conceptual and theoretical framework; Section 3 describes fintech ecosystem evolution; Section 4 reviews financial inclusion outcomes; Section 5 analyses fintech, credit and monetary policy; Section 6 explains the review methodology; Section 7 discusses policy implications; and Section 8 highlights research gaps and concludes.

## 2. Conceptual and theoretical framework

### 2.1 Defining key concepts

Fintech is used here as an umbrella term for the application of digital technologies to design and deliver financial products and services, spanning digital payments, mobile money, online and app-based banking, peer-to-peer and marketplace

lending, robo-advisory, and open-finance-based data sharing (10,4). In both Nigeria and Brazil, payments-focused fintechs and neobanks have been the most visible manifestations of this transformation, while digital lending and embedded finance have grown more gradually (13,14,3).

Financial inclusion refers to the state in which individuals and businesses have access to and can effectively use appropriate, affordable and convenient financial products-including payments, savings, credit, insurance and pensions, delivered in a responsible and sustainable manner (4,5). Measurement typically considers dimensions of access (e.g., account ownership, proximity of access points), usage (frequency and volume of transactions, savings and credit) and quality (suitability, reliability, consumer protection). In Nigeria, policy documents distinguish between formal inclusion through regulated institutions and broader inclusion that also counts some informal mechanisms, while Brazil's policy debate increasingly emphasizes effective use of digital accounts and credit, not only account ownership (15,16,5). Monetary policy effectiveness denotes the extent to which changes in the central bank's policy stance influence aggregate demand, inflation and financial conditions through channels such as short-term interest rates, bank lending, asset prices, expectations and the exchange rate (9,17). In inflation-targeting frameworks like Brazil's, the primary instrument is an overnight policy rate (the Selic), whereas in Nigeria the framework has evolved from monetary aggregates towards interest-rate-oriented strategies, with significant attention to exchange-rate and credit conditions (17,11).

### 2.2 Theoretical channels linking fintech, inclusion and monetary policy

Fintech can enhance financial inclusion through several mechanisms. Digital payments and mobile money lower transaction costs, reduce minimum balance requirements and allow remote onboarding, thereby expanding access for low-income and rural customers (18,19,4). Agent banking networks and merchant points of sale (POS) provide cash-in/cash-out infrastructure, while alternative data and digital footprints enable new credit scoring models for thin-file borrowers (20,21). Government-to-person transfers and wage payments delivered through digital accounts can also draw previously unbanked recipients into the formal financial system (7,4). These inclusion gains in turn interact with monetary policy. As more households and firms hold formal deposits and borrow from regulated institutions, changes in policy rates are transmitted to a larger share of balance sheets via the interest-rate and bank-lending channels (9,17). Greater access to digital payments and savings instruments can also influence the money-demand function and the relative importance of cash versus deposits, potentially affecting the transmission from policy rates to broader monetary and credit aggregates (10,9). At the same time, if a growing share of credit is extended by less regulated fintech and big-tech lenders whose funding costs and pricing strategies are less sensitive to policy rates, the traditional bank-based channel could be weakened (8,10).

Emerging empirical work supports a nuanced view. Using panel-vector autoregression for 19 countries, Cornelli and co-authors find that fintech credit shows a significantly lower and often statistically insignificant response to monetary policy shocks than bank credit, and that fintech credit currently explains less than 2 percent of the variance of real GDP, compared with around one-quarter for bank credit (8,9). Huang and colleagues, focusing on big-tech lending in China, document that big-tech loans tend to be smaller and more likely to be extended to new borrowers, and that, conditional on credit demand, big-tech lenders may react more strongly to expansionary policy on the extensive margin, even if their overall sensitivity to tightening remains limited (10). These findings suggest that fintech may both complement and partially substitute bank credit, with ambiguous implications for transmission depending on scale and business model.

### 2.3 Comparative framework and Figure 1

Nigeria and Brazil provide an informative contrast for studying these channels.

Both are large, populous middle-income economies with vibrant private fintech sectors and activist central banks, yet they differ markedly in financial depth, macroeconomic stability and state capacity (19,5,4). Brazil has long had a relatively deep and concentrated banking system and capital markets, and since the late 1990s has operated a formal inflation-targeting regime, whereas Nigeria's financial system is shallower, with larger informal sectors and episodic macroeconomic instability (19,17,11).

This article adopts a comparative analytical matrix with four dimensions: (i) regulatory and policy approach to fintech and inclusion; (ii) fintech ecosystem structure (business models, funding, competition with incumbents); (iii) inclusion outcomes (account ownership, usage and remaining gaps); and (iv) monetary policy and credit dynamics, including the role of fintech credit and digital payments. Throughout, the analysis emphasizes interactions between public digital infrastructure (e.g., Pix in Brazil, electronic payment systems and agent banking in Nigeria) and private innovation.

