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Monetary Policy Transmission And Inflation Dynamics In Nigeria: Analyzing The Impact Of Economic Uncertainty On Interest Rate Pass-Through

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Abstract
This study investigates the dynamics of key economic variables in Nigeria. namely the Treasury Bill Rate (TBR), Private Sector Credit (PSC), and the Consumer Price Index (CPI) using a Structural Vector Autoregression (SVAR) framework, with and without the inclusion of economic uncertainty indices. We estimate the contemporaneous relationships among these variables and examine the implications of domestic uncertainties, captured by the Nigerian Economic Policy Uncertainty Index (NUI). The SVAR model without uncertainties reveals that TBR operates with relative autonomy in the short run, while CPI and PSC are more interlinked, with CPI responding negatively to both TBR and PSC shocks. Incorporating uncertainties into the model adds layers of volatility and interdependence, with NUI introducing significant fluctuations in response to TBR shocks. The impulse response functions (IRFs) suggest that uncertainty amplifies the effects of monetary policy on credit and inflation dynamics, while the forecast error variance decomposition (FEVD) highlights the increasing influence of PSC on TBR over time in the presence of uncertainty. Our findings underscore the critical role of uncertainty in shaping monetary transmission mechanisms and suggest that effective policy design in Nigeria must account for these heightened risks and their impact on economic stability. Based on these findings, policymakers should account for economic uncertainty in the design of monetary policies, recognizing its potential to disrupt the transmission of policy effects. Additionally, credit control measures could play a vital role in stabilizing inflation. For researchers, the inclusion of uncertainty indices in econometric models is recommended to capture a more accurate representation of economic dynamics, particularly in volatile contexts like Nigeria.

Keywords: *Structural Vector Autoregression, Economic Uncertainty, Monetary Transmission Mechanism, Private Sector Credit and Inflation Dynamics.*

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I. Introduction

The dynamics of interest rate pass-through are a crucial area of study within monetary economics and financial theory. Understanding the transmission of central bank policy rates to various economic sectors is vital for policymakers, financial institutions, and investors (Bernanke & Blinder, 1992). In the context of Nigeria, elucidating the intricate relationships between interest rate dynamics, credit accessibility, inflation, and economic growth is paramount for effective economic policymaking and financial stability.

The transmission of monetary policy through changes in the central bank's policy rate to credit availability and ultimately to inflation, forms the core of monetary policy effectiveness in Nigeria (Ogbonna & Ebiringa, 2020). However, Nigeria's economic environment is often characterized by significant uncertainties, which can profoundly influence the efficacy of these transmission mechanisms. Exploring how these uncertainties, as measured by the Nigerian Economic Policy Uncertainty (NUI) can shape the dynamics between interest rates, credit availability and inflation, in Nigeria.

The relationship between interest rates, credit access, and economic growth is of critical importance for Nigeria, especially given the country's ambitions for sustainable development (Odusami & Alimi, 2019). However, various uncertainties ranging from policy ambiguities to insecurity and other shocks can disrupt these relationships, affecting both the speed and effectiveness of interest rate pass-through, and consequently its impact on credit availability and inflation (Ogun, 2017). By employing the NUI as a measure of Nigeria-specific uncertainties, this study aims to provide a deeper understanding of how these uncertainties influence the interactions between interest rates, credit availability, inflation, and economic growth.

Furthermore, the transmission mechanism from interest rates to credit availability and inflation in Nigeria is complex, influenced by numerous macroeconomic factors and structural challenges (Akanbi & Du,

2019). Uncertainties, such as political instability and insecurity exacerbate these complexities, posing significant challenges for both policymakers and financial institutions (Udoma, 2018). Understanding how uncertainties, as captured by the NUI, moderate the relationships between interest rates, credit access and inflation is crucial for developing robust monetary policy frameworks and enhancing financial stability in Nigeria's uncertain economic environment.

The role of uncertainties in the interest rate pass-through process has garnered increasing attention, especially in the context of significant economic disruptions such as global financial crises, geopolitical tensions, and domestic policy uncertainties. These uncertainties manifest in various forms, including economic policy uncertainty, financial market volatility, and geopolitical risks (Jurado, Ludvigson, & Ng, 2015). For policymakers, financial institutions, and investors, understanding how these uncertainties interact with interest rate dynamics is essential for formulating effective monetary policies, managing risks, and navigating volatile markets.

