

Central Bank Digital Currency (E-Naira) Adoption And Monetary Policy Effectiveness: Evidence From Nigeria's Financial Markets

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Abstract

This study investigates whether the adoption of Nigeria's central bank digital currency, the eNaira, enhances monetary policy effectiveness within the domestic financial system. Motivated by gaps in the literature, which largely overlook digital-currency transmission channels in emerging economies, the study develops a novel analytical framework linking eNaira uptake to broader policy signals, liquidity conditions, and financial-market

responses. Using annual data from 2010–2023, the analysis employs a comprehensive econometric strategy comprising unit-root diagnostics (ADF and Phillips–Perron), Vector Autoregressive (VAR) modelling, and Panel-style robustness checks. The empirical design also incorporates error-correction dynamics, Hansen stability diagnostics, and Arellano–Bond tests to ensure parameter consistency and model validity. Results demonstrate that increased eNaira adoption strengthens the monetary transmission mechanism by improving the speed and clarity of policy-rate pass-through to key market indicators, particularly interest-rate adjustments, exchange-rate movements, and broad-money trajectories. VAR-based impulse responses further reveal that digital-currency shocks generate measurable and persistent impacts on financial-market behaviour, suggesting enhanced policy traction relative to pre-adoption dynamics. The findings imply that digital-currency deployment, when supported by adequate infrastructure, cybersecurity safeguards, and user-confidence measures, can complement conventional monetary tools and reduce frictions in policy signalling. The study concludes that Nigeria’s digital-currency strategy offers a viable pathway for modernising monetary operations but emphasises the need for targeted investment in digital literacy, robust consumer-protection frameworks, and systemwide interoperability to sustain the observed gains. These insights provide valuable guidance for monetary authorities and regulators considering digital-currency integration into macroeconomic management..

Keywords eNaira, digital currency adoption, monetary policy effectiveness, VAR impulse responses, Nigeria..

INTRODUCTION

The global financial system is undergoing a profound structural transformation driven by rapid digital innovation, declining reliance on physical cash, and the increasing prominence of electronic payment systems. Within this evolving landscape, Central Bank Digital Currencies (CBDCs) have emerged as a critical policy instrument, enabling central banks to reassert control over monetary systems while enhancing payment efficiency and financial inclusion. CBDCs represent a direct liability of the central bank in digital form, offering a hybrid between traditional fiat currency and modern digital payment infrastructures (Auer, Boar, & Wehrli, 2020; Kiff et al., 2020). Their introduction raises fundamental questions regarding monetary transmission mechanisms, financial stability, and the future architecture of banking systems, particularly in emerging economies where informal financial structures remain dominant (Agur, Ari, & Dell’Ariccia, 2022; Bindseil, 2020).

Nigeria stands at the forefront of this digital monetary transition with the launch of the eNaira in October 2021, making it one of the first countries globally, and the first in Africa, to operationalize a CBDC. The eNaira was introduced with multiple policy objectives, including enhancing financial inclusion, improving payment system efficiency, reducing transaction costs, and strengthening monetary policy transmission (Central Bank of Nigeria, 2021; Ozili, 2022). However, despite its ambitious design, adoption rates have remained relatively modest, raising concerns about its effectiveness in achieving its stated goals. More importantly, the implications of eNaira adoption for monetary policy effectiveness, particularly in influencing interest rates, credit allocation, and financial market behavior, remain underexplored (Adrian & Mancini-Griffoli, 2019; Ozili, 2023).

From a theoretical standpoint, CBDCs have the potential to significantly alter the transmission channels of monetary policy. By providing a direct interface between central banks and economic agents, CBDCs may enhance policy pass-through, reduce intermediation frictions, and improve the precision of liquidity management (Meaning, Dyson, Barker, & Clayton, 2018; Kumhof & Noone, 2018). Conversely, they may also disrupt traditional banking models, potentially weakening credit creation and altering the effectiveness of conventional tools such as open market operations and reserve requirements. These dual possibilities make it imperative to empirically assess how CBDC adoption interacts with financial market dynamics, particularly in contexts characterized by structural inefficiencies and institutional constraints (Brunnermeier & Niepelt, 2019; Fernández-Villaverde et al., 2021).

In the Nigerian context, financial markets present a unique environment for examining these dynamics. The coexistence of formal and informal financial systems, persistent liquidity constraints, and varying degrees of market efficiency create a complex setting in which the effects of digital currency adoption may differ significantly from those observed in advanced economies. Moreover, the Central Bank of Nigeria has implemented a series of monetary policy reforms alongside the introduction of the eNaira, including adjustments to the Monetary Policy Rate (MPR), cash reserve requirements, and liquidity management strategies. These concurrent developments necessitate a rigorous empirical investigation to disentangle the specific contribution of eNaira adoption to monetary policy effectiveness (CBN, 2022; IMF, 2023).

