

Cryptocurrency and Fiat Monetary Transmission Dynamics in Nigerian Economy: A Bayesian DSGE Approach

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Abstract

This study examines the relationship between cryptocurrency and government-issued currency in the Nigerian economy through a Dynamic Stochastic General Equilibrium (DSGE) model estimated using the Bayesian framework. The model incorporated heterogeneous agents who decide on holding balances between fiat currency and cryptocurrency based on utility maximization. Using monthly data covering from April 2013 to December 2024, the response of macroeconomic variables to shocks in preferences, productivity, demand for cryptocurrency and fiat money and monetary policy were analyzed. The findings reveal that cryptocurrencies substitute the naira during real economic shocks, driven by inflation and exchange rate uncertainty, while monetary policy shocks create a complementary relationship. The study further highlighted the limited effectiveness of utilizing only bans in deterring cryptocurrency adoption as such bans are counterproductive without addressing underlying economic drivers. However, credible and transparent monetary policy can moderate the speculative impact of cryptocurrencies. Policy recommendations include strengthening regulatory frameworks instead of bans and promoting the eNaira to meet digital currency demand while preserving monetary sovereignty.

Keywords: Government Currency, Cryptocurrency, Monetary Policy Transmission, Currency Substitution, DSGE.

Introduction

The expansion of financial technologies and digital innovation have transformed monetary systems around the world. In particular, cryptocurrencies emerged as a major disruptive force in the global financial systems. Since the emergence of Bitcoin in 2008, cryptocurrencies have been utilized as a decentralized and borderless alternative to traditional government-issued money devoid of third-party interference (Ahmed, 2024; Joshipura et al., 2025). The growth of cryptocurrencies has enabled millions of financially underserved people to access financial services which potentially reduces income inequality and fosters economic empowerment (Agu, 2020; Galanti & Ozsoy, 2021; Akande et al., 2024).

Adoption of cryptocurrency in different countries has been uneven due largely to regulatory challenges and potential risks (KPMG & Chainalysis, 2025). In the global ranking of cryptocurrency adoption, Nigeria ranks second after India (Chainalysis, 2024). Data from

Chainalysis shows that Nigerians' cryptocurrency transaction volume stood at \$59 billion between June 2023 and June 2024 which translates to roughly N88.5 trillion naira at exchange rate of N1500 per dollar. About 85% of these transactions were below \$1 million which shows strong participation on retail traders. According to Consensys and YouGov (2024), Bitcoin is the most traded crypto asset in Nigeria covering 62% of transactions followed by Binance and Ethereum that traded 51% and 41% respectively. Until February 2025 when Securities and Exchange Commission (SEC) approved the launching of cNGN as the foremost stablecoin in Nigeria, all other crypto assets traded by Nigerians are issued overseas which potentially expose traders to risks associated with crypto trading.

Due to the risks associated with crypto transactions, the Central bank of Nigeria (CBN) prohibited Nigerian banks from holding crypto denominated assets or liabilities through a circular dated 5th February 2021. This is because of the fear that uncontrolled crypto transactions can fuel currency speculation, currency depreciation and diminish monetary policy transmission (Tomic et al., 2020; Acho, 2021; Safiyanu et al., 2022; Martinez & Deeksha, 2025). Consequently, banks were barred from maintaining deposit accounts or rendering financial services to cryptocurrency exchange companies. However, this ban was partially successful in deterring cryptocurrency transactions because traders found alternative means of carrying out their transactions outside the banks. This led to the revision of the ban in December 2023 allowing banks to offer services for only SEC licensed firms (SEC, 2024).

Despite Nigeria's prominence in cryptocurrency adoption, empirical evidence on the macroeconomic implication of cryptocurrency adoption remains scanty. Recent prohibition of crypto dealings and its perceived impact on the Nigerian economy requires further investigation due to inconclusive results from previous studies.

Statement of the Problem

Recent global ranking of Nigeria as the second highest in cryptocurrency adoption with widespread use of Bitcoin and stablecoins for hedging against inflation, facilitating cross-broader transactions and bypass of exchange rate regulations presents a significant and underexplored challenge for monetary policy and financial stability. To address this challenge, the CBN placed outright ban on crypto related transactions in 2021 but partially reversed the ban in 2023. However, despite these interventions, cryptocurrency usage persisted through peer-to-peer market. This shows evidence of an unbalanced policy environment in an evolving financial innovation pathway. Despite these significant policy shifts and the potential for macroeconomic instability from currency substitution, empirical evidence on the cryptocurrency-fiat currency nexus in Nigeria remains sparse. Prior studies relied on traditional econometric methods such as ARDL, VECM, GARCH and panel regression to investigate this nexus in Nigeria (Onyeke, 2020; Acho, 2021; Agu, 2020; Fakunmoju et al., 2022; Olorundare, et al., 2023; Safiyanu et al., 2022; Ajibola et al., 2024; Obisesan et al., 2024). These reduced form methods are inherently unable to capture forward-looking expectations, micro-founded behavioural responses and monetary policy

feedback mechanisms that characterize the interaction between digital and fiat currency systems. As a result, policymakers lack a structural understanding of how shocks to cryptocurrency demand propagate through the economy to affect output, inflation and the effectiveness of interest rate policy. Thus, there is risks of continued reliance on blunt regulatory prohibitions if this gap is not addressed. This study will therefore be guided by the following questions: Is cryptocurrency a substitute for or complement to the naira? How does this relationship change under different types of economic shocks? How does this affect the design of regulatory and monetary policy? This study employs a Dynamic Stochastic General Equilibrium (DSGE) framework tailored to the Nigerian economy to answer these research questions which is the first attempt at applying the general equilibrium to analyze the crypto-fiat currency dynamics in Nigeria.

Research Objectives

The main objective of this study is to examine the dynamic interaction between cryptocurrency and fiat currency in Nigeria by estimating a Bayesian DSGE model that incorporates a cryptocurrency sector. The specific objectives are to

- i. estimate the degree of currency substitution between the naira and cryptocurrency in response to different structural shocks.
- ii. analyze the impulse response of key macroeconomic variables to shocks in cryptocurrency demand, fiat money demand, productivity, preferences and monetary policy.
- iii. derive policy implications for regulatory frameworks and monetary policy effectiveness in a dual currency economy.

Literature Review

Theoretical Underpinning

This study is anchored on the monetary substitution theory and the New Keynesian Dynamic Stochastic General Equilibrium (DSGE) framework. The monetary substitution theory postulates that in an environment of dual currencies, economic agents tend to substitute between the alternate currencies if there is a potential for higher returns, stable value and ease of transaction. This substitution effect, thus influences the demand for money, inflation and policy transmission (McKinnon, 1982; Tomic et al., 2020). Given the micro-foundational nature of DSGE models, it is apposite to incorporate currency substitution within a DSGE structure that allows for a systematic analysis of how cryptocurrency adoption affects the economy through agents optimizing behaviors under rational expectations and nominal rigidities (Clarida, Galí & Gertler, 1999; Bojaj et al., 2022). Thus, integrating a cryptocurrency sector into a DSGE model captures the interactions between digital and fiat money markets, consumption, investment, and policy instruments. This allows for simulation of how shocks to cryptocurrency adoption or regulation propagate through the economy and influence output, inflation, and interest rates (Bas et

al., 2023). The structure of the DSGE model operationalizes the monetary substitution theory through the cross-elasticity parameters in the log-linearized currency demand equations. These parameters directly measure the magnitude to which a change in naira demand affects the demand for cryptocurrency and vice versa. This captures the substitution or complementarity dynamics. This approach provides understanding of the trade-offs between financial innovation, policy effectiveness, and macroeconomic stability in an emerging economy like Nigeria.

Nigeria's Cryptocurrency Landscape and Regulations

Nigeria has emerged as one of the world's leading cryptocurrency markets. Despite the regulatory challenges, Nigeria ranked second in the rate of cryptocurrency adoption. Initially, regulatory actions of CBN (2021) were quite restrictive when they issued a directive barring deposit money banks from operating accounts linked to cryptocurrency trading. This ban was justified by concerns over money laundering, terrorism financing and lack of robust oversight. However, this prohibition had significant macroeconomic implications. This led to disruption of the formal crypto ecosystem which pushed trading activity to peer-to-peer platforms, thereby reducing CBN's visibility over cross-border capital flows and potentially worsening exchange rate pressures through unofficial foreign currency transactions (Oladipupo et al., 2023). A more comprehensive regulatory framework emerged with the Investment and Securities Act (ISA) 2025 which formally recognized cryptocurrencies as securities under the oversight of the SEC (Osazuwa, et al., 2024). The SEC introduced licensing requirements for Virtual Asset Service Providers (VASPs), custodial obligations and strict anti-money laundering and counter-terrorism financing (AML/CTF) standards. This move from prohibition to regulated recognition is aimed to recapture visibility over capital flows, create a tax base for crypto-related income and mitigate the financial stability risks associated with unregulated leverages and investor losses.