This study specifically focuses on utilizing the Nigerian Economic Policy Uncertainty (NUI) as a comprehensive metric to quantify uncertainties. The NUI provides a unique perspective for assessing economic, political, and financial uncertainties specific to Nigeria (Baker, Bloom, & Davis, 2016). By leveraging this index, we aim to dissect the uncertainties and their impact on interest rate pass-through dynamics.

In this context, the research aims to contribute to the existing literature by offering empirical insights into the dynamics of interest rate pass-through, with a particular focus on the role of uncertainties. Through the extensive coverage and specificity of the Nigerian Economic Policy Uncertainty index, the study seeks to uncover the relationships between uncertainties and interest rate pass-through mechanisms, providing valuable implications for monetary policy, financial stability, and economic resilience in Nigeria.

II. Literature Review

In the evolving landscape of economic policymaking, the interplay between interest rate pass-through and uncertainties, whether global or domestic, represents a critical nexus that shapes macroeconomic trajectories. Central banks wield monetary policy as a potent tool, aiming to influence interest rates, credit conditions, and inflation. However, the efficacy of these transmission mechanisms can be significantly moderated by the prevailing level of uncertainties within the economy.

The interest rate pass-through process is central to understanding how monetary policy actions influence macroeconomic outcomes such as inflation and credit availability. The theory underpinning this mechanism is grounded in the monetary policy transmission framework, which posits that changes in central bank policy rates are transmitted through short-term interest rates, influencing long-term rates, credit conditions, and, ultimately, aggregate demand and inflation (Bernanke & Blinder, 1992). However, this transmission can be disrupted by uncertainties, which affect economic agents' expectations and decision-making processes.

Expectations Theory is crucial in explaining the pass-through of interest rates to inflation. According to this theory, long-term interest rates reflect market expectations of future short-term rates (Campbell & Shiller, 1991). In environments characterized by high uncertainty, these expectations can become distorted, leading to deviations between anticipated and actual interest rate movements. This distortion impacts inflation dynamics as firms and households adjust their consumption, investment, and pricing decisions in response to uncertain future interest rate paths.

The Risk Premium Hypothesis offers another perspective on the transmission of interest rates to inflation. It suggests that increased uncertainty leads to higher risk premiums demanded by investors, particularly on long-term bonds (Hamilton & Wu, 2012). As uncertainties rise, the yield spread between short-term and long-term interest rates may widen, reflecting heightened risk perceptions. This widening can influence inflation expectations, as higher risk premiums often signal uncertainty about future economic conditions, affecting the overall transmission of monetary policy.

Liquidity Preference Theory, originally posited by Keynes (1936), also provides insight into how uncertainties affect the interest rate pass-through mechanism. During periods of heightened uncertainty, economic agents may prefer holding liquid assets over long-term, less liquid investments. This shift in preference can reduce the demand for long-term bonds, driving up long-term interest rates, and impacting credit availability and inflation. The resulting changes in credit conditions and aggregate demand underscore the complexity of the transmission mechanism in uncertain economic environments.

Incorporating uncertainty into models of interest rate pass-through to credit and inflation is essential to capture the complexities of real-world economic dynamics. Uncertainty can stem from various sources, including economic policy, geopolitical tensions, insecurity and financial market volatility. The interaction between these uncertainties and the monetary policy transmission mechanism is critical for policymakers aiming to formulate effective responses and for economists seeking to accurately forecast inflation and credit dynamics in uncertain environments.

The empirical literature on Nigeria's monetary policy transmission highlights the centrality of credit channels in the interest rate pass-through process. Okaro (2011) emphasizes that bank lending is a primary conduit for monetary policy, where changes in interest rates influence borrowing costs, credit supply, and aggregate demand, thereby affecting inflation and economic growth. Mishkin (2012) similarly underscores the importance of the interest rate channel, particularly in economies where the banking sector plays a dominant role in financial intermediation.

Igweze, Adetoba, and Kumafan (2020) focus on the pass-through from the Monetary Policy Rate (MPR) to private sector credit, revealing significant linkages that underscore the importance of credit channels in Nigeria's monetary policy. Their findings align with earlier research by Kuttner & Mosser (2002), who also identified the interest rate channel as a pivotal mechanism in conventional macroeconomic models.