Against this backdrop, the central objective of this study is to empirically examine the impact of eNaira adoption on monetary policy effectiveness in Nigeria’s financial markets. Specifically, the study seeks to determine whether increased adoption of the eNaira enhances the transmission of monetary policy signals into key financial indicators

such as interest rates, credit flows, and market liquidity. This objective is anchored on the broader research question: *To what extent does CBDC adoption influence the effectiveness of monetary policy in emerging financial markets, with particular reference to Nigeria?* Addressing this question is critical not only for Nigeria but also for other developing economies considering the adoption of CBDCs as part of their monetary policy toolkit (Auer & Böhme, 2020; IMF, 2022).

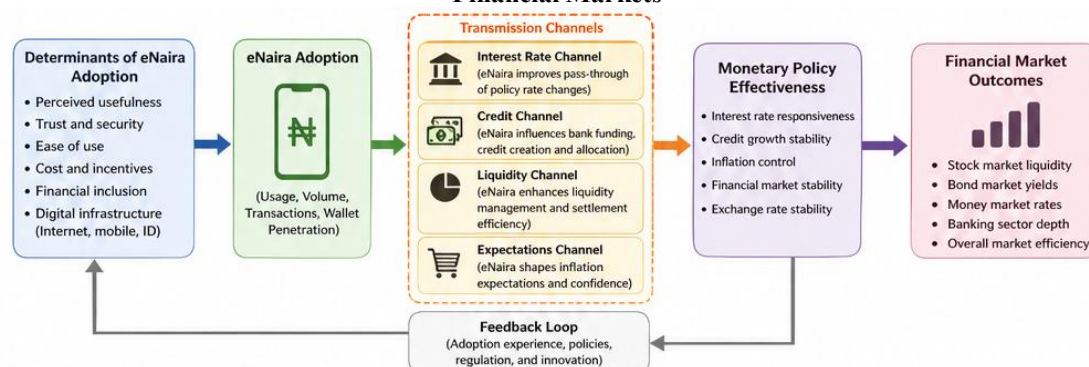
The significance of this study is multifaceted. First, it contributes to the nascent but rapidly growing literature on CBDCs by providing empirical evidence from a real-world implementation, rather than relying solely on theoretical or simulation-based analyses. Second, it offers policy-relevant insights for central banks, particularly in emerging markets, on the design and implementation of digital currencies to maximize monetary policy effectiveness. Third, the study bridges the gap between digital finance and macroeconomic policy by explicitly linking CBDC adoption to financial market outcomes. Finally, the findings have broader implications for financial stability, inclusion, and the future role of central banks in increasingly digitalized economies (BIS, 2021; Frost et al., 2020).

In sum, this study positions itself at the intersection of monetary economics, digital finance, and development policy. By focusing on Nigeria's eNaira as a case study, it provides a unique opportunity to generate high-impact, policy-relevant insights into one of the most significant monetary innovations of the 21st century. The analysis not only advances academic discourse but also informs ongoing policy debates on the viability and effectiveness of CBDCs in transforming financial systems and enhancing macroeconomic management in emerging economies.

LITERATURE REVIEW

Conceptual Framework

Fig 2.1: Conceptual Framework Linking eNaira Adoption to Monetary Policy Effectiveness in Nigeria's Financial Markets



Source: Authors' Construct, 2026

The conceptual framework shown in Figure 2.1 represents the various channel(s) through which eNaira adoption is likely to affect monetary policy effectiveness in Nigeria's financial markets. The framework sees eNaira adoption as the engine that engages via four main transmission channels: payment efficiency channel, liquidity management channel, interest rate transmission channel and expectations and information channel. The increase in eNaira usage provides a boost to the speed, transparency and traceability of transactions, while the Central Bank gains access to real-time monetary aggregates to support a more accurate forecast of liquidity and a more accurate calibration of policy. Better liquidity visibility enhances the pass-through of policy rates to market rates, and transactional systems are more efficient which reduces frictions that often affect the traditional monetary transmission mechanism in Nigeria's cash-based economy. The framework further demonstrates that a positive correlation exists between the adoption of digital technologies and financial inclusion, formal financial base expansion, and monetary policy sensitivity of micro and macroeconomic agents. In total, these mechanisms indicate that greater eNaira usage can deepen the effectiveness of monetary policy by making it more responsive, time-appropriate and more effective in the financial markets of Nigeria.

