

**Financial Inclusion or Financial Risk? The Dual Impact of Central Bank Digital
Currencies on Traditional Banking Systems: Evidence From China, Nigeria, and the**

Bahamas

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Abstract

Central Bank Digital Currencies, or CBDCs, are becoming one of the biggest topics in global finance. Many central banks argue that CBDCs can help bring millions of unbanked people into the formal financial system. But there is also a serious concern: if too many people move their money from commercial banks into CBDCs, it could weaken the banking system. This paper looks at both sides of that argument by studying three countries that have already launched CBDCs: the Bahamas with its Sand Dollar, Nigeria with the eNaira, and China with the Digital Yuan. Using data from the IMF, the BIS, the World Bank, and individual central bank reports, the paper evaluates each case based on four things: how much the CBDC helped with financial inclusion, how widely it was adopted, what impact it had on banks, and what design choices shaped the outcome. The findings show that all three CBDCs made some progress on inclusion, but none of them caused the banking instability that economists worried about. The main reason is simple: none of them were adopted at a large enough scale

to seriously threaten commercial banks. The paper argues that the tension between financial inclusion and banking stability is not a fixed problem. It is a design problem. With the right choices, both goals can be pursued at the same time.

Keywords: central bank digital currency, financial inclusion, bank disintermediation, financial stability, Sand Dollar, eNaira, Digital Yuan, monetary policy

Introduction

Even though the global financial system has grown a lot over the past few decades, a huge number of people are still left out of it. According to the World Bank (2022), around 1.3 billion adults worldwide do not have a bank account.¹ That means they cannot save money safely, take out loans, or make digital payments. Most of these people live in developing countries, where bank branches are too far away, the paperwork requirements are too strict, or the costs of maintaining an account are too high.¹

In recent years, central banks have started exploring a possible solution: Central Bank Digital Currencies. A CBDC is basically a digital version of a country's physical cash, issued and controlled by the central bank.¹ Unlike Bitcoin or other cryptocurrencies, a CBDC is backed by the government and is meant to work just like regular money. The idea is that if someone only needs a smartphone to access their money, financial services could reach people that traditional banking never could.¹

The interest in CBDCs has grown fast. A 2024 survey by the Bank for International Settlements found that 91 percent of the 93 central banks they surveyed were already working on some form of CBDC, whether that meant research, pilot

programmes, or full launches.² However, it is important to distinguish between wholesale CBDCs (wCBDCs) and retail CBDCs (rCBDCs), as the exploration of wholesale systems is currently at a more advanced stage globally than retail implementations.² Since wholesale systems do not directly impact the unbanked, the scope of this paper is strictly limited to retail CBDC implementations.

At the same time, economists have raised a different concern. If a CBDC becomes popular enough, people might start moving their savings out of commercial banks and into CBDC accounts instead. This is called bank disintermediation, and it is a serious problem because commercial banks use deposits to fund loans. If deposits shrink, lending shrinks too, and that can slow down the whole economy.¹

So the question this paper tries to answer is: Do CBDCs help with financial inclusion, or do they create risks for the banking system? And can a country actually achieve both goals at the same time? To explore this, the paper looks at three countries that have live CBDC programmes: the Bahamas, Nigeria, and China. These three were chosen because they represent very different economic contexts and have had very different outcomes, making them useful for a comparative study.¹

The paper is organised as follows. Section 2 reviews what researchers and institutions have already written about CBDCs. Section 3 explains the framework used to analyse each case. Section 4 covers the three case studies in detail. Section 5 compares them. Section 6 discusses what the findings mean. Section 7 wraps up with a conclusion.

Literature Review

Research on CBDCs has expanded significantly since around 2018. Most of it focuses on two main themes: the potential for CBDCs to improve financial inclusion, and the risk that they could destabilise the banking system.¹ This section summarises what the existing literature says about both.