This development replaced earlier regulatory ambiguity with structured guidelines that emphasize multi-agency collaboration, investor protection and market integrity. Some of the anticipated reforms include regulatory clarity on stablecoins, tokenization, and broader institutional participation (Osazuwa, et al., 2024).

Despite the ban on crypto market in Nigeria, empirical evidence shows that Nigeria's cryptocurrency adoption remained very resilient. According to KPMG and Chainalysis (2025), Nigeria recorded \$59 billion in cryptocurrency transactions between July 2023 and June 2024 which accounted for nearly half of Sub-Saharan Africa's total crypto transactions. It is important to note that 85% of the Nigeria's transactions were from small-scale retail and professional transfers under \$1 million. This implies that cryptocurrency has already been integrated into everyday financial activities rather than purely for speculative use.

However, concerns of systemic risks persist. Martinez and Deeksha (2025) warned that threats to financial stability, monetary sovereignty, and economic integrity may become a challenge. These risks include capital flight, circumvention of foreign exchange controls,

migration from naira deposits to dollar-pegged stablecoins and fraud facilitated by unregulated peer-to-peer transactions. This led to SEC's stricter supervision that mandated local incorporation of exchanges and expanded blockchain analytics for market surveillance. SEC also imposed a 10% capital gains tax, and introduced marketing regulations to protect retail investors. Thus, the ability to monitor and tax crypto transactions addresses the concern of monetary sovereignty and fiscal integrity.

Empirical Review

Cryptocurrency and Economic Growth

Empirical evidence on the cryptocurrency-growth nexus in Nigeria presents mixed findings. Onyeke (2020) investigated the effects of cryptocurrency on Nigeria's economic development to determine whether cryptocurrency adoption influences key economic variables such as economic growth, illicit financial flows, terrorism financing, and tax revenue. Applying a multiple linear regression model, the study found positive but statistically insignificant relationship between cryptocurrency and Nigeria's economic development. The study further found that, cryptocurrency exerted a weak inverse influence on illicit financial flows, terrorism, and tax revenue. Similarly, Obisesan et al., (2024) investigated the impact of cryptocurrencies on the economic growth of African countries with the aim of determining the extent to which Bitcoin, Ethereum, and Binance Coin affect economic growth. Using panel data from five African countries spanning 2016 to 2021, the study estimated OLS, fixed effects, and random effects models. They found that Bitcoin and Binance Coin exhibited a significant negative effect on GDP growth while Ethereum showed a significant positive contribution impact on GDP growth. Their results suggest that some cryptocurrencies may constrain growth while others may enhance it. While Ajibola et al., (2024) studied the impact of digital currency on Nigerian economic growth utilizing average annual value of Bitcoin and Binance coin against gross domestic product from 2014 to 2023 and found there was no significant impact of cryptocurrencies on economic growth, Suleiman and Abdullahi (2024) study on cryptocurrency and economic development in Nigeria's using illicit financial flows, terrorism, and tax revenue in a multiple linear regression model, found a weak positive correlation between cryptocurrency and economic development. Contrarily, Fakunmoju et al., (2022) examined the effect of cryptocurrency trading and corruption on economic performance in Nigeria using Tobit regression based primary data. Their finding reveals cryptocurrency and corruption exert negative effect on Nigeria's economic performance. These mixed findings indicate absence of consensus in the relationship between cryptocurrency and economic growth.

Cryptocurrency and Financial/Exchange Rate Stability

Studies that examined cryptocurrency's impact on financial stability and exchange rates reveal significant linkages. Acho (2021) investigated the implications of cryptocurrency

adoption for Nigeria's financial markets and overall economic performance. The study concentrated on understanding how cryptocurrency influences financial market stability, investor risk perceptions, and market dynamics. Utilizing GARCH model, the study found that price fluctuations strongly affect transaction volumes with higher volatility relative to conventional assets which exposed investors to risks. Panigrahi (2023) examined the nexus between cryptocurrency investments, financial stability and economic growth in India using quarterly time-series data spanning 2015Q1–2022Q4. The study incorporated variables such as Bitcoin prices, financial stability index, inflation rate, real GDP, exchange rate, economic volatility uncertainty and market volatility index. Estimating FMOLS and CCR to ascertain the long-run relationships between cryptocurrency adoption and macro-financial indicators, their results revealed that increase in cryptocurrency investments reduces financial stability. Contrarily, Sadiq et al., (2023) conducted an empirical investigation into the role of digital currency and blockchain security in accelerating financial stability, with a particular emphasis on the mediating role of credit supply using data from financial institutions and digital currency markets. Using regression-based mediation analysis, the study found that digital currency and blockchain security positively enhance financial stability. Credit supply was found to play a significant mediating role, as blockchain and digital currencies improve credit availability which in turn fosters greater stability in the financial system. Their findings emphasize that the impact of blockchain and digital currencies cannot be fully understood without considering credit supply mechanisms. Also, Bas et al., (2023) investigated the relationship between Bitcoin trading activity and traditional bank term deposits in Mexico, Indonesia, Nigeria, and Turkey. They examined the long-run linkages and direction of influence between Bitcoin trading volumes and bank deposits and found a significant negative association between Bitcoin trading volumes and term deposit volumes in Indonesia, Nigeria, and Turkey, while no such effect was observed in Mexico. Safiyanu et al., (2022) investigated the effect of cryptocurrency on exchange rate in Nigeria. Using monthly time series data and ARDL approach, the study found that Bitcoin price volatility significantly affects Nigeria's exchange rate in both the short and long run. Specifically, in the long run, higher Bitcoin volatility contributes to an appreciation of the domestic currency, whereas in periods of low Bitcoin prices, increased demand for U.S. dollars to purchase Bitcoin leads to currency depreciation. This finding highlighted consistence in volatility transmission and financial stability risk associated with cryptocurrency transactions.

Regulatory Impact and Policy Effectiveness

The effectiveness of regulatory interventions has been a focus of recent empirical studies. Most of these studies found negative impact of crypto ban on the economy. For instance, Olorundare, et al., (2023) examined the prospects of cryptocurrency, its economic implications and public perception of regulation in Nigeria using primary data. Their findings revealed that 91% of respondents possessed knowledge of cryptocurrency, while 46.8% supported regulated cryptocurrency activities by the government as opposed to a

total ban. Furthermore, 73% opposed restrictions preventing commercial banks from engaging in cryptocurrency transactions. The study highlighted that the growth of the Nigerian cryptocurrency market has been partly driven by the devaluation of the naira, which encourages individuals to explore digital assets as alternative stores of value. Similarly, Oladipupo et al., (2023) examined the economic and trade consequences of Nigeria's cryptocurrency prohibition. They assessed how crypto ban shaped domestic economic activities and cross-border trade. Using mixed method of qualitative and quantitative technique, their result showed the ban on crypto transactions substantially reduced official cryptocurrency trading volumes which caused moving to informal peer-to-peer networks. Furthermore, the move constrained innovation and undermined financial inclusion which negatively affected small and medium-sized enterprises (SMEs) that rely on cryptocurrencies for cross-border transactions.

The tendency of crypto transactions to become instruments for crime and indirect wedge in monetary policy effectiveness have equally been studied. Lukianchuk et al., (2017) had analyzed current trends, concerns and unique aspects of cryptocurrency turnover while emphasizing its implications for economic development, crime and regulation in Ukraine. Their findings indicate that cryptocurrency enhances economic growth through technological innovation but facilitated cross-border crime in the absence of strong legal frameworks. Similarly, Tomic et al., (2020) investigated the potential effects of cryptocurrencies on the conduct and effectiveness of monetary policy by central banks in emerging markets. The findings indicate that cryptocurrencies reduce the effectiveness of traditional monetary policy tools by operating outside central bank regulation. This effect is amplified in countries with underdeveloped financial infrastructure which may destabilize other economic sectors.

Cryptocurrency and Financial Inclusion

Some empirical literature emphasized the potentials of cryptocurrency to enhance financial inclusion. In this strand, Agu (2020) investigated the economic implications of cryptocurrency adoption across African countries, with emphasis on financial inclusion, economic empowerment, and regulatory challenges. The study found that cryptocurrencies enhance economic empowerment by expanding access to financial services for underserved and marginalized populations while also enabling cost-effective cross-border transactions. In terms of cryptocurrency's potential to mitigate financial exclusion, Ahmed (2024) investigated the role of Shariah-compliant security tokens in advancing financial inclusion within Islamic finance systems. The study was motivated by the question of how blockchain-based Islamic-compliant tokens and their associated technological and regulatory ecosystems can enhance access to finance, particularly for small and medium-sized enterprises (SMEs) in Muslim-majority regions. The findings revealed that Shariah-compliant security tokens offer alternative financing opportunities for SMEs that are often excluded from conventional financial channels. By leveraging

blockchain ecosystems, these tokens provide enhanced transparency, stronger governance, and adherence to Islamic ethical standards. Similarly, El Hajj and Farran (2024) investigated the role of cryptocurrencies in fostering inclusive finance and economic empowerment in developing economies. They explored how cryptocurrency adoption influence financial inclusion among marginalized and unbanked populations in countries where cryptocurrency adoption has surged despite weak financial infrastructure. The findings revealed that cryptocurrencies significantly improve access to affordable financial services, lowering transaction and remittance costs while empowering marginalized groups through broader participation in the digital economy and cross-border trade.