Figure 1 depicts fintech adoption (payments, digital accounts, digital credit, data-sharing) as an exogenous shock that directly increases financial inclusion via improved access, usage and quality. Higher inclusion expands the share of households and firms linked to formal financial intermediaries and digital payment rails, thereby strengthening the interest-rate and credit channels of monetary policy. In parallel, the growth of fintech and big-tech credit modifies the structure of intermediation and may exhibit lower sensitivity to policy rates, potentially weakening traditional bank-lending channels. Regulation, public digital infrastructure and macroprudential policy mediate these effects, shaping the net impact on monetary policy effectiveness.

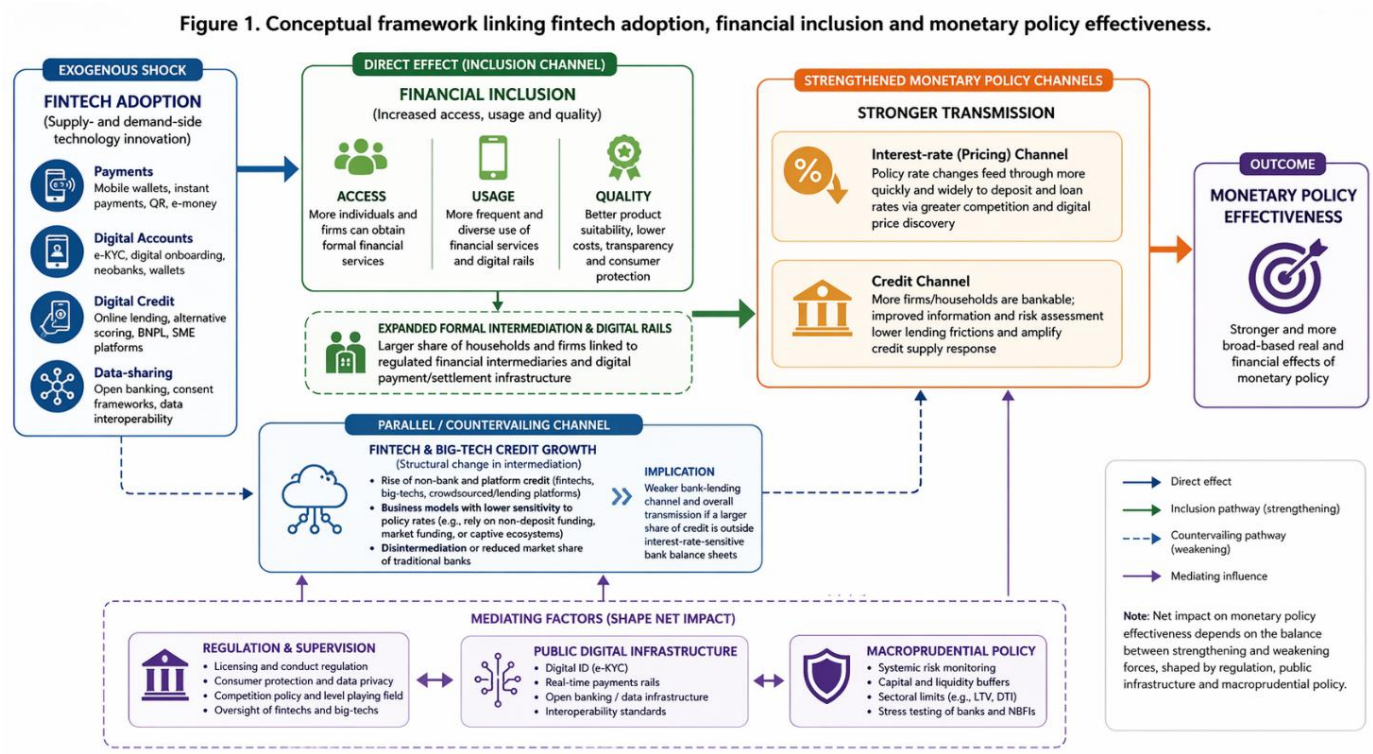


Figure 1. Conceptual framework linking fintech adoption, financial inclusion and monetary policy effectiveness.

## 3. Fintech adoption and ecosystem evolution in Nigeria and Brazil

### 3.1 Nigeria's fintech landscape (2010-2024)

Nigeria's fintech ecosystem emerged against the backdrop of low initial inclusion-46.3 percent of adults were financially excluded in 2010-and explicit policy commitments to reduce exclusion to 20 percent by 2020 (5,6). The Central Bank of Nigeria (CBN) and stakeholders implemented the NFIS in 2012 and complementary initiatives such as the cash-less policy and Payments System Vision 2020, which promoted electronic payments, agent banking and mobile money (6,5). These reforms opened space for payment service providers, mobile money operators and agent networks, supported by investments in the Nigeria Inter-Bank Settlement System (NIBSS).