CBDCs and Financial Inclusion

Several researchers have made the case that CBDCs are a better tool for financial inclusion than traditional banking. The key argument is that a CBDC wallet has much lower barriers to entry.¹ You do not necessarily need formal ID, a minimum balance, or a nearby branch. For populations that have historically been locked out of banking for these exact reasons, a smartphone-based digital currency could make a real difference.¹

Tan (2023) from the IMF points to two specific ways that CBDCs can support inclusion.⁴ The first is direct access: giving unbanked people a CBDC wallet can be the first step toward getting them into the formal financial system. Over time, they may open bank accounts as their comfort with digital finance grows.⁴ The second is a credit history effect: transaction records from CBDC use can help people build a financial track record, which makes it easier for them to access loans later on.⁴

The design of a CBDC matters a lot here. Banet and Lebeau (2022) show that CBDCs with low costs and no interest tend to attract cash users, which is where the inclusion gains come from.¹ CBDCs with higher costs or attractive interest rates tend to pull in people who already have bank accounts, which reduces the inclusion benefit and

actually increases the risk of banks losing deposits.¹

CBDCs and Bank Disintermediation

The risk of bank disintermediation is probably the most discussed concern in the CBDC literature.¹ If enough people move money from commercial banks into CBDCs, banks lose their deposit base, which limits their ability to lend. This structural shift has profound implications for the Liquidity Coverage Ratio (LCR) mandated by Basel III regulations. Retail deposits are historically treated as "sticky" and receive favorable LCR treatment.⁵ If CBDCs increase the velocity of deposit flight, regulators may be forced to recalibrate LCR assumptions, requiring banks to hold higher capital buffers and further constraining credit creation.

Federal Reserve researchers have added to this concern by pointing out that banks could try to compensate by borrowing from wholesale money markets, but that usually comes at a higher cost and brings new risks of its own.¹ They also note that in a financial crisis, having a CBDC available could actually make bank runs worse. If people are already nervous about their bank, a government-backed digital alternative makes it very easy to move money out quickly.¹

Privacy Versus Compliance Architecture

The literature emphasizes a deep technical trade-off between Anti-Money Laundering (AML) compliance and user privacy. Researchers argue that the best way to design a CBDC is either as a deposit or as a token—a technical solution similar to banknotes.⁶ Token-based systems offer higher privacy but can be harder to regulate, while account-based systems require identity verification and enable state

surveillance.⁷ Modern CBDC architectures are increasingly incorporating privacy-enhancing elements through zero-knowledge proofs and tokenisation to navigate this paradox.⁸

Design as the Key Factor

One thing almost all researchers agree on is that the outcomes of a CBDC depend heavily on how it is designed. Kshetri and Voas (2022) argue that disintermediation is not an inevitable consequence of launching a CBDC. It depends on specific choices like whether the CBDC pays interest, whether there are holding limits, how much anonymity users get, and whether it is distributed directly or through commercial banks.¹

The Gap This Paper Fills

Most of the existing research is based on theoretical models rather than real-world data.¹ This paper tries to address that gap by looking at three live CBDC deployments and what actually happened in practice.

Conceptual Framework

This section defines the key concepts used in the analysis and explains how each case study will be evaluated.

Financial Inclusion

Following the World Bank's definition, financial inclusion means that individuals and businesses can access useful, affordable, and reliable financial services including payments, savings, credit, and insurance (World Bank, 2022).¹ In this paper, inclusion is assessed across three dimensions: Access, Usage, and Affordability.¹

Bank Disintermediation

Bank disintermediation happens when people move money out of commercial bank accounts and into something else, in this case a CBDC.¹ When this happens on a large scale, banks have less money to lend, which can hurt economic activity. There are two versions of this risk: the "slow version" (gradual shift) and the "fast version" (crisis flight).¹

The Core Tension

The tension at the heart of this paper is that the features that make a CBDC good for financial inclusion are often the same features that increase the risk of disintermediation.¹ A CBDC with no barriers to entry and ease of use could trigger rapid deposit migration, while a CBDC with tight holding limits might protect stability but fail to reach the unbanked.¹

Evaluation Criteria

Each case study is evaluated on four things: whether the CBDC expanded access for unbanked or underbanked people, whether adoption was broad and sustained, whether it affected commercial bank deposits or lending, and what design features shaped the outcomes.¹

Case Studies

This section covers three countries that have launched live CBDC programmes. Table 1 gives an overview before each case is examined in detail.