The reviewed literature provided valuable insights through traditional econometric approaches. None of these studies implemented a general equilibrium modeling approach and forward-looking dynamics of cryptocurrency adoption in Nigeria. The mixed findings from previous studies provided the justification for a structural modeling approach that captures the complex interactions between cryptocurrency markets, household decisions and monetary policy transmission.

Research Methodology

The Model

The study employs a DSGE model for Nigerian economy which incorporates a cryptocurrency sector together with traditional government currency. The model closely follows Asimakopoulous et al., (2023) adapted for Nigerian economy. The model economy system includes three economic agents – households, firms and monetary authority. Each optimizes their decisions under uncertainty. The households maximize their expected lifetime utility derived from consumption and labour supply while choosing the allocation of their wealth between government currency and cryptocurrency. The firms are made up of intermediate good producers under monopolistic competition and final goods producers who aggregate intermediate goods. These firms set prices and production based on costs, demand and productivity shocks. The monetary authority follows a modified Taylor-type rule to set interest rates that respond to inflation, output and money supply.

Households

The representative household maximizes expected utility of the form

$$\max_{\{C_t, H_t, B_t, M_t^g, M_t^c\}} E \sum_{t=0}^{\infty} \beta^t A_t \left[u \left(C_t, \frac{M_t^g}{P_t}, \frac{M_t^c}{P_t} \right) - \eta H_t \right] \quad (1)$$

subject to the following budget constraint

$$M_{t-1}^g + \chi_t M_{t-1}^c + T_t + B_{t-1} + W_t H_t + D_t = P_t C_t + \frac{B_t}{R_t} + M_t^g + \chi_t M_t^c \quad (2)$$

Where β is discount factor which represents household preference for current consumption over future consumption, η represents inverse of elasticity of labour supply, $\frac{M_t^g}{P_t}$ and $\frac{M_t^c}{P_t}$ are used to denote real balances of government currency and real balances of cryptocurrency respectively. χ_t represent relative price of government currency against cryptocurrency. Equation (2) shows joint households' decision on consumption, government currency and cryptocurrency in the utility function. It is assumed that cryptocurrency represents a private digital currency serving as alternative to government currency. This implies that household savings may be held in either commercial banks deposits or cryptocurrency holdings. C_t represents household period t consumption, H_t represents household period t labour supply.

The sources of income to the household in the budget constraint include T_t , nominal lump-sum government transfers, nominal dividend payments from firms in the intermediate goods-producing sector, D_t , value of nominal bonds from the previous period B_{t-1} , labour income $W_t H_t$ where W_t is the nominal wage. The households use the income for consumption, at nominal price P_t , new bonds valued at $\frac{B_t}{R_t}$ where R_t is nominal interest rate.

Equation 3 to 5 are autoregressive shock processes on the IS curve, government currency and cryptocurrency demand curves respectively which are given as

$$\ln(A_t) = \rho^a \ln(A_{t-1}) + \varepsilon_t^a \quad (3)$$

$$\ln(E_t^g) = \rho^{eg} \ln(E_{t-1}^g) + \varepsilon_t^{eg} \quad (4)$$

$$\ln(E_t^c) = \rho^{ec} \ln(E_{t-1}^c) + \varepsilon_t^{ec} \quad (5)$$

Where $0 < \rho^a, \rho^{eg}, \rho^{ec} < 1$, ε_t^a , ε_t^{eg} and ε_t^{ec} are normally distributed innovations with standard deviations σ^a , σ^{eg} and σ^{ec} respectively.

Firms

The economy is populated by two types of firms, a continuum of monopolistically competitive firms indexed by $i \in [0, 1]$ that produce differentiated varieties of intermediate goods and perfectly competitive final goods producing firm that combines the varieties of intermediate goods for final production given the following constant-returns to scale technology

$$Y_t = \left[\int_0^1 Y_t(i) \frac{(\theta-1)}{\theta} di \right]^{\frac{\theta}{(\theta-1)}} \quad (6)$$

Where θ represents calvo probability of firms that cannot adjust prices in a given period. At each period, the final goods-producing firm combines $Y_t(i)$ amount of intermediate goods at the nominal price of $P_t(i)$ to manufacture Y_t units of final goods and maximizes profit by choosing

$$Y(i) = \left(\frac{P_t(i)}{P_t} \right)^{-\theta} Y_t \quad (7)$$

Where price, P_t is given

$$P_t = \left[\int_0^1 (P_t(i))^{1-\theta} di \right]^{\frac{1}{(1-\theta)}} \quad (8)$$

The representative intermediate goods-producing firm use a linear technology to manufacture $Y_t(i)$ units of intermediate good i by hiring $H_t(i)$ units of labour is given as $Y(i) = Z_t H_t(i)$ (9)

Where Z_t represents aggregate productivity shock following the autoregressive process $\ln(Z_t) = \rho^z \ln(Z_{t-1}) + \varepsilon_t^z$ (10)

$0 < \rho^z < 1$, ε_t^z is normally distributed innovations with standard deviations σ^z .

Monetary Policy

The nominal interest rate set by the monetary authority follow a modified Taylor rule as follows

$$\ln\left(\frac{R_t}{R}\right) = \rho^r \ln\left(\frac{R_{t-1}}{R}\right) + (1-\rho^r)\rho^y \ln\left(\frac{Y_t}{Y}\right) + (1-\rho^r)\rho^\pi \ln\left(\frac{\pi_t}{\pi}\right) + (1-\rho^r)\rho^{\mu^g} \ln\left(\frac{\mu_t^g}{\mu^g}\right) + \varepsilon_t^r \quad (11)$$

Where ρ^r denotes interest rate smoothing parameter, ρ^y coefficient on output, ρ^π coefficient on inflation, ρ^{μ^g} coefficient on government currency growth and $\mu_t^g = (M_t^g / P_t) / (M_{t-1}^g / P_{t-1})$. ε_t^r is a normally distributed zero mean serially uncorrelated policy shock with σ^r standard deviation. Equation (11) shows the adjustment of short-term nominal interest rate in response to output and inflation deviations from their steady states levels.

Model Equilibrium

Following the computation of the first order conditions and Taylor approximation, the log-linearized equilibrium model follows Equations (12) to (16)

$$\hat{y}_t = \hat{y}_{t+1} - \alpha_1(\hat{r}_t - \hat{\pi}_{t+1}) + \alpha_2[(\hat{m}_t^g - \hat{e}_t^g) - (\hat{m}_{t+1}^g - \hat{e}_{t+1}^g)] + \alpha_3[(\hat{\chi}_t + \hat{m}_t^c - \hat{e}_t^c) - (\hat{\chi}_{t+1} + \hat{m}_{t+1}^c - \hat{e}_{t+1}^c)] + \alpha_1(\hat{b}_t - \hat{b}_{t+1}) \quad (12)$$

$$\hat{m}_t^g = \delta_1 \hat{y}_t - \delta_2 \hat{r}_t + \delta_3 \hat{e}_t^g - \delta_4 \hat{\chi}_t - \delta_4 \hat{m}_t^c + \delta_4 \hat{e}_t^c \quad (13)$$

$$\hat{m}_t^c = \delta_5 \hat{y}_t - \delta_6 \hat{r}_t + \delta_7 \hat{e}_t^c - \delta_8 \hat{m}_t^g + \delta_8 \hat{e}_t^g \quad (14)$$

$$\hat{\pi}_t = \left(\frac{\pi}{R}\right) \hat{\pi}_{t+1} + \psi \left[\left(\frac{1}{\alpha_1}\right) \hat{y}_t - \left(\frac{\alpha_2}{\alpha_1}\right) (\hat{m}_t^g - \hat{e}_t^g) - \left(\frac{\alpha_3}{\alpha_1}\right) (\hat{\chi}_t + \hat{m}_t^c - \hat{e}_t^c) - \hat{z}_t \right] \quad (15)$$

$$\hat{r}_t = \rho^r \hat{r}_{t-1} + (1 - \rho^r) \rho^y \hat{y}_t + (1 - \rho^r) \rho^\pi \hat{\pi}_t + (1 - \rho^r) \rho^{\mu^g} \hat{\mu}_t^g + \varepsilon_t^r \quad (16)$$