Since the mid-2010s, Nigeria has seen the rise of diverse fintech players offering mobile wallets, merchant payments, card-accepting POS devices, remittances and micro-savings, alongside digital banks and lending platforms (22,23,13). Empirical studies using data from 2009 to 2024 find that proxies for fintech such as POS transactions, web and mobile banking usage and ATM volumes are positively associated with measures of financial inclusion, although the strength and significance of individual channels vary (24,21,20). Bamanga and co-authors, for example, find that mobile banking, internet banking, POS terminals and ATMs all contribute to financial inclusion, with some channels exerting stronger effects than others (13). More recent work on fintech disruptions between 2015 and 2024 confirms that adoption, accessibility and innovation in fintech are important drivers of inclusion, while regulatory frameworks have so far played a more limited role.(22)

### 3.2 Brazil's fintech landscape (2010–2024)

In Brazil, fintech built on a relatively sophisticated yet concentrated banking system.

From the early 2010s, new entrants such as Nubank and a wave of payments, credit and digital-wallet providers challenged incumbent banks by offering low-fee digital accounts, user-friendly apps and innovative credit products (14,25,3). By the mid-2020s, Brazil counted more than 1,500 fintechs across payments, lending, personal finance and other segments, making it one of the world's most dynamic fintech hubs (3,14).

Regulators and the Central Bank of Brazil (BCB) played a catalytic role by liberalizing the payments market, promoting competition and building public digital infrastructure.

A landmark initiative was the launch in 2020 of Pix, a real-time payment system operated by the BCB that offers instant, 24/7, low-cost transfers for individuals and firms.(4,3)

By 2024-2025 Pix was processing over 3-6 billion transactions per month and handling transaction values approaching or exceeding Brazil's annual GDP, with around 75–80 percent of adults actively using the system.(25,14,3). Parallel reforms advanced an open finance framework that enables data sharing between institutions and third-party providers, and the BCB has launched a digital real (Drex) CBDC pilot to support programmable payments and tokenized assets.(12,3)

### 3.3 Comparative synthesis and Table 1

While both countries have vibrant fintech ecosystems, their structure and policy environment differ. Nigeria's market is more cash-intensive, with strong roles for mobile money operators, POS-driven merchant acquiring and agent networks, but more limited penetration of fully licensed digital banks (23,7,5). Brazil's system is more bank-centric, yet fintechs and neobanks have gained significant market share in cards and unsecured consumer credit, and public digital infrastructure such as Pix and open finance have become central pillars of the ecosystem (14,3,4).

Table 1. Stylized overview of fintech ecosystem characteristics in Nigeria and Brazil (2010–2024).

| Dimension | Nigeria | Brazil |
|---|---|---|
| Initial financial inclusion (circa 2010) | High exclusion; 46.3% of adults excluded in 2010; NFIS targets 20% exclusion by 2020.(6,5) | Higher baseline banked population; legacy of concentrated but deep banking sector.(4,26) |
| Key regulatory milestones | 2010 Maya Declaration commitment; 2012 NFIS; cash-less policy; tiered KYC; agent banking and mobile money guidelines (5,6) | Payments liberalization; 2013-2018 card and acquiring reforms; 2020 launch of Pix; phased implementation of open banking/open finance; Drex pilot.(4,3,12) |
| Dominant fintech business models | Mobile money, payment gateways, POS merchant acquiring, wallets, remittances; emerging digital banks and lending platforms.(23,13,22) | Neobanks and digital accounts (e.g., Nubank); Pix-based payments; digital wallets; marketplace and fintech credit; wealth and investment platforms.(3,14,25) |
| Public digital infrastructure | NIBSS instant payments; shared switches; growing agent and POS network; national ID reforms ongoing.(5,6,7) | Pix as universal instant payment rail; interoperable QR and alias system; open finance APIs; digital ID (Gov.br); Drex CBDC pilot.(4,12,3) |
| Regulatory approach to fintech | Functional licensing (payment service providers, microfinance, switching); emphasis on risk containment and incremental innovation.(5,20) | Pro-competition, innovation-friendly regulation; central bank as platform builder (Pix, open finance) and prudential overseer of new entrants.(4,3) |

## 4. Fintech and financial inclusion outcomes

### 4.1 Evolution of financial inclusion in Nigeria

Nigeria's NFIS aimed to reduce the share of financially excluded adults from 46.3 percent in 2010 to 20 percent by 2020, implying a target of 80 percent inclusion (5,6).