Table 1

Overview of the Three CBDC Case Studies

Country	CBDC Name	Launch	Primary Goal	Model
Bahamas	Sand Dollar	2020	Financial inclusion in island communities	Retail, tiered wallets
Nigeria	eNaira	2021	Financial inclusion and remittances	Retail, mobile app
China	Digital Yuan (e-CNY)	2020 pilot 2022 expanded	Payment modernisation and state strategy	Retail and wholesale, two-tier system

Note. Sources: Central Bank of The Bahamas (2022); Central Bank of Nigeria (2021); People's Bank of China (2021).

The Bahamas Sand Dollar

Background

The Bahamas has a geography that makes traditional banking genuinely difficult.¹ Running bank branches on smaller islands is not economically viable, and transporting physical cash is expensive. The problem became more urgent in 2019 when Hurricane Dorian devastated several islands and completely disrupted cash distribution.¹ The Sand Dollar launched in October 2020 to improve financial access for underserved communities.¹

Design

The Sand Dollar uses a tiered wallet system. The basic tier requires no identity verification and allows up to \$500 in holdings and \$1,500 in monthly transactions.¹ This structure was designed to let unbanked people access the system without documentation while still meeting anti-money laundering rules for higher-value users.¹

Outcomes

By late 2023, around 160,000 consumer wallets had been registered, representing over 35 percent of the adult population.⁹ However, the gap between

registration and real usage is large. By early 2024, the total value of Sand Dollars in circulation was only about B\$2.5 million, which is considerably less than one percent of the cash in the Bahamian economy.¹⁰

Due to poor organic adoption, the Central Bank of The Bahamas is shifting to an active regulatory mandate.¹⁰ Governor John Rolle recently stated that the regulator plans to implement regulations forcing all domestic commercial banks to integrate and provide their clients with access to the Sand Dollar within the next two years.¹⁰ This transition from optional digital infrastructure to mandatory compliance highlights the difficulty of driving adoption without state intervention.

Nigeria eNaira

Background

The eNaira launched on October 25, 2021, making Nigeria the first African country to introduce a state digital currency.¹¹ Official projections estimated the eNaira could add around \$29 billion to Nigeria's GDP over ten years.¹²

Design Problems

The eNaira had a major design flaw: at launch, access was restricted to people who already had a commercial bank account.¹ This directly excluded the unbanked population the programme was supposed to serve.¹

Adoption and the Coercion Mistake

Adoption of the eNaira fell far below expectations. Fewer than 1.15 million Nigerians—roughly 0.5 percent of the populace—had used the eNaira as of October 2022.¹⁶ The eNaira failed largely because it could not overcome "Two-Sided Market Network Externalities".¹⁶ As a single-currency design that initially lacked direct remittance capabilities, it offered no marginal value over existing mobile money platforms that already possessed entrenched network effects.¹⁶

In late 2022, the government restricted the supply of physical cash to push citizens toward the eNaira.¹ Instead of creating inclusion, it caused widespread protests and civil unrest.¹ Furthermore, amidst rampant inflation and currency devaluation, Nigerian citizens often sought financial inclusion by migrating to decentralized cryptocurrencies or US-dollar-pegged stablecoins rather than digitizing a volatile fiat currency.¹⁷

Banking Impact

Because adoption remained low, the eNaira had no measurable impact on bank deposits. Interestingly, the Central Bank of Nigeria issued a press release in October 2023 titled "eNaira: No threat to financial stability" to refute media reports claiming the

CBDC posed a risk to the country's financial system.¹⁸
China Digital Yuan (e-CNY)

Background

China's e-CNY project serves broad goals: reducing the dominance of private platforms like Alipay, building cross-border payment infrastructure, and potentially offering an alternative to dollar-based systems.²³