The role of uncertainty in moderating the effectiveness of monetary policy transmission has gained prominence in recent literature. Frank H. Knight's distinction between risk and uncertainty provides a foundational understanding of how ambiguous economic conditions can disrupt the pass-through mechanism. Uncertainty, defined as the inability to predict future economic policies or outcomes, complicates the transmission of interest rates to credit and inflation by altering the behavior of economic agents and their expectations about future economic conditions (Knight, 1964).

Recent studies have further explored these dynamics. Anderl & Caporale (2023) investigate the asymmetric effects of economic policy uncertainty and oil price uncertainty on inflation, finding that uncertainties significantly amplify the impact of monetary policy changes. Their findings suggest that greater transparency and communication from monetary authorities could mitigate the adverse effects of uncertainty on inflation expectations and, consequently, on the pass-through mechanism. Similarly, Haq et al. (2023) utilizes a multiscale TVP-VAR approach to examine the dynamic linkages between economic policy uncertainty, market volatility, and asset prices during the COVID-19 pandemic. Their analysis underscores the profound impact of uncertainty on monetary policy transmission, particularly in periods of heightened global uncertainty. In the Nigerian context, research by Adekunle et al. (2018) and Ezeaku et al. (2018) has highlighted the complex interplay between monetary policy variables and uncertainty. These studies employ advanced econometric techniques, such as Johansen co-integration, error correction models, and VAR frameworks, to examine the robustness of different transmission channels under varying levels of uncertainty.

The literature on interest rate pass-through in Nigeria reveals that the transmission mechanism is sensitive to both domestic and external uncertainties. As Nigeria continues to navigate an uncertain economic landscape, understanding the interplay of these transmission mechanisms is crucial for effective monetary policymaking. By focusing on the role of uncertainties, particularly those captured by the Nigerian Economic Policy Uncertainty (NUI) index, this study aims to provide new insights into the dynamics of interest rate pass-through to credit and inflation, offering valuable implications for both policy and practice.

III. Data And Methodology

Given the complexities inherent in studying interest rate pass-through, particularly as it relates to inflation with credit as a transmission channel and uncertainties as a controlling factor, a robust econometric framework is essential. The Structural Vector Autoregression (SVAR) model is well-suited for this purpose (Uhlig, 2005).

The SVAR[1] model facilitates the estimation of dynamic interactions between key economic variables[2], such as the policy rate (as captured by the Treasury Bill Rate, TBR), private sector credit (PSC), inflation (as measured by the Consumer Price Index, CPI), and economic uncertainties (as captured by the Nigerian Economic Policy Uncertainty Index, NUI). This model enables the identification of both contemporaneous and lagged effects, thereby providing a comprehensive view of the monetary policy transmission mechanism.

In this context, the SVAR model can be expanded to explicitly include credit availability and uncertainty as integral components. Private sector credit is modeled as a conduit through which interest rate changes influence inflation, while NUI is incorporated to control for the moderating effects of uncertainties on this relationship. By employing the SVAR framework, the study aims to assess the transmission from interest rates to inflation, mediated by credit availability, under the influence of economic uncertainties.

The analysis employs monthly time series data on key Nigerian economic indicators, including inflation rate, TBR, Private sector credit and NUI. The Structural shocks are identified using Cholesky decomposition, which preserves the economic causality inherent in the system. This allows for the isolation of specific shocks, providing clarity on their impact on the overall dynamics. The model was subjected to impulse-response analysis to trace the effects of shocks over time.