EFInA's Access to Financial Services surveys show that, by 2020, around 64 percent of adults were financially served (including formal and informal channels) and 35.9 percent-about 38 million adults-remained completely excluded, indicating that the NFIS target was missed (15,7). Nonetheless, the share of adults using formal financial services exceeded 50 percent for the first time, with banking penetration rising from 40 to 45 percent between 2018 and 2020 (7,15).

Several studies attribute part of this progress to fintech-enabled channels.

Empirical analyses using time-series and vector autoregression approaches find that increased usage of ATMs, POS terminals, web banking and mobile banking is positively associated with deposit ratios and other proxies for financial inclusion.(21,20,24)

Akutson and Sani, for instance, show that POS transactions and ATM usage are associated with a decline in reliance on traditional bank branches, while web-based payments have a positive and significant effect on inclusion, suggesting a shift from branch-based to digital access points (24). Other work highlights that fintech adoption, accessibility and innovation have played important roles in improving inclusion, whereas regulatory frameworks and infrastructure constraints have so far limited their impact in some regions.(22)

Despite these gains, important gaps remain. EFInA and related studies document persistent gender, age and rural–urban disparities: women, young adults and rural residents are significantly more likely to be excluded or rely on informal mechanisms (19,15,7). Digital literacy, smartphone affordability, network coverage and trust in digital channels also constrain uptake, and many formal account holders still use accounts infrequently or primarily for cash-in/cash-out, limiting the developmental benefits of inclusion (18,7,19).

### 4.2 Evolution of financial inclusion in Brazil

Brazil entered the 2010s with relatively high levels of bank account ownership but substantial inequality in access to affordable credit and efficient payments. Global Findex data and regional surveys indicate that by 2017 around two-thirds of adults held an account, and subsequent years saw further increases, with account ownership surpassing 80 percent in many Latin American economies (26,1,4). Mastercard-commissioned research suggests that by the early 2020s, a large majority of Brazilian adults not only owned accounts but also used debit and credit cards and mobile channels, with mobile financial usage-especially peer-to-peer transfers-becoming widespread (4). The launch of Pix in 2020 significantly accelerated digital payments adoption. Within a few years, Pix processed more transactions than all debit and credit cards combined and became the dominant payment method for a wide range of use cases (3,14). By 2024, Pix handled transaction values on the order of Brazil's GDP, with over 170 million registered Pix keys and more than 60 percent of the population using Pix at least once per month, while some sources estimate that 75-80 percent of adults actively use the system (25,14,3). Alongside Pix, digital wallets such as PicPay, PagSeguro and Mercado Pago, as well as neobanks like Nubank, have onboarded tens of millions of previously underbanked consumers by offering low-fee, app-based accounts and cards (14,25,3).

Yet here too, inclusion is not uniform. Surveys suggest that around 20 percent of Brazilians remained unbanked in the mid-2020s, with low-income, rural and informally employed groups over-represented (27,16,14). High indebtedness has emerged as a concern, with some observers warning of a shift "from unbanked to over-indebted," as easy access to consumer credit, including via fintech channels, exposes households to stress in the face of shocks and high interest rates (16).

### 4.3 Comparative analysis, Figure 2 and Table 2

Viewed together, Nigeria and Brazil illustrate distinct but convergent trajectories.

Nigeria moved from very low baseline inclusion to a situation where a small majority of adults use formal financial services, with fintech contributing to expanded access but large exclusion gaps persisting (15,7,19). Brazil moved from moderate to very high account ownership and intensive use of digital payments, with public digital infrastructure and fintech competition driving both inclusion and, in some segments, over-extension (3,14,4).

Figure 2 presents stylized line charts, based on Global Findex, EFInA and regional survey data, comparing (i) the percentage of adults with an account (formal or digital) in Nigeria and Brazil, and (ii) the relative growth of digital payments (mobile money, online banking, Pix) versus cash usage.

The Nigeria series shows gradual increases in account ownership and digital payments from a low base, with a notable but insufficient acceleration after the 2012 NFIS and the expansion of agent banking.

The Brazil series starts at a higher level and rises more steeply in the 2010s, with a marked inflection after the launch of Pix, accompanied by a strong decline in the share of expenses paid in cash.