Equation (12) shows the log-linearized version of the consumption Euler equation linking the household's marginal rate of intertemporal substitution to real interest rate. A non-zero output elasticity to real balance of government currency, α_2 and output elasticity to real balance of cryptocurrency, α_3 shows the non-separability of consumption and real balances of government currency and cryptocurrency. This allows $\hat{m}_t^g$ and $\hat{m}_t^c$ terms to appear in the IS curve. Equation (13) represents government currency demand relationship incorporating income elasticity of government currency demand, δ_1 , interest semi-elasticity of government currency demand, δ_2 , elasticity of $\hat{m}_t^g$ with respect to government currency demand shock, δ_3 and cross elasticity of government currency demand and cryptocurrency demand, δ_4 . Equation (14) represents cryptocurrency demand relationship incorporating income elasticity of cryptocurrency demand, δ_5 , interest semi-elasticity, δ_6 , elasticity of $\hat{m}_t^c$ with respect to crypto demand shock, δ_7 , cross elasticity government currency demand. Equation (15) allows real balances of government and cryptocurrency to appear in the forward-looking Philips curve because of the non-separability in the utility function and thus directly influences marginal cost and inflation. Equation (16) represents the log-linear monetary policy rule. The relationship shows that interest rate adjusts to output, inflation and government currency growth.

Data Sources and Transformation

Monthly series from April 2013 to December 2024 was used. Data on average monthly Bitcoin price (sourced from <https://coinmarketcap.com>) was used to proxy price of cryptocurrency because it is the most prominent cryptocurrency in terms of market capitalization. The choice of Bitcoin presents a methodological limitation because there is

increasing dominance of stablecoins such as USDT and USDC in the Nigerian market. By acknowledging this limitation, the estimated cryptocurrency demand elasticities will be interpreted as a reflection of the broader crypto market. Although the result may differ for stablecoin-specific interpretations. Other time were sourced from CBN statistical bulletin, namely: real private consumption expenditure, real broad money (M2), real gross domestic product (RGDP) and monetary policy rate (MPR). As its standard with DSGE models, the series were detrended using Hodrick-Prescott filter (Pfeifer, 2014). The detrended observed series and the associated exogenous shocks are shown in Table 1

Table 1: Observed Variables and Exogenous Shocks

Acronym	Observed Variables	Shocks
op_t	Real GDP	productivity shock, ϵ_{ps_z}
gc_t	Broad money (M2)	government currency demand shock, $\epsilon_{ps_{eg}}$
cp_t	Bitcoin price	cryptocurrency demand shock, $\epsilon_{ps_{ec}}$
pc_t	Real private consumption expenditure	preference shock, ϵ_{ps_a}
ir_t	Monetary Policy Rate	monetary policy shock, ϵ_{ps_r}

Model Parameter Prior Selection

Tables 2 and 3 displays selection of prior mean for the endogenous parameters and shock processes. Since our study is the foremost in incorporating cryptocurrency sector in DSGE model in Nigeria and given the paucity of empirical studies in this area, selection of suitable priors for model estimation constitutes a major contribution of this work. Non-informative prior means were mainly selected so that the data guides the posterior result. α_1 was fixed equal to one assuming the same level of risk aversion in the logarithmic consumption utility function in accordance with its consistence for monthly data frequency.

Table 2: Prior Selection of Endogenous Parameters

Parameter	symbol	Distribution	Priors	Std Dev.
Output elasticity to real bal. of govt. currency	α_2	Normal	0.047	0.0500
Output elasticity to real bal. of cryptocurrency	α_3	Beta	0.046	0.0100
Income elasticity of govt. currency demand	δ_1	Beta	0.056	0.0150
Interest semi-elasticity of govt. currency demand	δ_2	Beta	0.269	0.0500
Elasticity of real bal. of govt curr. to gov. curr demand shock	δ_3	Beta	0.553	0.1000
Cross elasticity of govt. curr. demand and crypto. demand	δ_4	Beta	0.397	0.0500

Parameter	symbol		Priors	
Income elasticity of cryptocurrency demand	δ_5	Gamma	0.060	0.0100
Interest semi- elasticity of cryptocurrency demand	δ_6	Beta	0.130	0.0500
Elasticity of real bal. of crypto. to crypto. demand shock	δ_7	Beta	0.801	0.1000
Cross elasticity of crypto. demand and govt. curr. demand	δ_8	Beta	0.710	0.1000
Elasticity of relative price btw govt. curr. wrt crypto.	ϱ	Gamma	0.655	0.1000
Interest rate smoothing	ρ^r	Beta	0.614	0.0500
Taylor rule coefficient on output	ρ^y	Beta	0.154	0.0100
Taylor rule coefficient on inflation	ρ^π	Gamma	1.980	0.0500
Taylor rule coefficient on govt. currency growth	ρ^{μ^g}	Beta	0.489	0.0500

We selected relatively high gamma prior mean for productivity shock persistence ρ^z along the line of Asimakopoulos et al., (2023) assuming a more persistent technology shock than consumption preferences, government and cryptocurrency demand shocks. The moderate prior means for shock persistence to government currency demand, cryptocurrency demand and preferences follow a beta distribution. This was chosen to allow for Nigeria's macroeconomic uncertainties which also informed the selection of inverse gamma distribution with infinite prior variances of shock processes.

Table 3: Prior Selection of Shock Processes

Parameter	symbol		Priors	
		Distribution	Mean	Std Dev.
Productivity shock persistence	ρ^z	Gamma	0.921	0.0500
Government currency demand shock persistence	ρ^{eg}	Beta	0.653	0.0500
Cryptocurrency demand shock persistence	ρ^{ec}	Beta	0.774	0.0500
Preference shock persistence	ρ^a	Beta	0.706	0.0500
Productivity shock std. error	σ^z	Inverse gamma	0.070	Inf
Government currency demand shock std. error	σ^{eg}	Inverse gamma	0.050	Inf
Cryptocurrency demand shock std. error	σ^{ec}	Inverse gamma	0.010	Inf
Preference shock std. error	σ^a	Inverse gamma	0.030	Inf
Monetary Policy shock std. error	σ^r	Inverse gamma	0.076	Inf

Model Estimation Procedure

The Bayesian estimation method was used to estimate the posterior mean distribution of the parameters. As it is typical with Bayesian methodology, the posterior result is the outcome of the estimation using the prior mean selections. To implement the estimation, Markov Chain Monte Carlo (MCMC) method was applied with Metropolis-Hastings's algorithm allowing for 50,000 posterior draws. Brooks and Gelman (1998) diagnostic test confirmed the moments of multiple chains. Based on the resulting posterior means, the Bayesian Impulse Response Function (IRF) of the model was plotted. In addition, the MCMC univariate and multivariate diagnostic tests as shown in Figures 6 were implemented to confirm model convergence.

Results

Posterior Interpretation

Tables 4 and 5 reports the estimated posterior means and their respective 90 percent credible intervals for the endogenous and exogenous parameters of the model. The estimated posterior mean of δ_1 is 0.0619. This captures income elasticity to government currency demand. The posterior mean is slightly higher than the prior mean value (0.056). This result suggest that government currency demand is not strongly driven by income. This is a reflection of the preference of cash-based transactions irrespective of level of income (Bagudu & Okolie, 2022; Ejinkonye et al., 2023). The posterior mean of δ_2 , interest semi-elasticity of government currency demand, is 0.067 which is much smaller than the prior mean of 0.269. This implies that government currency demand is weakly sensitive to interest rates adjustments. This is a reflection of low formal savings penetration and weak monetary policy transmission which limits interest rate channels in the financial system (Eleam et al., 2022). The posterior mean of δ_5 , income elasticity of cryptocurrency demand, shows that the posterior mean of 0.06 is equal to the prior mean. The alignment of the posterior mean with that the prior mean suggest that the demand for cryptocurrency is income sensitive. According to Chainalysis (2024), greater percentage of cryptocurrency transactions are carried out by middle income earners who view cryptocurrency as financial asset whose holding increases with increase in income. The posterior mean of interest semi-elasticity of cryptocurrency demand δ_6 0.13, matches the prior mean value. This suggest that cryptocurrency demand is moderately sensitive to interest rates. This shows that at the level of financial system development and regulation in Nigeria, cryptocurrency demand is not strongly responsive to domestic monetary policy rate (Vasylchyshyn, 2017; Alekseenko & Gidigbi, 2021).