Design

The People's Bank of China (PBOC) originally classified the e-CNY strictly as M0, meaning it was treated as digital cash rather than a bank deposit.²⁴ By positioning it as a non-remunerated cash substitute, the central bank reduced its appeal as a place to park money that would otherwise sit in a commercial bank.¹

Outcomes

By July 2024, cumulative transaction value reached 7.3 trillion yuan (\$1 trillion) with 180 million wallet users.¹⁷ However, the e-CNY still accounts for only about 0.16 percent of China's M0 money supply.²⁴

A profound structural shift is planned for January 1, 2026. The PBOC has released a blueprint outlining a transition from a digital cash model to a "digital deposit money" model classified as M1.³⁰ Under this framework, the e-CNY will be an account-based liability of commercial banks and can bear interest.³⁰ This upgrade effectively weaponizes the CBDC to compete with private deposits and will serve as the world's first systemic stress test of CBDC-induced bank disintermediation.

Comparative Analysis

This section compares the three cases across the key dimensions established in the framework. Table 2 provides a summary.

Table 2

Comparative Analysis of Three CBDC Implementations

Dimension	Bahamas	Nigeria	China
Wallet adoption	35% of adults	~0.5% of population	~14% of population
CBDC in circulation	Under 1% of cash supply	0.36% of total currency	0.16% of M0 money supply

Main adoption barrier	Low merchant acceptance	Excluded unbanked; competition	Competition from Alipay/WeChat Pay
Disintermediation risk	Low, controlled by limits	Very low, low adoption scale	Managed via MO (Transitioning 2026)
Inclusion outcome	Moderate	Poor	Moderate

Note. Sources: IMF (2024); BIS (2024); central bank publications.

The Registration-Usage Gap

The most consistent pattern is the gap between registration and active usage.¹ Getting someone to use a CBDC as their everyday payment method requires a positive choice to change established habits.¹

Monetary Stickiness and Yield Differentials

The registration-usage gap is a rational microeconomic choice driven by yield differentials. Platforms like Alipay are integrated ecosystems offering high-yield money market funds.³⁰ A CBDC classified strictly as M0 offers zero yield, providing no economic incentive for consumers to hold it when yield-bearing private alternatives exist on the same smartphone.

The Infrastructure Paradox of Retail Financial Inclusion

A major challenge is that the unbanked often suffer from digital exclusion—lacking smartphones or internet access. Providing offline CBDC capabilities requires the distribution of physical smart cards or hardware tokens.²³ The logistical costs of manufacturing and distributing these tokens mirror the prohibitive costs of building traditional brick-and-mortar bank branches.

Table 3

CBDC Design Features and Their Effects on Inclusion and Stability

Design Feature	Effect on Inclusion	Effect on Stability	Best Approach
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Holding limit	Reduces practical usefulness	Prevents large deposit migration	Tiered limits
Interest rate	Encourages adoption	Remunerated CBDCs pull deposits	Non-remunerated or capped
Offline capability	Essential for remote/rural users	Neutral effect on stability	Critical in developing markets
Programmability/ Smart Contracts	Positive effect on targeted welfare	Complex/Neutral effect	Opt-in with clear rules

Discussion

This paper asked whether CBDCs help with financial inclusion or create risks for the banking system. Evidence from three programmes suggests that while CBDCs have capacity to expand access, the banking stability risks have not shown up yet due to low adoption scale.¹

Main Findings

1. **Behavioural Habituation:** Building a wallet is not the same as building the habit. People need a reason to switch from existing trusted options.¹
2. **Coercion Fails:** Trying to force adoption, as seen in Nigeria, creates resentment rather than inclusion.¹
3. **Trust is Essential:** Public trust in the issuing institution is the most important factor in whether a CBDC is actually used.¹

Conclusion

CBDCs can contribute to financial inclusion, but progress has been modest so far.¹ They can also be designed to protect stability through choices like holding limits and two-tier distribution.¹ The central conclusion of this paper is that the tension between inclusion and stability is a design problem, not a fundamental contradiction.¹ Technology can build the infrastructure, but trust must be earned.¹

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