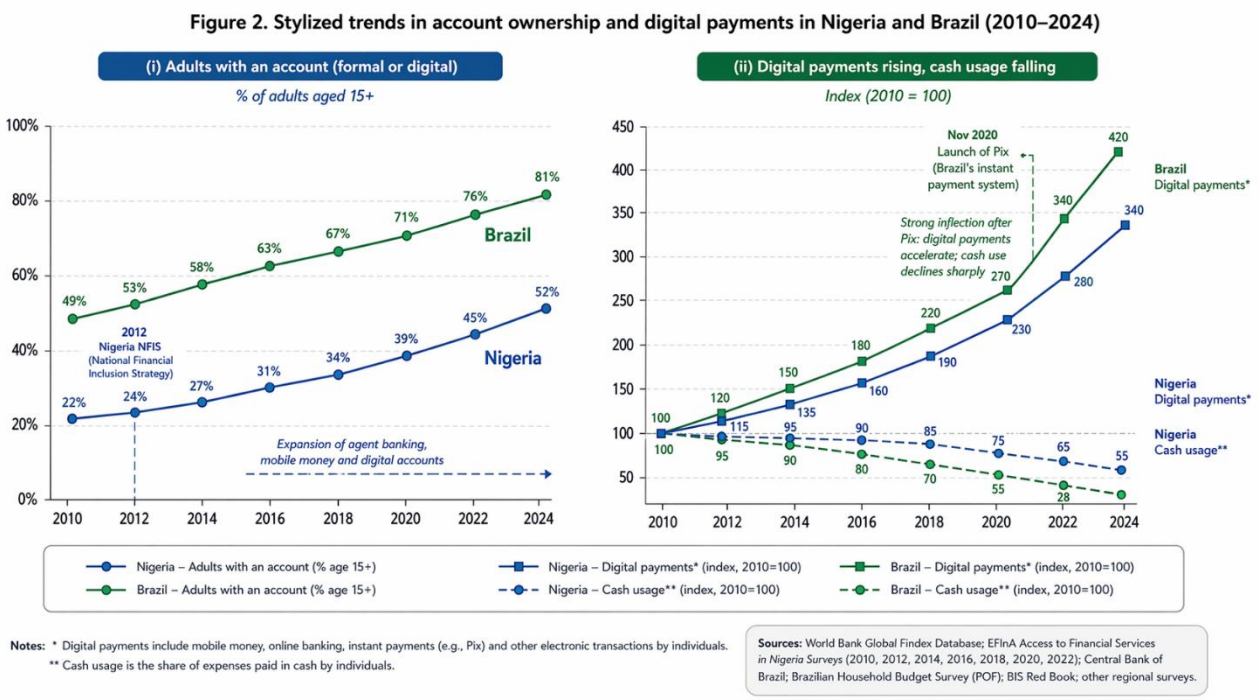


Figure 2. Stylized trends in account ownership and digital payments in Nigeria and Brazil (2010–2024).

Table 2. Selected financial inclusion indicators and fintech-related developments in Nigeria and Brazil (2010-2024, qualitative summary).

| Indicator | Nigeria | Brazil |
|---|---|---|
| Adult account ownership | Low base in 2011–2014; significant increase by 2020 but overall inclusion still around mid-60 percent and NFIS targets not met.(18,15,7) | Moderate base (~two-thirds of adults with accounts) rising to high levels (around or above 80 percent) by early 2020s.(4,26,1) |
| Use of digital payments | Growing use of ATMs, POS, web and mobile banking; digital account usage uneven, with many accounts dormant or used mainly for cash-out. (20,24,21,7) | Rapid adoption of card and mobile payments; Pix becomes dominant payment rail with billions of monthly transactions and broad population coverage.(4,3,14) |
| Access gaps | Persistent gender, rural–urban and income gaps; significant shares of adults remain completely excluded.(19,15,7) | Remaining exclusion concentrated among low-income and informal workers; concerns about over-indebtedness and quality of credit rather than pure access.(16,14) |

| | | |
|---|---|---|
| Role of fintech | Positive impact of fintech channels on inclusion, especially via POS, mobile and web banking; regulatory and infrastructure constraints limit reach in some regions.(13,22,20,21) | Fintechs and neobanks central to onboarding new users and diversifying products; public digital infrastructure (Pix, open finance) amplifies impact.(4,3,25) |

## 5. Fintech, credit and monetary policy effectiveness

### 5.1 Monetary policy frameworks in Nigeria and Brazil

Brazil operates a well-established inflation-targeting regime with the Selic policy rate as its main instrument and a floating exchange rate. BCB decisions are communicated through a transparent committee process, and transmission runs through bank lending, capital markets and expectations channels (11,9). Despite cycles of tightening and easing, recent IMF analysis indicates that pass-through from the policy rate to lending rates remains relatively strong: a 1 percentage point increase in the policy rate is estimated to raise average lending rates by about 0.7 percentage point after four months, with some dampening due to directed credit (11). Nigeria's monetary framework has been more hybrid, combining elements of monetary-aggregate targeting, exchange-rate management and interest-rate policy. The CBN employs a monetary policy rate (MPR) complemented by reserve requirements and prudential tools, and has historically relied extensively on direct interventions and development finance schemes, which can complicate transmission. Recent research using data from 1993 to 2022 finds that financial inclusion variables have significant long-run effects on monetary policy indicators, supporting the notion that inclusion can enhance the effectiveness of policy (17).