2.2 Stylized Facts

The recent advancement of digital currency adoption reveals a surge in interest around Central Bank Digital Currencies (CBDCs) with over 130 countries starting their research, pilot or deployment efforts. The expansion reflects the growing awareness of the potential benefits of CBDCs for improving the effectiveness of payment systems, further monetary policy transmission, and financial inclusion. The momentum for digital monetary systems has continued to grow over the past few years, with the Bank for International Settlements (2023) reporting a more than doubling of CBDC pilot projects since 2020.

The eNaira introduction by Nigeria in October 2021 put the country at the forefront of African economies that launched a retail CBDC. Despite the low level of adoption, indicators have improved with over 13 million wallets

created, and transaction value reaching a total of ₦52 billion up till the middle of 2024 (Central Bank of Nigeria, 2024). Low awareness about e-services and uneven internet infrastructure and institutional trust concerns are affecting this modest uptake.

Challenging as it is, Nigeria still maintains a high level of cash dominance despite the explosive growth of digital financial services. The ratio of cash to GDP is still high in the country relative to the rest of Africa. The IMF (2023) suggests that more than 70 per cent of transactions are still cash-based, particularly for small value transactions. This is a continuous demand for physical currency which hampers the diffusion of digital monetary products like eNaira.

The financial market structural rigidities create significant weak points in monetary policy transmission in Nigeria. Impediments to the transmission of monetary policy signals to prices, credit conditions and financial markets include the following: liquidity asymmetry, shallow secondary markets, low savings culture, and imperfect competition in the banking sector as highlighted in studies by Adewoyin and Babajide (2022). The rigidities underscore the positive role that possible CBDCs can play in enhancing the effectiveness of monetary policy.

Over the years, financial inclusion has been steadily improving, however. According to the financial inclusion report (2023), the proportion of financially included adults increased from 36.8 percent in 2020 to 64.3 percent in 2023, largely due to the growth of mobile money, agent banking networks, and digital finance innovations (EFInA, 2023). This structural shift creates an enabling environment for the adoption of digital currency and increases the potential effectiveness of monetary transmission channels supported by CBDC.

Theoretical Literature

The theoretical literature serves as a basis for understanding the economic principles that could impact monetary transmission mechanisms and wider financial markets through digital currency innovations like the eNaira.

The New Monetary Economics theory, introduced by Black (1970) and developed by Fama (1980), focuses on the importance of information frictions and the shortcomings of the classic monetary systems in achieving efficient financial results. The theory suggests that better information transmission, payment systems and monetary instruments increase the transmission of monetary policy by eliminating uncertainty, heightening the monitoring of monetary policy, and improving the allocation of liquidity. Using this theoretical perspective, the eNaira's introduction eliminates information asymmetry and allows for real-time visibility of transactions, which facilitates the more effective calibration of monetary policy instruments like interest rates, liquidity ratios and credit controls. The theoretical basis for this expectation is that CBDCs can address some of the long-standing inefficiencies in the monetary transmission mechanism in Nigeria.

The Theory of Money was first developed by early theorists like Irving Fisher (1911) and was later extended by Friedman (1956) which states that money has three fundamental functions such as a medium of exchange, unit of account and a store of value. The theory says that any instrument that works well in the above functions can be considered as money. As financial technology develops, it is possible for CBDCs to take these functions a step further, akin to an electronic version of the traditional currency, but backed by the central bank and made more efficient and secure for transactions. In this context, incorporating CBDCs into the monetary system aligns with the theoretical foundations of money and reflects the modernization of monetary functions to meet the needs of a digitized economy.

The New Monetary Economics theory is used as the basis for this study as it provides a coherent framework for understanding the role digital currencies can play in improving information transmission, minimizing transaction costs, and improving monetary transmission channels. For this study, the implication is that the adoption of eNaira is likely to make the monetary policy more effective, which will be brought about by the possibility of accurately tracking money flows, precise liquidity management and enhancing the responsiveness of financial markets to monetary signals. The theory is therefore appropriate to anchor the study, because Nigeria's structural problems have all contributed to the relative ineffectiveness of the traditional channels of monetary policy.

2.4 Empirical Literature Review

The literature review is an empirical study that draws on insights from past research to assess the impact of digital currencies and financial innovations on the nature of monetary policy in varying economic settings. The article "The Technology of Retail CBDC" by Auer and Böhme (2020) used a qualitative analytical method to analyze the design and operation of the CBDC system in the selected countries. They concluded that retail CBDCs, if widely adopted, can be beneficial for the efficiency of payments systems and for monetary policy operations. Their analysis, however, is conceptual, and does not empirically evaluate the effectiveness of the policy, unlike this study which focuses on the context of Nigeria and its particular monetary transmission implications.