[1] See Herwartz and Plödt (2016); Kilian, (2009), Kilian & Murphy, (2012) for details

[2] Data is sourced from the Central Bank of Nigeria (CBN) statistical bulletin, covering the period from January 2009 to May 2024

Model**:**

The general form of Structural Vector Autoregressive model is given as:

$A_0 Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \cdot \quad \cdot \quad \cdot + A_p Y_{p-1} + \mu_t$ (1)

The SVAR Model without uncertainty is formulated as:

$$Y_t = \begin{pmatrix} TBR_t \\ PSC_t \\ CPI_t \end{pmatrix} \quad (2)$$

Equation (2) is the vector of endogenous variables at time t. $A_1, A_2, \ldots, A_p$ in equation (1) are matrices of coefficients for the lagged values of the endogenous variables while μ_t is a vector of structural shocks, assumed to be uncorrelated (orthogonal). A_0 is the contemporaneous impact matrix (also called the structural matrix) and is given as:

$$\begin{pmatrix} 1 & a_{12} & a_{13} \\ a_{12} & 1 & a_{23} \\ a_{31} & a_{32} & 1 \end{pmatrix} \begin{pmatrix} TBR_t \\ PSC_t \\ CPI_t \end{pmatrix} = \begin{pmatrix} 1 & b_{12} & b_{13} \\ b_{12} & 1 & b_{23} \\ b_{31} & b_{32} & 1 \end{pmatrix} \begin{pmatrix} TBR_{t-1} \\ PSC_{t-1} \\ CPI_{t-1} \end{pmatrix} + \begin{pmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \end{pmatrix} \quad (3)$$

From equation (3), a_{ij} are the contemporaneous effects of variable j on variable I; b_{ij} are the coefficients on the lagged variables while μ_{ij} are the structural shocks. To identify the structural shocks, we need to impose restrictions[3] on the A_0 matrix as follows:

$$\begin{pmatrix} 1 & 0 & 0 \\ a_{21} & 1 & 0 \\ a_{31} & a_{32} & 1 \end{pmatrix} \quad (4)$$

The SVAR model with uncertainty follows similar structure:

$$Y^*_t = \begin{pmatrix} TBR_t \\ NUI_t \\ PSC_t \\ CPI_t \end{pmatrix} \quad (5)$$

A_0^* is the contemporaneous impact matrix of the model with uncertainty as:

$$\begin{pmatrix} 1 & a^*_{12} & a^*_{13} & a^*_{14} \\ a^*_{21} & 1 & a^*_{23} & a^*_{24} \\ a^*_{31} & a_{32} & 1 & a^*_{34} \\ a^*_{41} & a^*_{42} & a^*_{43} & 1 \end{pmatrix} \begin{pmatrix} TBR_t \\ NUI_t \\ PSC_t \\ CPI_t \end{pmatrix} = \begin{pmatrix} 1 & b^*_{12} & b^*_{13} & b^*_{14} \\ b^*_{21} & 1 & b^*_{23} & b^*_{24} \\ b^*_{31} & b^*_{32} & 1 & b^*_{34} \\ b^*_{41} & b^*_{42} & b^*_{43} & 1 \end{pmatrix} \begin{pmatrix} TBR_{t-1} \\ NUI_{t-1} \\ PSC_{t-1} \\ CPI_{t-1} \end{pmatrix} + \begin{pmatrix} \mu^*_{1t} \\ \mu^*_{2t} \\ \mu^*_{3t} \\ \mu^*_{4t} \end{pmatrix} \quad (6)$$

Equation (5) is the vector of endogenous variables capturing uncertainty (NUI) at time t. From equation (6), a^*_{ij} are the contemporaneous effects of variable j on variable I; b^*_{ij} are the coefficients on the lagged variables while μ_{ij} are the structural shocks. The restrictions are imposed on the A_0^* matrix as follows:

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ a^*_{21} & 1 & 0 & 0 \\ a^*_{31} & a^*_{32} & 1 & 0 \\ a^*_{41} & a^*_{42} & a^*_{43} & 1 \end{pmatrix} \quad (7)$$

Once the structure of A_0 and the lag length[4] ρ are determined, the model can be estimated using maximum likelihood or Bayesian methods. Before proceeding with the estimation of a SVAR model, it is imperative to ensure that the time series data are stationary[5], as non-stationary data can lead to spurious results.

One of the foundational assumptions in SVAR modeling is that the structural shocks are orthogonal, meaning they are uncorrelated with each other. This orthogonality is essential for correctly identifying the structural parameters of the model. After estimating the SVAR, orthogonality tests will be conducted to verify this assumption. The Cholesky decomposition method will be employed to orthogonalize the shocks, ensuring that the structural innovations are independent, which is crucial for the accurate interpretation of the model's impulse response functions.