### 5.2 Financial inclusion and monetary policy in Nigeria

The UFPI study on "Financial inclusion and monetary policy in Nigeria" uses an autoregressive distributed lag (ARDL) model with CBN data to examine how inclusion indicators affect monetary policy effectiveness (17). It finds that measures such as the number of bank branches, ATMs and POS terminals, as well as broader access indicators, have statistically significant long-run impacts on monetary policy variables, suggesting that greater inclusion strengthens the transmission mechanism.

The study concludes that improving access to formal financial services; particularly credit to SMEs-can enhance the long-run effectiveness of monetary policy by expanding the set of agents that respond to policy signals (17). Complementing this macro-level evidence, micro-oriented Nigerian studies show that fintech channels can alter the structure of intermediation. Akutson and Sani document that increased use of POS payments and ATMs is associated with a reduction in the number of physical bank branches, indicating substitution from bricks-and-mortar to digital access points.(24)

Other work finds that web and mobile banking have statistically significant positive effects on deposit-based measures of inclusion, which should, in principle, make the deposit and credit channels of monetary policy more potent (20,21). However, the persistence of cash usage, informal finance and structural bottlenecks in credit markets-such as weak collateral registries and judicial enforcement-continue to limit the reach of conventional interest-rate changes, especially for MSMEs (5,19).

### 5.3 Fintech, credit growth and monetary transmission in Brazil

Brazil's experience since the mid-2010s highlights how fintech and financial inclusion interact with credit dynamics and monetary policy. Following the pandemic, Brazil implemented a strong monetary tightening cycle, with the Selic rate reaching around 15 percent, among the highest policy rates globally

(11). Yet, in 2024 bank credit grew by about 11.5 percent and corporate bond issuance by 30 percent, raising concerns that policy tightening was failing to constrain credit (11). IMF analysis attributes this apparent paradox to two main factors. First, cyclical income growth and improved labor-market conditions boosted demand for credit. Secondly, structural reforms-including the expansion of fintech lenders and digital banks and increased bond-market financing-raised access to credit and competition, even as the basic policy rate increased.(11) Digital banks and fintech lenders came to account for roughly one-quarter of the credit card market and more than 10 percent of non-payroll personal loans by 2024, putting pressure on incumbent banks to cut spreads and expand offerings.(14,3,11) Despite this, estimates of pass-through from the policy rate to lending rates suggest that transmission remains active, albeit dampened by directed credit and heterogeneity across products.(11)

### 5.4 Global evidence on fintech credit and monetary policy

Cross-country evidence from the BIS and related research provides a broader context.
Cornelli and co-authors assemble data on fintech and big-tech credit across 19 countries from 2005 to 2020 and find that fintech credit exhibits a lower and often insignificant sensitivity to monetary policy shocks compared with bank credit.(9,8) While this could imply a weakening of traditional transmission channels as fintech credit grows, the authors note that fintech and big-tech credit still account for a small share of total credit in most economies, so their macroeconomic impact remains limited.(8,9)

Huang and colleagues, using loan-level data, compare big-tech and bank lending to SMEs and find that big-tech loans are typically smaller and more likely to be extended to new borrowers; in response to expansionary policy, big-tech lenders increase the number of borrowers more than banks do, suggesting that fintech can strengthen transmission on the extensive margin by reaching clients outside traditional bank portfolios. (10) Related studies show that fintech and big-tech credit growth is driven by technological advantages in screening and monitoring, uneven regulation and the demand for convenient digital credit, all of which shape how monetary policy shocks are transmitted through non-bank channels.(9,10)

### 5.5 Comparative synthesis

For Nigeria and Brazil, these findings imply that fintech's current impact on monetary policy effectiveness is likely modest but increasing. In Nigeria, fintech-driven inclusion expands the depositor base and access to electronic payments, which should, over time, enhance the sensitivity of consumption and investment to policy-induced changes in interest rates and credit conditions, provided that structural impediments to credit intermediation are addressed (21,20,24,17). In Brazil, fintech competition and public digital infrastructure have supported credit expansion even under high policy rates, but IMF evidence suggests that overall transmission remains intact; fintech credit still represents a relatively small share of total credit, although its role in re-allocating credit and influencing spreads is non-negligible (3,14,9,11).

Looking ahead, the expansion of Pix-based credit products, open-finance-enabled lending and potential Drex-based innovations could, if not carefully regulated, create segments of credit that are less tightly linked to policy rates. At the same time, increased data availability and programmable money could provide central banks with new tools and more granular information to calibrate policy and monitor transmission.