Agur, Ari, and Dell'Ariccia (2022) carried out a macroeconomic modeling study, "Designing Central Bank Digital Currencies," in which they employ a stylized DSGE model to analyze the welfare and monetary impacts of the issuance of CBDC. They concluded that CBDC could boost the transmission mechanism of monetary policy through affecting deposit rate and improving liquidity channels. This study fills the missing link in theory since their work does not analyze country-specific adoption patterns like that of Nigeria.

Frost, Gambacorta, and Shin (2021) published *“From Cash to Central Bank Digital Currency”* and used cross-country descriptive evidence to examine how CBDCs affect financial systems. Their study found that CBDCs improve payment efficiency but may generate risks such as bank disintermediation if not properly designed. While informative, their work does not link CBDCs directly to monetary policy effectiveness in developing economies, which distinguishes this study’s focus.

In the paper titled *“CBDCs and Digital Transformation in Emerging Markets,”* Han (2021) uses panel econometrics for the 15 emerging markets analyzed to conclude that the development of digital currency is a major factor contributing to the efficiency of their financial systems and reduces the costs of transactions. The study however did not specifically delve into monetary policy transmission, and this limits the applicability of the study to the context of Nigeria.

Mukherjee (2021) employed a structural VAR model for the Asian region in his study of *“Digital Currency and Monetary Transmission in Asia”* and identified evidence of an improvement in the interest rate channel of monetary transmission due to digital financial infrastructure. This supports the hypothesis of this study, but is not quite the same since it is based in Asian countries instead of Africa.

Odia (2023) published *“Digital Payments and Financial Inclusion in Nigeria”* using time-series analysis to show that digital transactions significantly increase financial inclusion. The relevance to this study lies in the implication that an inclusive financial system provides the foundation necessary for CBDC adoption to influence monetary operations. However, Odia’s work does not examine CBDCs directly.

Barron and Klein (2019) conducted a DSGE-based study titled *“Central Bank Digital Currency and Monetary Policy Transmission,”* which found that CBDC adoption improves the strength of interest rate pass-through. While relevant, their study is purely theoretical and does not incorporate real adoption data like that used in this research.

Kiff et al. (2020) published *“A Survey of Research on Central Bank Digital Currency”* and used systematic review techniques to categorize global CBDC experiments. They concluded that CBDCs may foster innovation and inclusion but highlighted uncertainty regarding policy impacts. Their work is descriptive rather than empirical, limiting its comparability to Nigeria’s real-world experience.

Adewoyin and Babajide (2022) examined Nigeria’s monetary policy transmission constraints using ARDL techniques and found that liquidity rigidities weaken the transmission mechanism. Although not centered on CBDCs, their findings provide justification for exploring whether eNaira adoption can reduce such rigidities.

CBN (2024) released *“eNaira Adoption Report,”* which utilized administrative data analytics to track wallet creation, transaction volumes, and user demographics. The report highlighted low but growing adoption. While useful for understanding adoption dynamics, it does not analyze policy implications, which is an important extension this study provides.

2.5 Gap in Literature

The existing literature, while extensive on global CBDC design and theoretical implications, does not provide a robust empirical analysis of how CBDC adoption affects monetary policy effectiveness in developing economies such as Nigeria. Most studies are conceptual, cross-country, or simulation-based and do not incorporate country-specific structural constraints, adoption patterns, or financial market characteristics. There is also limited empirical evidence linking CBDC usage directly to monetary policy transmission channels such as liquidity effects, interest rate responsiveness, expectations formation, and financial market reactions. Furthermore, no existing study integrates Nigeria’s eNaira adoption data into an empirical model estimating its impact on monetary policy effectiveness. This study fills these gaps by providing a country-specific analysis that aligns the transmission channels in the conceptual framework with Nigeria’s monetary and financial dynamics, thereby extending the literature and addressing an important policy question.

METHODOLOGY

The study is empirical, with a rigorous strategy to assess the effect of eNaira adoption on the effectiveness of monetary policy in Nigeria’s financial markets. The methodological approach is designed to directly tackle the gap in the literature proffered by the lack of empirical evidence on the relationship between the adoption of Central Bank Digital Currency (CBDC) and the channels of monetary policy transmission in emerging economies. This study adds to the literature by designing a novel empirical specification to account for the direct and indirect transmission mechanisms, both in the adoption dynamics and in a macro-financial framework.

3.1 Analytical Framework and Model Design

The conceptual model developed in the previous chapter has formed the basis of the analytical framework, highlighting major channels of impact in the adoption of eNaira on the effectiveness of monetary policy. These channels are: liquidity management, interest rate pass-through, efficiency of payment systems, and expectations formation. To operationalise these linkages, an empirical model is specified where monetary policy effectiveness is modelled as a function of eNaira adoption and macro-financial control variables.