Table 4: Posterior of Endogenous Parameters

Parameter symbol				90% HPD Interval		
	Distribution	Prior Mean	Posterior Mean	Low	High	Std, Dev
α_2	Normal	0.047	0.0119	-0.0671	0.1010	0.0500
α_3	Beta	0.046	0.0476	0.0309	0.0633	0.0100
δ_1	Beta	0.056	0.0619	0.0364	0.0879	0.0150
δ_2	Beta	0.269	0.0669	0.0461	0.0873	0.0500
δ_3	Beta	0.553	0.6162	0.4692	0.7716	0.1000
δ_4	Beta	0.397	0.4506	0.3837	0.5283	0.0500
δ_5	Gamma	0.060	0.0600	0.0454	0.0733	0.0100
δ_6	Beta	0.130	0.1304	0.0906	0.1687	0.0500
δ_7	Beta	0.801	0.9645	0.9414	0.9891	0.1000
δ_8	Beta	0.710	0.6775	0.5086	0.8344	0.1000
ϱ	Gamma	0.655	0.6373	0.4825	0.7776	0.1000
ρ^r	Beta	0.614	0.6397	0.5942	0.6877	0.0500
ρ^y	Beta	0.154	0.1602	0.1424	0.1760	0.0100
ρ^π	Gamma	1.980	1.9442	1.8671	2.0319	0.0500
ρ^{μ^g}	Beta	0.489	0.4934	0.4083	0.5750	0.0500

The cross-elasticity parameters are used to capture currency substitution between government currency and cryptocurrency. δ_4 measures cross-elasticity of government currency demand to cryptocurrency demand while δ_8 measures cross-elasticity of cryptocurrency demand to government currency demand. The posterior means of δ_4 (0.4506) and δ_8 (0.6775) are close to their prior means of 0.397 and 0.710 respectively. This indicates moderate substitution between government currency and cryptocurrency in Nigeria. Despite regulatory barriers, high transactions in cryptocurrency shows that it serves as a partial substitute for naira especially under inflation and exchange rate pressures (Ajayi, 2022; Joseph, 2022). The slightly stronger substitution of government currency demand to cryptocurrency demand aligns with the shifting to cryptocurrency by Nigerians as a hedge against naira depreciation (Ozili, 2023). Elasticity of relative price between government currency and cryptocurrency ϱ , shows a close posterior (0.6373) and prior (0.655) means. This supports a moderate sensitivity of currency choice to relative prices

which implies that Nigerian crypto traders respond to movements in cryptocurrency prices.

For the Taylor rule parameters, the interest rate smoothing ρ^r with a posterior mean of 0.6397, coefficient on output ρ^y of 0.16 and coefficient on inflation ρ^π of 1.944 are close to their respective prior means. The interest rate smoothing parameters confirms that there is significant smoothing in the data which shows CBN's cautious and gradual policy rate adjustments. This reflects central banks' preferences for making incremental changes to policy rates rather than abrupt, large adjustments to prevent excessive volatility in financial markets (Wieland & Sack, 1999). The output response parameter (0.16) shows that CBN allocates lesser weight to output stabilization than price stability. This is reflected in the posterior mean of coefficient on inflation of 1.944. This is a confirmation that there is strong inflation targeting in Nigeria's monetary policy due to persistent high inflation (Lawrence, 2023). The posterior mean of coefficient on government currency growth ρ^{μ^g} is 0.4934. This indicates a stable but partial response of CBN to monetary aggregates observed in Nigerian monetary policy framework (Kumar et al., 2013).

Table 5: Posterior of Shock Processes

Parameter	symbol	Distribution	Posterior	Mean	Credible Interval
productivity shock persistence	ρ^z	Gamma	0.908	0.866	0.950
government curr. Demand shock persistence	ρ^{eg}	Beta	0.684	0.626	0.744
cryptocurrency demand shock persistence	ρ^{ec}	Beta	0.797	0.743	0.851
Preference shock persistence	ρ^a	Beta	0.781	0.733	0.827
productivity shock std. error	σ^z	Inverse gamma	0.282	0.253	0.310
government curr. demand shock std. error	σ^{eg}	Inverse gamma	0.053	0.037	0.069
cryptocurrency demand shock std. error	σ^{ec}	Inverse gamma	0.215	0.193	0.238
Preference shock std. error	σ^a	Inverse gamma	1.730	1.449	2.023
Monetary Policy shock std. error	σ^r	Inverse gamma	0.769	0.660	0.879

Impulse Response Functions

The impulse response functions (IRFs) generated based on the exogenous shocks to the estimated model and the response of the endogenous variables are reported in Figures 1 to 5. The shock processes are grouped into two: traditional shocks - preference (eps_a),

productivity (eps_z), monetary policy shock (eps_r) and currency demand shocks - government currency demand (eps_{eg}) and cryptocurrency demand (eps_{ec}). The IRFs were generated based on respective means and standard errors of the shock processes for 40 months horizon. Figure 1 reports the response of output, government currency, cryptocurrency, inflation and interest rate to consumer preference shock.

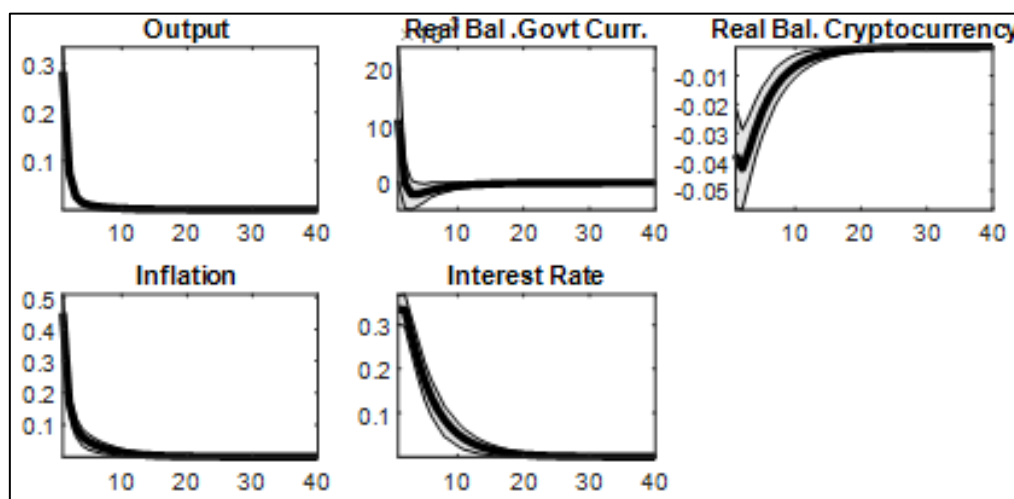


Figure 1: Preference shock - eps_a . Solid lines denote median response, shaded areas denote 90% credible interval

Preferences indicate consumption and savings choices of households. Figure 1 shows that the households prefer consumption over savings. This causes output to increase on impact of the shock because increased consumer demand boosts economic activities which directly leads to GDP growth. As a result of the surge in consumption demand, production increases to meet the higher level of desired consumption leading to increased inflation. Expectedly, CBN responds by upward adjustment of interest rate to curb rising inflation to stabilize the economy. However, the preference shock leads to a fall in real naira balance as higher prices reduces the purchasing power of consumers leading them to access their cash savings to fund their rising consumption. Similarly, there is a fall in the real balance of cryptocurrency as people convert their cryptocurrency reserve to naira in order to finance their consumption which reduces their crypto balance. This shows that there is a substitution effect between naira demand and cryptocurrency demand for shock to preference. This finding is in line with Ireland (2004), Andrés et al., (2009) and Asimakopoulous et al., (2023) whose findings showed a currency substitution effect as a result of increase in the relative prices of government currency with respect to cryptocurrency.

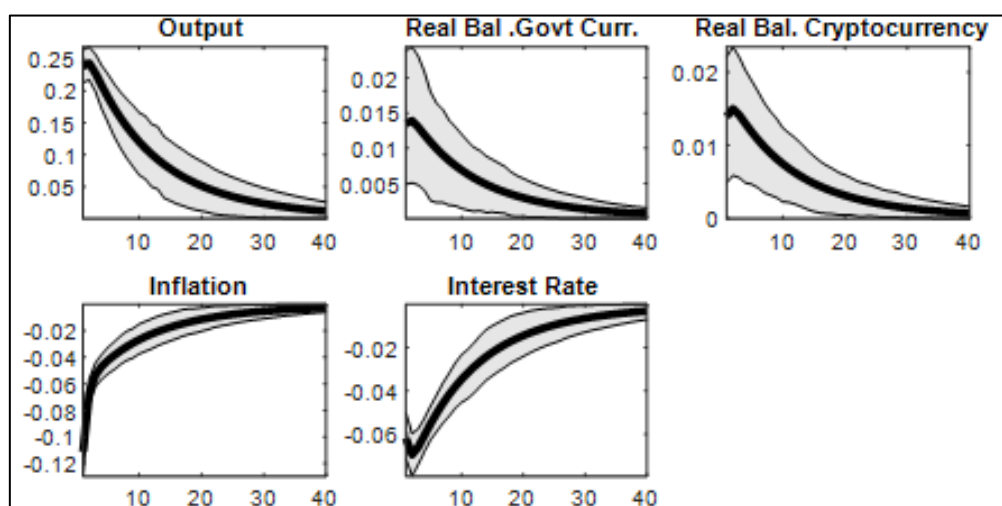


Figure 2: Productivity shock - ϵ_{ps_z} . Solid lines denote median response, shaded areas denote 90% credible interval