Impulse Response Functions (IRFs) form a central component of post-estimation analysis in SVAR modeling. IRFs trace the effects of a one-time shock to one of the variables on the current and future values of all the variables in the model. By analyzing the IRFs, researchers can gain insights into the dynamic interactions

[3] We employ Recursive Identification using Cholesky Decomposition which assumes a particular ordering of the variables (e.g., TBR → PSC → CPI), where TBR affects PSC and CPI contemporaneously, but not vice versa

[4] The lag length was determined using automatic VAR model in R, where the best lag is automatically determined.

[5] Stationarity implies that the statistical properties of the series, such as mean and variance, are constant over time. To test stationarity, the Augmented Dickey-Fuller (ADF) test was employed. These tests help determine whether the data series contain a unit root, indicating non-stationarity, or if they are trend-stationary, which is suitable for SVAR modeling.

among the variables and understand how shocks propagate through the system over time. This analysis is instrumental in uncovering the transmission mechanism of monetary policy, particularly the pass-through of interest rate changes to inflation and credit conditions in the presence of economic uncertainties (Lütkepohl, 2005).

IV. Results And Discussion Of Findings

The Augmented Dickey-Fuller (ADF) test results[6] indicate that the TBR and PSC are stationary at the second difference, while CPI is stationary at second difference when logged.

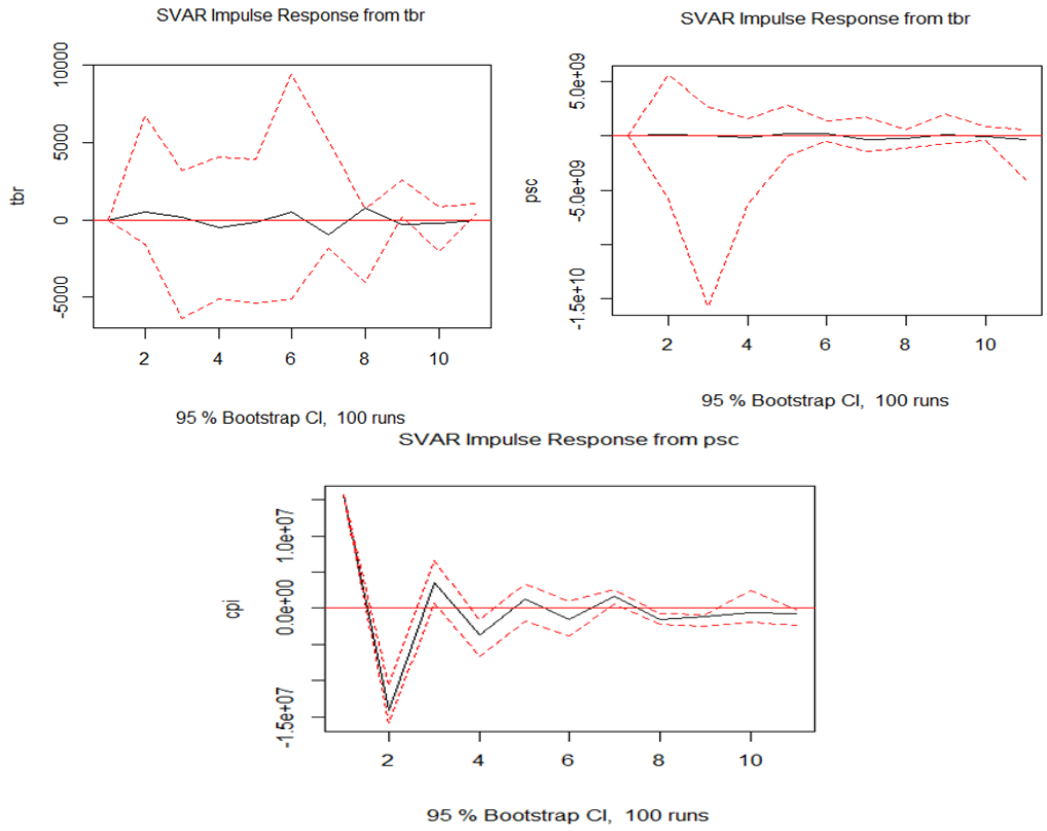
Interest Rate Passthrough to Inflation Without Uncertainty

The A matrix [7] in table 1 shows that the TBR is only influenced by its own shock, as indicated by the diagonal element (0.1), while the off-diagonal elements are zero, showing no contemporaneous effect from PSC or CPI. The PSC is influenced by its own shock and, to a small extent, by the TBR.