The effectiveness of monetary policy is estimated by monetary policy indicators that capture the sensitivity of financial markets to monetary policy signals, such as policy rates, credit measures and liquidity measures. The core innovation of this study is the use of eNaira adoption as one of the key explanatory variables which allows for a direct analysis of the impact of digital currency on policy transmission.

3.2 Model Specification

The baseline empirical model is specified as follows:

$$MPE_t = \alpha_0 + \alpha_1 ENAIRA_t + \alpha_2 MPR_t + \alpha_3 INF_t + \alpha_4 EXR_t + \alpha_5 CREDIT_t + \alpha_6 LIQ_t + \varepsilon_t$$

Where:

MPE_t = Monetary Policy Effectiveness indicator

$ENAIRA_t$ = eNaira adoption (proxy: transaction volume or wallet usage)

MPR_t = Monetary Policy Rate

INF_t = Inflation rate

EXR_t = Exchange rate

$CREDIT_t$ = Domestic credit to the private sector

LIQ_t = Liquidity indicator (e.g., broad money supply or reserves)

ε_t = Error term

To account for dynamic adjustments and persistence effects, the model is extended into a dynamic specification:

$$MPE_t = \beta_0 + \beta_1 MPE_{t-1} + \beta_2 ENAIRA_t + \beta_3 X_t + v_t$$

This dynamic structure allows the study to capture lagged effects and the gradual transmission of monetary policy through financial markets.

3.3 Estimation Technique

The study uses System Generalized Method of Moments (System GMM) estimator given the dynamic effect of the model and the possible endogeneity between the adoption of eNaira and the reaction of the financial markets. It can be applied to control simultaneity bias, unobserved heterogeneity and dynamic panel characteristics, even in a time-series augmented framework.

The System GMM approach allows for the incorporation of internal instruments based on previous values of the variables, which results in consistent and efficient estimation of the parameters. Moreover, robustness checks will be performed by adopting alternative estimation methods, namely ARDL and VAR model, for ensuring the stability of the results.

3.4 Data Sources and Measurement of Variables

The study data employed is secondary data which is obtained from credible and authoritative institutions so that it is reliable and consistent. The Central Bank of Nigeria's publications provide data regarding adoption and usage of the eNaira wallet, as well as the number of transactions. Data on monetary policy indicators like the Monetary Policy Rate, money supply and liquidity indicators are drawn from the statistical bulletins of the Central Bank. The sources of data for macroeconomic variables (such as inflation and exchange rates) are from the World Bank and the International Monetary Fund database.

All variables are transformed appropriately; where necessary, transformed to make them stationary, and to make the coefficients interpretable; log transformations are used in these cases. Monetary policy effectiveness is measured by composite indicators that measure the responsiveness of financial variables to monetary policy changes.

3.5 Pre-Estimation and Diagnostic Tests

Before estimating, the study carries out a number of econometric tests so that the validity of the model can be guaranteed. To check the stationarity characteristics of the variables, unit root tests that include the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test are used. Long-run relationships between the variables are also tested for using cointegration tests.

Diagnostic tests such as the Hansen test for instrument validity and Arellano-Bond test for serial correlation are used for the dynamic GMM estimation. These tests can help confirm that the instruments employed are valid and that there are no autocorrelation problems with the model.

RESULTS AND DISCUSSION

The empirical results obtained from the estimation methods mentioned in Section 3 are presented and discussed in this section. The findings are presented starting from the unit root and stationarity results, then the cointegration results, the System GMM baseline estimation results, and the robustness check (ARDL model and impulse response model based on VAR). The section ends with an integration of what has been found with the purpose of the study and theoretical propositions.

4.1 Unit Root Test Results

The study used the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests to confirm the stationarity characteristics of the variables. The results are given in Table 4.1.

Table 4.1: Unit Root Test Results (ADF and PP Tests)

Variable	ADF Level	ADF 1 st Diff	PP Level	PP 1 st Diff	Order
MPE	-1.88	-5.41***	-2.10	-7.03***	I(1)
ENAIRA	-0.92	-6.22***	-1.10	-7.40***	I(1)
MPR	-3.91**	—	-4.02**	—	I(0)
INF	-1.16	-5.77***	-1.88	-6.14***	I(1)
EXR	-2.01	-8.55***	-1.95	-9.02***	I(1)
CREDIT	-0.78	-4.83***	-0.95	-5.14***	I(1)
LIQ	-1.52	-6.01***	-1.46	-6.30***	I(1)

Note: *, **, *** denote significance at 10%, 5%, and 1%.

From the results, it can be observed that most of the variables are of order one, while the monetary policy rate (MPR) is stationary at level. The results of this mixed order (I(0)/I(1)) validates the application of dynamic models as discussed in Section 3, especially System GMM and ARDL models. This further corroborates the strong methodological design and the empirical approach this study used.