Figure 2 reports the response of output, government currency, cryptocurrency, inflation and interest rate to productivity shock which shows that a positive shock makes the economy more efficient due to technological improvement. Productivity shock on impact causes output to increase significantly and persistently. This implies that more goods and services can be produced using the same productive inputs as a result of improved production efficiency. Consequently, there is fall in inflation as higher productivity causes a surge in supply of goods which pushes the price downwards. In order to maintain productivity at its level, the CBN lowers interest rates to circumvent price pressures. Due to increase in output and low inflation, households experience higher real income which leads to increase in the real balances of both government currency and cryptocurrency. This simultaneous increase in both currency holdings is consistent with positive wealth effect where higher productivity increases overall economic resources which leads to accumulation of more of both types of assets. Thus, there is no observable trade-off between both currencies in this scenario. In this case currency substitution behaviour is absent. This pattern is contrary to substitution effect documented in Ireland (2004) and Andrés et al., (2009) which was driven by different types of shocks where relative prices adjust. Instead, productivity shock generates a uniform increase in demand for both currencies showing an improvement in economic fundamentals rather than a shift in relative preference.

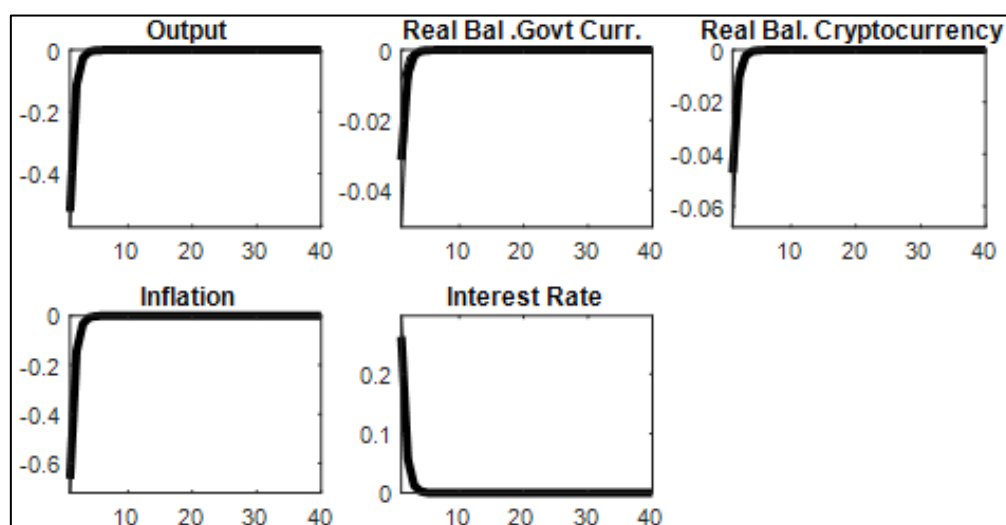


Figure 3: Monetary Policy shock - ϵ_{ps_r} . Solid lines denote median response; shaded areas denote 90% credible interval.

Figure 3 reports the response of output, government currency, cryptocurrency, inflation and interest rate to monetary policy shock. As expected, a positive shock to interest rate causes output to fall on impact due to higher cost of borrowing which leads to reduced investment and consumption. This slows down economic growth. This confirms that CBN's aggressive monetary tightening to combat hyperinflation lowers growth. Due to the inflation targeting stance of CBN, the primary objective of monetary tightening is to fight inflation. Thus, rate hike induces a fall in aggregate demand leading to fall in the price level. The impact of interest rate hike on real balances of government currency and cryptocurrency follows similar pattern due to disinflationary effect of tightening. Due to economic contraction, both currencies fall with the effects being more pronounced in cryptocurrency as higher rates on naira savings makes it more attractive than the zero interest on cryptocurrency. This implies that there is complementarity effect of monetary policy increase between cryptocurrency and the naira. This finding equally reveals the effectiveness of monetary policy in restoring confidence in the naira which mitigates capital flight into cryptocurrencies. Overall, monetary policy is effective in moderating the impact of cryptocurrency speculations on the economy. This finding contradicts Tomic et al., (2020) and Bas et al., (2023) who found that cryptocurrencies reduce the effectiveness of traditional monetary policy tools by operating outside central bank regulation.

Considering the overall response to the traditional shocks, our finding indicates that there is substitution effect between government currency and cryptocurrency for preference and productivity shocks. This implies that there is uniform reaction between government currency and cryptocurrency preference or productivity shock. This shows that cryptocurrency is not the main driver of other variables rather it responds to movements in government currency balance. Similarly, government currency and cryptocurrency complement each other when there is shock to monetary policy.

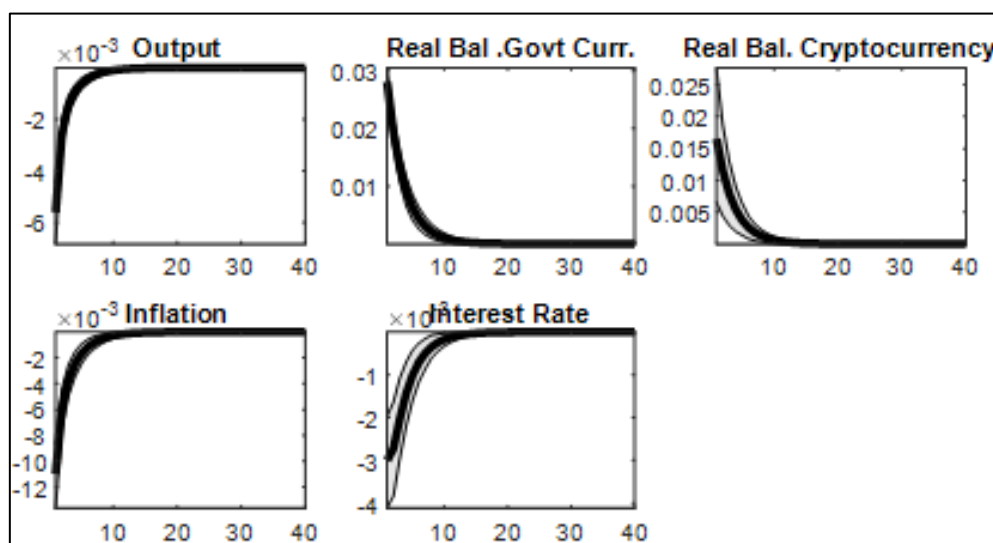


Figure 4: Government currency demand shock - eps_eg. Solid lines denote median response, shaded areas denote 90% credible interval

Figure 4 reports the response of output, government currency, cryptocurrency, inflation and interest rate to government currency demand shock. This shock represents a sudden increase in people's preference to hold naira triggering liquidity hoarding. This shock on impact causes output to decline because holding more cash reduces spending on consumption and investment which in turn causes decline in aggregate demand and fall in output. Government currency demand shock induces a fall in inflation as the decline in aggregate demand for goods and services creates downward pressure on prices. The CBN reacts by lowering interest rates and making borrowing cheaper as a result of the falling output and prices in a bid to stimulate the economy. Real balance of cryptocurrency also falls indicating a substitution effect as people momentarily shifts from cryptocurrencies into naira as a safer asset. This flight to safety scenario is typical in Nigerian economic context where incessant domestic banking sector stress, extreme volatility and fear of crypto market collapse pushes people to keep physical cash. It is expected that cut in monetary policy rate should encourage people to spend the hoarded money.

Figure 5 reports the response of output, government currency, cryptocurrency, inflation and interest rate to cryptocurrency demand shock. This shock is important for monetary authorities because it is reflective of the scenario people move their wealth into cryptocurrencies in periods of hyperinflation and naira devaluation. Due to the impact of shock to real balance of cryptocurrencies, output falls following a diversion of funds from consumption and investment in the real economy into financial assets which in turn depresses aggregate demand leading to a fall in prices. Real balance of naira decreases as people are using naira to buy cryptocurrencies. This further confirms a substitution effect between naira and cryptocurrency. The capital flight induced by shift to cryptocurrency weakens the naira while the CBN reacts by lowering interest rate to counter negative output gap and disinflationary pressure. This finding is in line with Panigrahi (2023) who found that

increase in cryptocurrency investments reduces financial stability in India. However, this finding counteracts Sadiq et al., (2023) who argued that digital currency and blockchain security positively enhance financial stability.