## 6. Methodology of the review and comparative approach

### 6.1 Review design

The article adopts an integrative narrative review rather than a formal systematic review. The fintech, inclusion and monetary policy literatures relevant to Nigeria and Brazil are heterogeneous in methods, indicators and time coverage, spanning time-series econometrics, cross-country panels, case studies and policy reports.
A narrative approach allows synthesis of diverse

sources while maintaining a clear comparative structure. However, selection bias and publication bias remain concerns, and the article does not attempt a meta-analysis of effect sizes.

### 6.2 Data sources and selection criteria

The review draws on peer-reviewed journal articles, working papers, central bank and government documents, and reports by international organizations and reputable industry analysts. Key academic sources include Nigerian studies on fintech and inclusion using VAR and OLS methods; broader assessments of inclusion progress using Global Findex data; and international work on fintech credit and monetary policy transmission (20,19,9,10,17). Policy and industry documents from the CBN, BCB, EFInA, the IMF, the World Bank, Mastercard and regional media provide up-to-date information on regulatory reforms, digital infrastructure and ecosystem developments (6,7,15,4,5,3,11).

Inclusion criteria were: (i) focus on Nigeria and/or Brazil or provide generalizable evidence on fintech, inclusion or monetary policy; (ii) publication between 2010 and early 2026, with emphasis on 2015-2024; and (iii) empirical or policy-relevant content. Exclusion criteria included purely descriptive press pieces with little analytical content and studies focused exclusively on crypto-assets or wholesale market microstructure.

### 6.3 Comparative analytical steps

The comparative framework proceeded in three steps. First, country-specific evidence was synthesized along the four analytical dimensions outlined in Section 2.3. Second, cross-cutting themes-such as the role of public digital infrastructure, the pattern of inclusion gaps and the scale of fintech credit-were identified and compared. Third, insights from global research on fintech credit and monetary policy were mapped onto the Nigerian and Brazilian contexts to derive hypotheses about future evolution. Tables 1 and 2 and Figures 1 and 2 are used to organize and communicate the comparative findings.

## 7. Policy discussion and implications

### 7.1 Regulatory lessons from Brazil for Nigeria

Brazil's experience highlights the power of sequenced, innovation-friendly regulation combined with public digital infrastructure. By designing Pix as a universal, low-cost, interoperable payment rail owned by the central bank, authorities created a platform on which both incumbents and new entrants could innovate, dramatically lowering transaction costs and facilitating digital account adoption (4,3). The parallel rollout of open banking and open finance, with standardized APIs and robust consent frameworks, unlocked data-driven business models while giving consumers greater control over their financial data (9,3).

For Nigeria, key lessons include the value of building robust, inclusive payment infrastructure that can support instant low-value transfers at scale and ensuring that regulatory frameworks for data sharing, consumer protection and competition are in place before fintech and big-tech players reach systemic scale. While Nigeria has made progress with NIBSS infrastructures and agent networks, further investment in reliability, interoperability and digital identification would strengthen the foundation for more advanced fintech offerings (7,6,5).

### 7.2 Lessons from Nigeria for Brazil and other markets

Nigeria's trajectory offers lessons on reaching financially excluded populations in contexts of weaker infrastructure and lower average incomes. The expansion of agent banking, mobile money and POS-based merchant acquiring has demonstrated how non-branch channels can extend the reach of formal finance into rural and peri-urban areas, even where smartphone penetration and digital literacy are limited (15,7,5). Fintech business models that leverage simple USSD interfaces, agent networks and partnerships with mobile network operators may be particularly relevant for other African and low-income economies, and can complement app-based models more typical in Brazil.

Brazil and other Latin American countries can also learn from Nigeria's experience with explicit

national financial inclusion strategies. Regular monitoring of inclusion targets, combined with granular data on gender, age and region, can help identify and address persistent exclusion gaps. However, Nigeria's failure to meet its ambitious 2020 targets also serves as a cautionary tale about over-optimistic planning and the need to address structural barriers such as poverty, education and infrastructure alongside financial sector reforms (19,5,15).

### 7.3 Safeguarding monetary policy effectiveness

As fintech continues to reshape financial intermediation, regulators must ensure that monetary policy transmission remains effective. In both Nigeria and Brazil, this calls for extending the regulatory perimeter to capture significant fintech and big-tech lenders, ensuring that their funding structures and risk management practices are compatible with macro-prudential objectives (8,10,9).

Macro-prudential tools such as counter-cyclical capital buffers, limits on loan-to-income and loan-to-value ratios, and stress tests that include fintech portfolios can help contain excessive credit growth in specific segments.