The diagonal element for PSC is 0.01531, indicating a weaker self-effect compared to TBR, and it is also contemporaneously affected by TBR (0.01531). The CPI shows a stronger negative contemporaneous relationship with both TBR and PSC (-0.29561) but has a minimal self-effect (1.232e-06). This suggests that CPI is more responsive to changes in TBR and PSC than to its own past values in the immediate period.

Impulse Response Function

Impulse response functions (IRF[8]s) indicates that a shock to TBR has a highly variable impact on PSC, with large positive and negative fluctuations. For instance, a shock leads to an initial significant negative impact, followed by very large positive values (e.g., 3.595334e+06) and subsequent oscillations.



[6] The tbr series becomes stationary after differencing it twice (d.2). The PSC shows a much stronger stationarity with a test statistic of -6.174936, significant even at the 1% level, also at the second difference (d.2). The CPI when logged and differenced twice, was also stationary as indicated by the test statistic of -5.72949, which is significant at any level.

[7] The A matrix represents the contemporaneous relationships between the variables in the SVAR model.

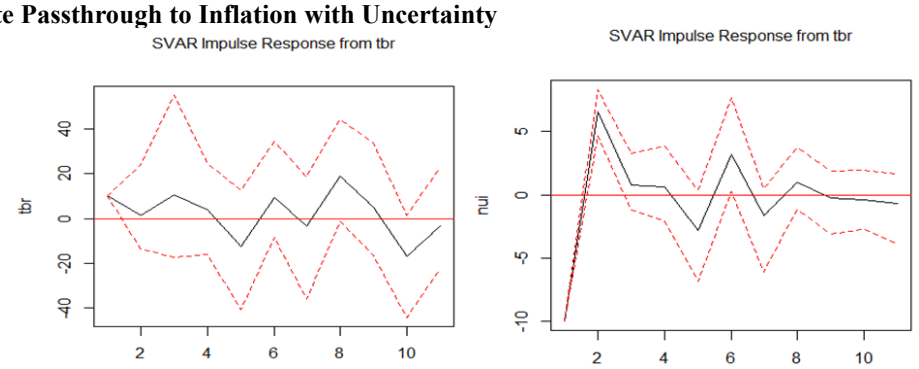
[8]The impulse response functions (IRFs) depict the reactions of each variable to shocks in another variable. The response of a variable to its own shock or to another variable's shock is essential in understanding the dynamic interactions within the system.

This erratic behavior indicates that PSC is highly sensitive to changes in TBR but not in a stable or predictable manner. The CPI's response to a PSC shock shows a strong and mostly positive response, with the impulse responses starting at a high level (15671136.4) and gradually decreasing over time. This pattern suggests that an increase in PSC initially leads to a significant increase in CPI, but the effect diminishes over time.

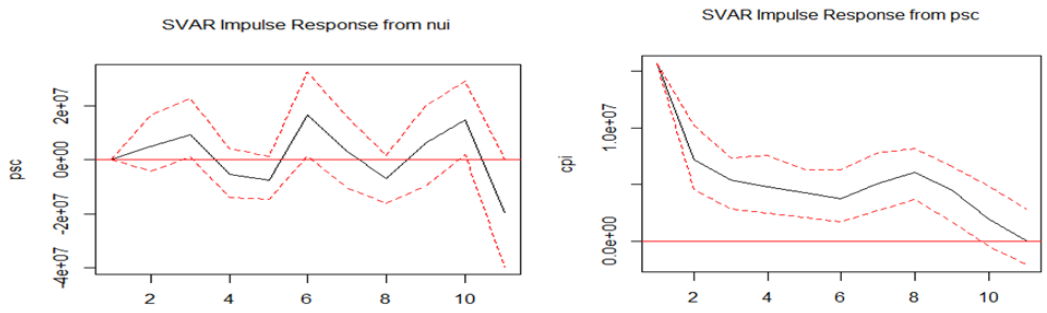
The Forecast Error Variance Decomposition (FEVD[9]) in table 2 shows that over time, PSC begins to contribute slightly to the variance, though CPI remains almost negligible. PSC's variance is primarily driven by its own shocks, with a minor but consistent contribution from CPI over time. TBR's contribution to PSC's variance is minimal. CPI's variance decomposition shows it is mostly driven by its own shocks, with a very small contribution from PSC and TBR over time.