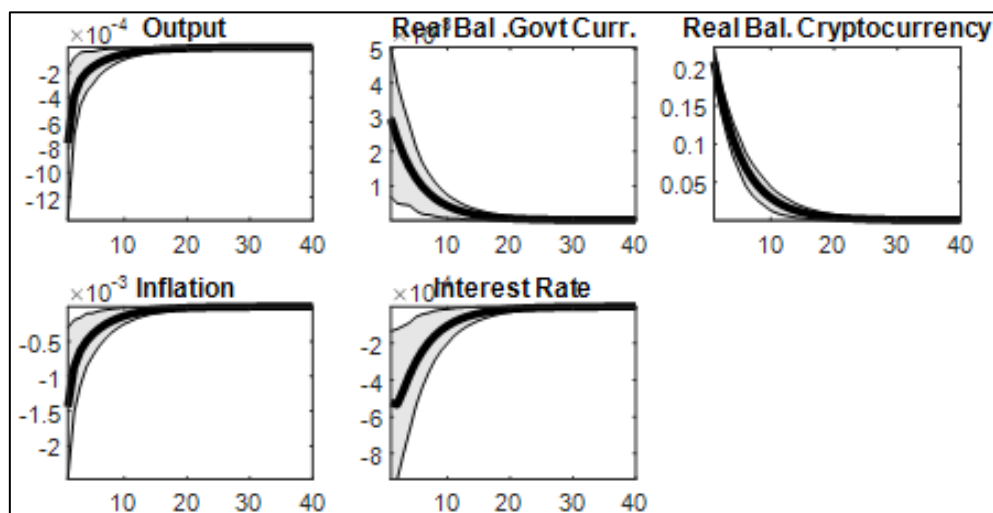


Figure 5: Cryptocurrency demand shock - eps_ec. Solid lines denote median response, shaded areas denote 90% credible interval

Discussion of Findings

This study presents a DSGE model of the Nigerian economy where cryptocurrency sector was integrated. The result of the Bayesian estimation yields a critical insight in understanding the interplay between cryptocurrency and government currency. The key finding of this study is the existence of dual relationship between cryptocurrency and domestic currency. Cryptocurrency acts as a substitute to naira in response to real economic shocks (preference, productivity, and currency demand shocks) but complements the naira in response to nominal monetary policy shocks. This finding has several implications on monetary policy and financial stability in Nigeria. Firstly, the finding of substitution effect when there is preference and productivity shocks is in line with empirical reality on the usage of cryptocurrency in Nigeria (Chainalysis, 2024). The adoption and usage of cryptocurrency is mainly dominated by the middle class with moderate holdings whose currency demand is majorly driven by potential short-term utility. Thus, when there is positive preference shock for consumption, people liquidate both naira and cryptocurrency savings to finance expenditure. This shows that, in the Nigerian context, both currencies are perceived as stores of value to be utilized for immediate spending. The finding also reveals moderate substitution effect in response to government currency demand shocks (flight to safety into naira) and cryptocurrency demand shocks (flight from naira into crypto). Due to domestic economic uncertainties, people tend to substitute between both currencies as potential hedge against high inflation and naira depreciation. This behaviour poses a challenge to monetary policy effectiveness as public confidence in

the naira is conditional and volatile. The fragile trust naira can be disrupted easily which can destabilize financial stability. This finding is supported by Ireland (2004), Andrés et al., (2009) and Nakorji and Asuzu (2019) who argued that concerns over banking sector stability and persistent currency depreciation remains a major driver of asset diversification.

Secondly, the finding of currency complementarity between government currency and cryptocurrency in response to monetary policy shock in Nigeria is a critical departure from previous literature (Ireland, 2004; Asimakopoulos et al., 2023). This finding is critical given the concerns of monetary policy effectiveness in the face of alternative currency like the cryptocurrency. The finding reveals that there is a simultaneous decline in the real balances of both naira and cryptocurrency to a contractionary monetary policy shock. When the CBN raises the monetary policy rates with the aim of curbing inflation, peoples' confidence in naira is restored and naira-denominated savings become more attractive due to expected higher returns. As a result, capital flight into cryptocurrency is mitigated given the increased opportunity cost of holding zero-interest crypto assets. Thus, the finding confirms that a credible monetary policy can be an effective tool towards the management of capital flows between the traditional financial system and evolving cryptocurrency market and further moderate the impact of cryptocurrency speculation on the economy (Elsayed & Sousa, 2022). This demonstrates that the coexistence and complementarity of government currency and cryptocurrency in Nigeria have created a new dynamic in monetary policy response to shocks. Therefore, there is need for regulatory frameworks to manage this dualism. Concurrently, the fact that cryptocurrency demand is moderately sensitive to income but not strongly responsive to the policy rate supports the understanding that crypto holdings are driven more by other motives than by interest rate adjustments (Chainalysis, 2022). This may explain the reason behind the failure of blunt instruments like the 2021 ban on cryptocurrency transaction in Nigerian banks which merely shifted transactions to peer-to-peer platforms rather than curbing demand.

Policy Implications

1. The findings of this study suggest a paradigm shift in the regulatory and monetary policy approach towards cryptocurrency in Nigeria. Empirical evidence showed that a blanket prohibition of crypto transactions without considering the underlying economic drivers has proven counterproductive. The persistent substitution effect implies that cryptocurrency demand is inelastic to outright suppression. Therefore, there is the need for monetary authorities to develop a robust regulatory framework instead of prohibition. There should be compulsory licensing for crypto exchanges with strong mechanism against money laundering and clear taxation guidelines for crypto operators in Nigeria.
2. The finding that effective monetary policy induces complementarity between the naira and cryptocurrency implies that the current condition is not harmful to policy transmissions. There is need for CBN to strengthen its inflation targeting credibility. This involves consistent and transparent communication together with

improvement in the monetary policy transmission mechanism by deepening the financial system and increasing formal savings penetration. A credible policy regime reduces the desire to shift to cryptocurrency as a hedge against policy uncertainty and naira depreciation.

3. The finding of moderate substitution effects show that both currencies stand as alternative for utility. This emphasizes that there is opportunity for the use of CBDC alongside the fiat currency. The CBN should make the naira more attractive by aggressively promoting its digital currency, the eNaira. This can be achieved by integrating it with innovative financial services and digital payment platforms. Thus, CBN can provide a digital payment alternative that meets public demand while retaining monetary sovereignty by offering a CBDC that is efficient, accessible, and trustworthy.
4. The concerns that the crypto market can trigger financial instability necessitate the need for the implementation of macroprudential surveillance in the crypto market. Monitoring activities in the crypto market can mitigate its spillover effects from crypto demand shocks to output, inflation and financial stability. The monetary authorities should evolve frameworks to monitor the size and interconnection of the crypto market with the traditional banking system. This will help in identifying and mitigating systemic risks that could arise from a sharp downturn in the crypto market.

It is important to note that the findings of this study are still tentative due to inherent limitations. Short span of data on cryptocurrency may affect parameter precision. Moreover, the model abstracts from some institutional features of Nigeria's informal economy that may influence cryptocurrency adoption pattern.

Conclusion

This study investigated monetary transmission dynamics between cryptocurrency and the traditional fiat system in Nigeria. A cryptocurrency sector was incorporated into a DSGE model estimated through the Bayesian framework. The non-informative prior means were selected to reflect the data and economic structure in operation in Nigeria. A key finding from the analysis of this study is that the relationship between the naira and cryptocurrency is not uniform but critically depends on the nature of the underlying economic shock. There is a substitution effect between the naira and cryptocurrency in response to real economic shocks. This is an indication of the role of cryptocurrency as a hedge and alternative store of value during periods of domestic economic uncertainty. Contrarily, there is complementarity effect between the naira and cryptocurrency in response to a monetary policy shock, where a credible tightening by the CBN restores confidence in the naira and dampens capital flight into crypto assets. Given persistent substitution effect despite restrictive regulatory environment, we conclude that the demand for cryptocurrency in Nigeria is structurally embedded and driven by deep-seated factors such as inflation

hedging, remittance needs, and a lack of confidence in the traditional financial system. Again, the evidence of complementarity during monetary policy tightening reveals that a credible and well-communicated inflation-targeting regime can be effective in managing the crypto-fiat dynamics which mitigates its potential destabilizing effects.