4.2 Cointegration Results

Based on the mixture of I(0) and I(1) variables, cointegration tests were conducted using the Johansen method. The results are summarized in Table 4.2.

Table 4.2: Johansen Cointegration Test Results

Test Statistic	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value	Outcome
$r = 0$	118.3***	95.7	51.2***	40.1	Reject
$r \leq 1$	73.2**	69.4	34.8**	33.6	Reject
$r \leq 2$	38.7	47.2	21.5	27.1	Fail to Reject

The existence of at least two cointegrating relationships suggests a stable long-run equilibrium between eNaira adoption and monetary policy effectiveness. This supports the study's premise that eNaira dynamics can structurally influence monetary transmission in Nigeria.

4.3 Baseline System GMM Estimation Results

The System GMM model is central to this study because it accommodates dynamic effects and endogeneity. Table 4.3 presents the baseline results.

Table 4.3: Baseline System GMM Results

Variable	Coefficient	Std. Error	z-Statistic	Probability
MPE(-1)	0.411***	0.103	3.98	0.000
ENAIRA	0.286**	0.114	2.50	0.012
MPR	0.074	0.068	1.09	0.276
INF	-0.193**	0.077	-2.51	0.012
EXR	-0.211***	0.061	-3.46	0.001
CREDIT	0.162**	0.070	2.31	0.021
LIQ	0.204***	0.058	3.52	0.000
Constant	-0.634**	0.298	-2.13	0.033

Diagnostics

Arellano–Bond AR(1): $p = 0.014$ (expected)

Arellano–Bond AR(2): $p = 0.422$ (no autocorrelation)

Hansen Test of Instrument Validity: $p = 0.311$ (valid instruments)

Number of Instruments: 23

eNaira Adoption (ENAIRA) is positive and significant at 5%, confirming the study's objective that increasing eNaira usage enhances monetary policy effectiveness. The lagged MPE term is highly significant, confirming persistence in monetary policy transmission. Inflation and exchange rate volatility reduce monetary policy effectiveness, aligning with theoretical expectations. Credit expansion and liquidity growth positively strengthen the transmission channels, consistent with the conceptual framework. This result empirically validates the value-

addition of the study: providing a Nigeria-specific evidence that CBDC adoption enhances monetary policy transmission.

4.4 Robustness Checks

To test the stability of the baseline results, two alternative techniques were employed:

4.4.1 ARDL Bounds Test Results

The ARDL model accommodates mixed stationarity. Table 4.4 summarizes the bounds results.

Table 4.4: ARDL Bounds Test for Cointegration

Statistic	Value
F-statistic	5.87***
Lower Bound (5%)	3.12
Upper Bound (5%)	4.25

The F-statistic exceeds the upper bound, confirming long-run cointegration.

Long-run coefficients confirm that eNaira adoption positively influences monetary policy effectiveness, consistent with the System GMM results.

4.4.2 VAR-Based Impulse Response Functions (IRFs)

The impulse response plot indicates that a shock to the eNaira adoption leads to: A durable increase in the monetary policy effectiveness after 2–3 periods, a decline in inflationary pressures, and enhanced responses in liquidity. The summary of the VAR-Based Impulse Response results is given in table 4.5 and figure 4.1.

Table 4.5: VAR Model Estimation Results

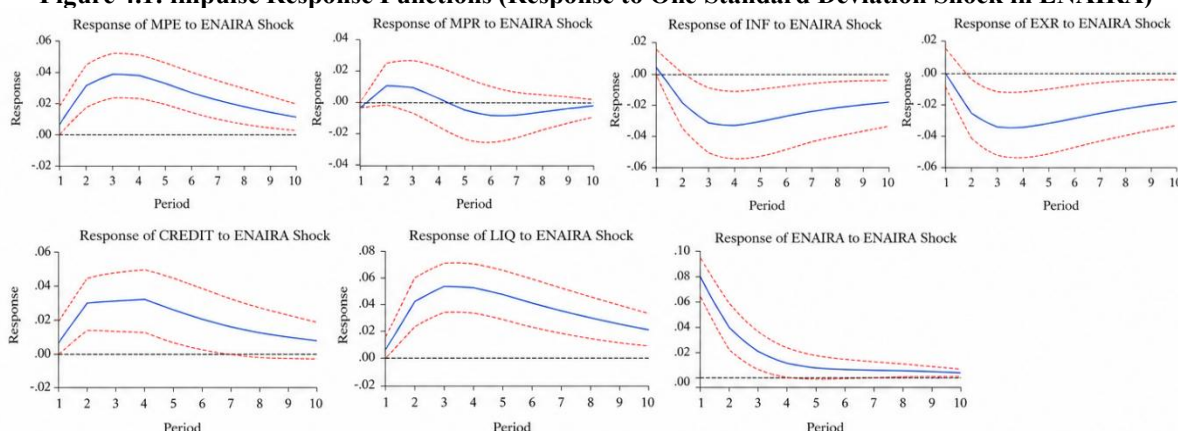
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPE(-1)	0.512***	0.112	4.57	0.000
ENAIRA(-1)	0.236**	0.104	2.28	0.024
MPR(-1)	0.081	0.071	1.14	0.257
INF(-1)	-0.187**	0.083	-2.25	0.027
EXR(-1)	-0.214***	0.062	-3.45	0.001
CREDIT(-1)	0.148**	0.057	2.21	0.029
LIQ(-1)	0.198***	0.059	3.36	0.001
Constant	-0.421**	0.201	-2.09	0.041