CBDCs and real-time payment data may enhance central banks' information sets and operational capabilities. Brazil's Drex pilot, for example, aims to enable tokenized deposits and programmable payments, which could eventually allow more targeted and efficient policy interventions, although careful design is needed to avoid disintermediation of banks (12,3). For Nigeria, exploring a more integrated approach between its e-Naira initiative, existing instant payment infrastructures and commercial bank innovations could support more effective and inclusive monetary transmission.

### 7.4 Inclusion, competition and consumer protection trade-offs

Fintech-driven inclusion is not an unalloyed good. Brazil's experience with rising household indebtedness, particularly in high-cost consumer credit, illustrates the risk that newly included borrowers may become over-leveraged, especially when macroeconomic conditions deteriorate or policy rates rise sharply (16,14,11). In Nigeria, the proliferation of digital lenders with opaque pricing and aggressive collection practices has raised concerns about consumer protection, data privacy and reputational risks to the formal financial system (23,22).

Regulators therefore need to balance pro-competition and innovation policies with robust conduct, disclosure and data-protection frameworks. Financial literacy initiatives should be integrated into inclusion strategies, and supervisory capacity must be upgraded to monitor fast-moving digital markets. Open finance regimes should include safeguards against algorithmic bias and exclusionary practices that could disadvantage vulnerable groups.

## 8. Research gaps and conclusion

### 8.1 Identified gaps in the literature

Despite rapid growth in fintech research, several gaps remain. First, causal evidence on the impact of fintech adoption on monetary policy transmission in emerging economies is scarce. Existing studies either focus on cross-country panels of fintech credit or on specific big-tech lenders, with limited coverage of African and Latin American markets like Nigeria and Brazil. (10,8,9).

Second, micro-level data that link individual or firm-level fintech usage to borrowing, saving and spending responses to policy shocks are largely unavailable, constraining identification of behavioural channels.

Third, the literature rarely integrates financial inclusion, competition and macro-prudential perspectives in a unified empirical framework. Studies of Nigeria often examine fintech and inclusion without explicitly modelling monetary policy, while research on Brazil's monetary policy transmission typically treats fintech and inclusion as background structural features rather than active variables (13,20,19,17). Finally, relatively little work has examined the potential role of CBDCs and programmable payments in reshaping transmission mechanisms.

### 8.2 Suggestions for future research

Future research could proceed along several avenues. One priority is to construct linked datasets that combine household or firm surveys with administrative records on digital payments, account usage and credit from banks and fintechs. Such data would permit analysis of how different groups adjust consumption, saving and borrowing in response to policy changes, and whether fintech users respond differently from non-users. Another promising direction is to exploit quasi-experimental variation created by policy changes such as the launch of Pix and open finance in Brazil, the rollout of agent banking regulations in Nigeria, or the introduction of CBDC pilots. Difference-in-differences and event-study designs could help identify the impact of these reforms on inclusion, credit allocation and the strength of monetary transmission.

Comparative studies that include additional African and Latin American countries would improve external validity and shed light on the role of institutional context.

### 8.3 Conclusion

This article has reviewed how fintech adoption between 2010 and 2024 has affected financial inclusion and monetary policy effectiveness in Nigeria and Brazil. In both countries, fintech-particularly digital payments, mobile channels and neobanks; has significantly expanded access to financial services, although Nigeria still faces substantial exclusion gaps while Brazil contends more with issues of over-indebtedness and quality of access (13,15,4,3). Public digital infrastructure, notably Pix in Brazil and NIBSS-enabled instant payments and agent networks in Nigeria, has been critical in enabling private innovation and accelerating inclusion (6,5,4,3).

On the monetary policy side, current evidence suggests that fintech credit remains too small to materially undermine aggregate transmission, even if it exhibits lower sensitivity to policy rates than traditional bank credit (8,9,11). In Nigeria, greater inclusion through fintech channels appears to strengthen the long-run link between financial variables and policy instruments, while in Brazil, fintech and bond-market development have supported credit growth without eliminating the impact of high policy rates. The net effect of fintech on monetary policy effectiveness will depend on how fast fintech credit scales up, how it is regulated and how central banks leverage new data and technologies. For regulators and policy makers in other emerging economies, the Nigeria-Brazil comparison underscores three key lessons. First, digital public goods, instant payment systems, interoperable IDs and open finance frameworks, can dramatically lower barriers to inclusion when combined with competitive fintech ecosystems. Second, explicit financial inclusion strategies must be realistic and accompanied by efforts to tackle structural constraints and protect consumers. Third, safeguarding monetary policy effectiveness in a fintech-rich environment requires extending regulatory and macro-prudential tools to new intermediaries, while harnessing the informational advantages of digital finance.

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