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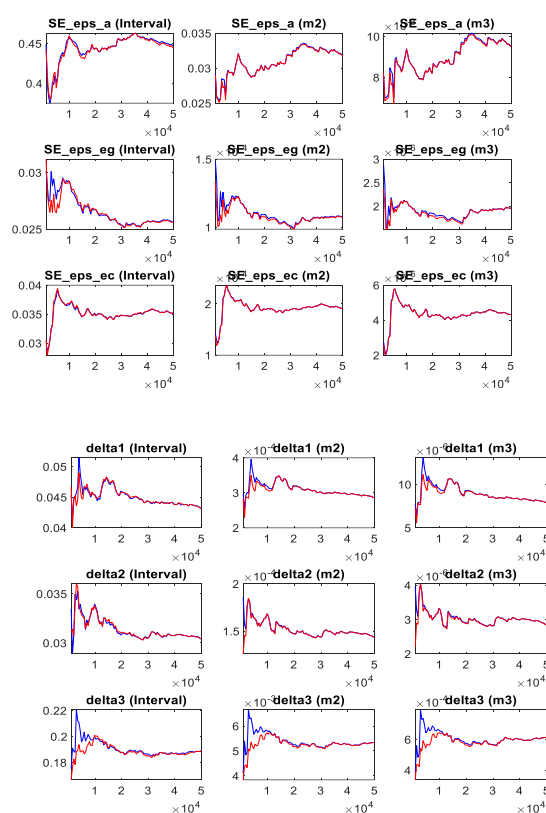
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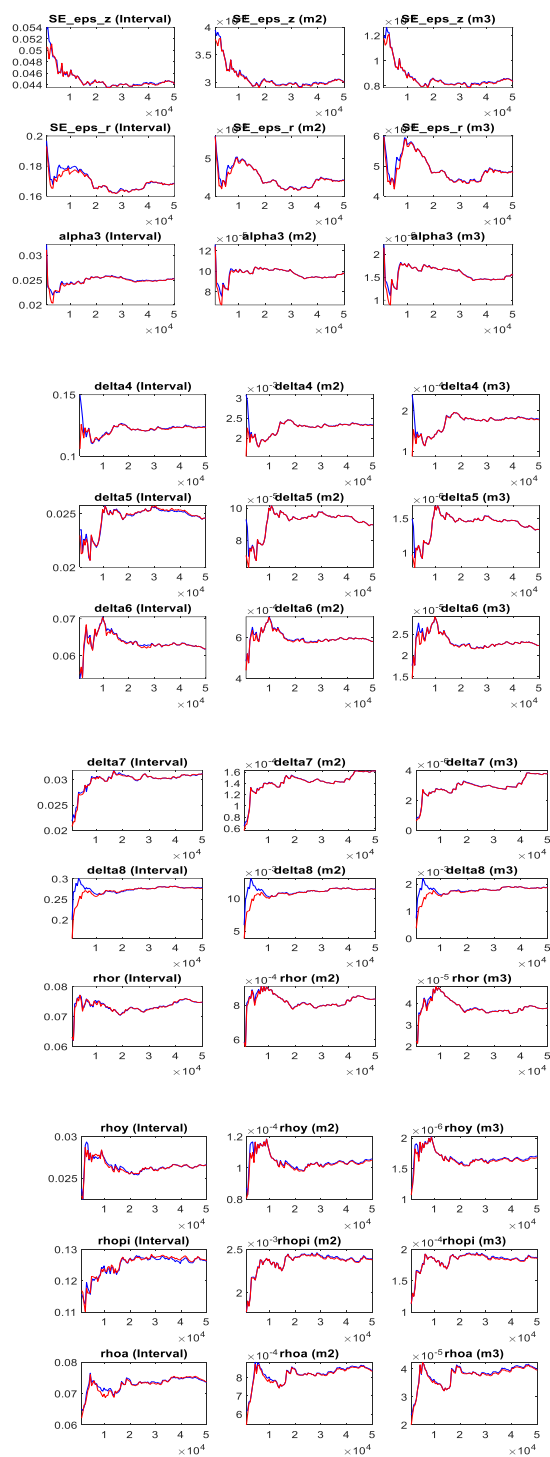
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Appendix.

Figure 6: Univariate and Multivariate Convergence Diagnostic for MCMC the chains





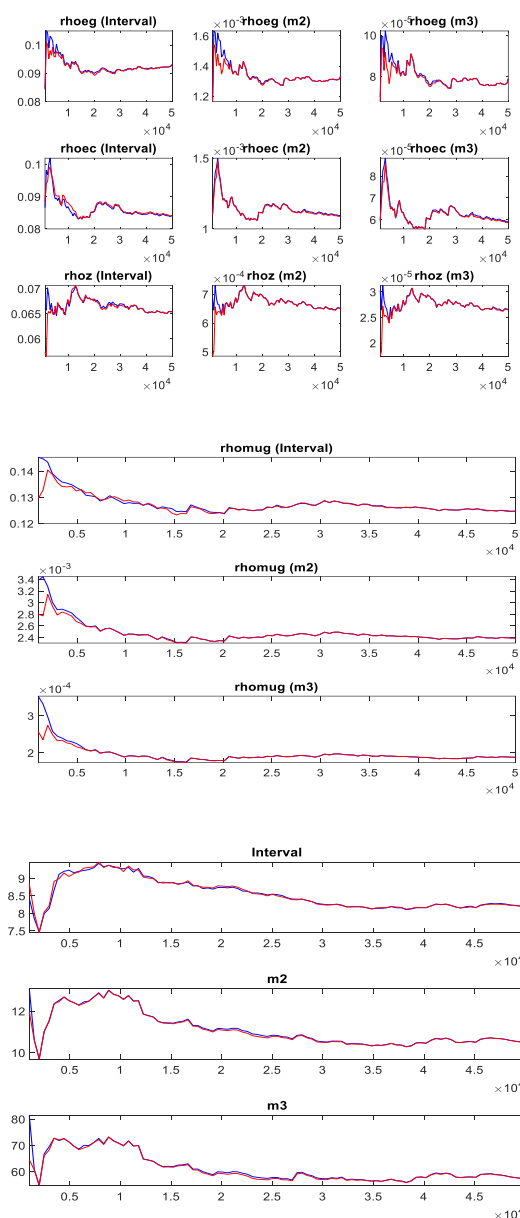


Figure 7: Prior and Posterior Distributions of the Model Parameters.

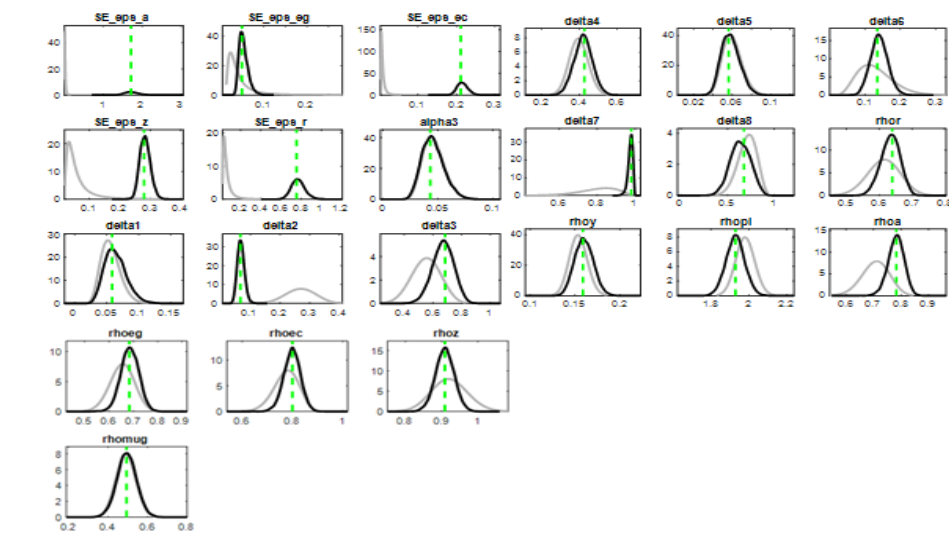


Figure 8: Smoothed Shocks

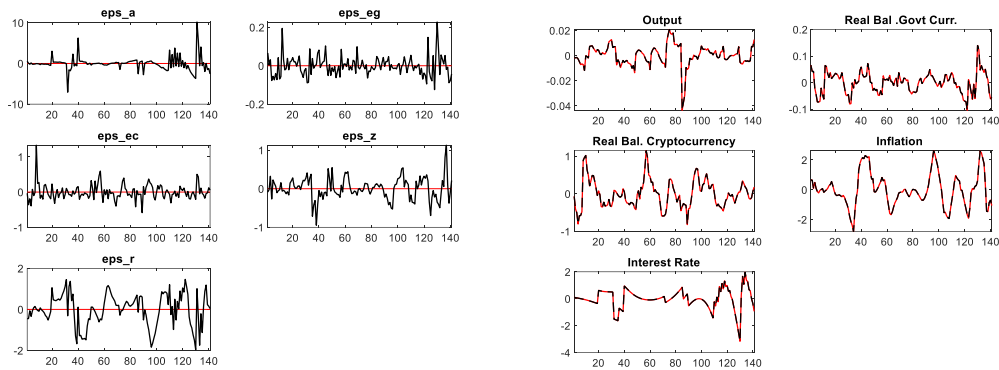


Figure 9: Historical and Smoothed Variables