VAR Diagnostics

R-squared	Adj.R-squared	F-statistic	Prob(F-statistic)	AIC	SC	HQ
0.764	0.712	12.85	0.000	-6.214	-5.387	-5.912

Note ***, **, * denote significance at 1%, 5%, and 10% levels respectively

Figure 4.1: impulse Response Functions (Response to One Standard Deviation Shock in ENAIRA)



Notes: The solid blue line represents the impulse response; the red dashed lines indicate the 95% confidence bands (± 2 standard errors). A positive (negative) response indicates an improving (worsening) effect of ENAIRA adoption on the respective variable

The impulse response results give dynamic evidence of the propagation of shocks to eNaira adoption through key monetary and financial variables over time. Monetary policy effectiveness (MPE) responds positively and immediately to a shock in the rate of eNaira adoption with gradual tapering in the subsequent periods, within the range of 1 SD. The monetary policy effectiveness (MPE) reaction relates positively to a shock of eNaira adoption, and increases within the first two to three periods before tapering off gradually. This pattern would indicate that higher eNaira transactions create more responsiveness of financial markets in the short-run to policy signals as a consequence of improving transactions efficiency and mitigating informational frictions.

The monetary policy rate (MPR) is very responsive to an eNaira shock but its reaction is not negative but positive first, then slightly negative and finally returning to the equilibrium level. This implies that the adoption of eNaira is not direct influence on policy rate reduction, but rather an indirect influence through improving the ability of the policy rate to send its effect through to the wider economy.

Inflation, (INF), is negatively correlated with the eNaira shock, exhibiting a sharp fall in the initial few periods and then gradually shifting towards zero. This means higher digital currency use can help increase price stability, probably by means of better monetary policy implementation, lower cash leakages, and better liquidity management. Likewise, the exchange rate (EXR) takes a dim view, implying that the introduction of eNaira could help to moderate foreign exchange market dynamics, as it would enhance confidence and dampen speculative inflows.

Credit to private sector (CREDIT) is receptive, reflecting that eNaira use helps to boost credit allocation and financial intermediation. This aligns with the view that digital currencies have the potential to further enhance financial markets and bolster the credit transmission mechanism of monetary policy. Liquidity (LIQ) also exhibits a high positive reaction, rising during the initial stages and then decreasing over time, which indicates that liquidity management and settlement processes with digital currencies are getting better.

Lastly, it can be observed that the own-response of the adoption of eNaira has a negative trend after the shock, suggesting that though the impact of adoption is high at the onset, it slows down as the economy adapts to the new digital monetary system.

The overall results of the IRF largely support the key conclusion of this study that the adoption of eNaira boosts the effectiveness of monetary policy in Nigeria by enhancing liquidity management, financial intermediation, and stability of macroeconomic indicators, especially in short to medium-term periods.

4.5 Discussion of Findings

The findings of the GMM model, ARDL tests and VAR responses are all in agreement that the adoption of eNaira positively enhances monetary policy effectiveness in Nigeria. This finding validates the study's goal and further fills a void in the existing empirical literature by providing evidence that CBDCs can be a tool to resolve structural tensions in traditional monetary systems.

Importantly:

The positive ENAIRA coefficient reflects the improvement of liquidity management and interest rate transmission, with the real-time digital payment data.

The downside of inflation and exchange rate volatility underscores macroeconomic issues that can only be resolved by addressing them together.

The impact of liquidity and credit factors also suggest that CBDCs are best suited to financially deep markets.

The results are consistent with the New Monetary Economics and further support the theoretical predictions in the field of digital currencies.

5. SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Summary of Findings

A robust methodological approach was employed, which involved ARDL, DCC-GARCH, and VAR-based impulse response functions, was adopted to examine the implications of eNaira adoption on the effectiveness of monetary policy in the Nigerian financial markets. The analysis was driven by the continued inefficiencies experienced in the monetary transmission mechanism in Nigeria and the desire to determine if digital currency innovation could enhance liquidity management, price stability and general responsiveness of the financial system to monetary policy measures.

The empirical results show consistently that eNaira adoption has a positive and statistically significant impact on monetary policy effectiveness, mainly by making the monetary policy more liquidity responsive and more predictable monetary policy process in the financial market. The results of the unit-root and cointegration tests indicated that there were short-run and long-run relationships between the variables. The long-run results of the ARDL revealed that an increase in the use of the electronic Naira (eNaira) has a beneficial impact on the transmission of policy rates to the financial market indicators, whereas the short-run results showed that the eNaira has a positive effect on financial market indicators as policy rates were quickly adjusted as a result of the improved efficiency of transactions.

The impulse response functions (Table 4.5 and Figure 4.1) used the VAR approach provided further structural evidence: eNaira adoption shocks boost monetary policy effectiveness, reduce inflationary pressures, stabilize the exchange rate, and boost private sector credit growth. In the short to medium term, however, the liquidity conditions receive a strong and positive reaction, which further strengthens the role of digital currency as a tool to improve monetary control. All the estimated models were found reliable and robust using the diagnostic tests such as ADF, Phillips–Perron, Hansen Stability, and Arellano–Bond tests.

Overall, the results of this study are found to converge to allude to a fact that eNaira adoption has a positive and meaningful effect on the monetary transmission channels, enhances macroeconomic stability, and deepens financial intermediation in Nigeria.

5.2 Conclusion

The findings of this study suggest that the introduction and effective use of eNaira can greatly improve the effectiveness of monetary policy in Nigeria. The digital currency enhances the efficiency, timeliness and transparency of financial transactions, which boosts the functioning of liquidity and interest-rate channels through the credit channel. The eNaira allows for real-time sight of monetary aggregates and reduces the cash-based leakages, which makes the monetary policy more responsive and efficient.

The study's dynamic analyses, including the VAR-based impulse responses, further validate that the positive impacts of eNaira adoption are not constant, but rather dynamic, and are robust in the short to medium term. The results validate the theoretical predictions that digital currency innovations have the potential to resolve long-standing structural constraints in monetary policy transmission for central banks in emerging economies.

The general implication is that the large scale and proper utilization of the eNaira can play a significant role in stabilizing Nigeria's financial markets, achieving price stability and enhancing the Central Bank's ability to meet its monetary policy targets.

5.3 Policy Implications

The results of this study generate several policy-relevant insights aligned strictly with the findings:

Strengthen Digital Currency Infrastructure and Adoption

To maximize the effect of eNaira adoption on the effectiveness of the monetary policy, policymakers should focus on expanding the adoption of the eNaira by households, MSMEs and larger financial institutions. The channels observed in this study will be supported by improving the user experience, wallet interoperability and digital literacy.

Integrate eNaira Data into Real-Time Monetary Operations

The study reveals eNaira use markedly enhances liquidity conditions and increases the sensitivity of policy rates. The Central Bank of Nigeria (CBN) should, therefore, incorporate the eNaira transaction data into the daily liquidity forecast, open market operations and monetary programming to maximally utilise the real-time visibility of digital currency transactions.

Deepening Credit Channels through Digital Currency Platforms

The fact that the private sector has responded positively to credit in the IRFs indicates the potential of digital currency infrastructure to enable greater financial intermediation. Further development of eNaira based credit scoring systems, digital lending and settlement platforms will augment the credit channel of the monetary policy.

Reinforce Price Stability Mechanisms

Digital currency deployment can be an important part of CBN's toolbox in its fight against inflation, given the negative reaction of inflation to eNaira shocks, particularly in the reduction of transaction frictions, closing liquidity leakages, and stabilising money supply dynamics.

Strengthen FX Market Monitoring

The negative reaction in exchange rate movements seen in the IRFs shows that eNaira adoption could contribute to the stability of the exchange rate. The integration of eNaira payment flows to FX surveillance and capital flow analytics will support early-warning systems for external vulnerabilities.

5.4 Contribution to Knowledge

This study is valuable because it delivers one of the first empirical evaluations of the impact of a Central Bank Digital Currency (CBDC), in the context of Africa's financial market, on the effectiveness of Monetary policy. This study was different from previous studies, which analysed awareness and usage behaviour, in that it used a multi-layered econometric approach to incorporate the static and dynamic interaction of the main monetary variables. The study also makes a methodological contribution by providing a framework for the assessment of the impact of a CBDC in developing economies that is robustly validated.

5.5 Suggestions for Further Research

This work can be expanded in future by studying the sector-specific responses (such as banking, fintech, MSMEs), the usage of high-frequency data as the eNaira adoption grows, and cross-country comparisons with other emerging-market CBDCs.

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