The SVAR model reveals that TBR, PSC, and CPI exhibit different dynamics in response to shocks: TBR is largely self-driven with minimal influence from other variables, suggesting that monetary policy actions directly impacting TBR are relatively isolated in their immediate effects. PSC is more interconnected, responding to both its own shocks and those from TBR, indicating that credit conditions are sensitive to interest rate changes, although the response is complex and volatile. CPI is highly responsive to shocks from both TBR and PSC, underscoring the significant role of monetary and credit conditions in influencing inflation dynamics. Overall, the results of the model without uncertainties suggest that while TBR acts somewhat independently in the short run, PSC and CPI are more intertwined, with inflation showing a strong response to financial variables. This has implications for monetary policy, where actions on interest rates can have pronounced but unpredictable effects on credit conditions and inflation

Interest Rate Passthrough to Inflation with Uncertainty



The SVAR estimation results for the interest rate passthrough model with uncertainty indicates the relationships among the variables: Treasury Bill Rate (TBR), Economic Uncertainty Index[10] (NUI), Private Sector Credit (PSC), and Consumer Price Index (CPI). The result reveals significant relationships among the variables. The diagonal elements are close to 0.1, indicating that each variable has some degree of self-influence. For instance, TBR is 0.1, which suggests that its own lag has a strong influence on its current value. Other off-diagonal elements, like NUI, share the same coefficients, indicating that Nigerian uncertainty index have similar effects on other variables. The negative coefficients in the CPI row suggest that these variables might negatively influence consumer prices.



[9] The FEVD measures the volatility in each variable. It provides insight into the proportion of the forecast error variance of each variable that is attributed to shocks from other variables.

[10] Their EPU index developed by Tumala, et al (2023) is based on news articles published in five major newspapers in Nigeria, namely, Daily Trust, The Punch, Guardian, Business Day and Thisday. To construct their index, they first obtain raw monthly EPU article counts. Specifically, for each month and newspaper, they count articles that contain one or more terms in each of the following three categories: economy, policy & uncertainty.

The NUI response to a shock in the TBR shows a more controlled fluctuation, with values ranging from -10 to approximately 7,865. The lower and upper confidence intervals indicate that while the reactions can be severe, they are mostly bounded within a predictable range. The private sector credit response to treasury bill shocks is significant.

The results indicate that private sector credit in the Nigerian is highly sensitive to changes in TBR with possible extreme values as suggested by the wide range in confidence intervals. The consumer price response to Private sector credit shocks with initial high positive values, gradually decreasing. This suggests that inflation is heavily influenced by private sector credit changes, although the influence diminishes over time. The graph suggests that an increase in private sector credit (PSC) has an inflationary effect ion CPI, but this effect fades as the economy adjusts. The fluctuation at the mid-point could indicate delayed secondary effects or market corrections before the CPI stabilizes.

The forecast error variance of the private sector credit is mostly explained by Treasury Bill Rate shocks over time. The contribution of the other variables remains minimal, with TBR accounting for almost 99.71% of the variance. The variance in the private sector credit is almost entirely due to its own shocks initially, with increasing influence from global uncertainty index as time progresses. By the 10th period, NUI contributes nearly 99.71% to the variance in PSC. Similar to the NUI, the PSC variance is mainly driven by Nigerian uncertainty index's, with NUI shocks explaining 99.71% of the variance by the 10th period. CPI variance is also predominantly explained by itself and PSC, with CPI contributing almost all the variance over time. For CPI, the variance decomposition shows a similar pattern where the majority of the variance is explained by the shocks to private sector credit.

V. Conclusion

The analysis without uncertainties and the analysis incorporating uncertainties reveal different dynamics in the interactions among key economic variables, particularly the Treasury Bill Rate (TBR), Private Sector Credit (PSC), and the Consumer Price Index (CPI). The estimated A matrix from the Structural Vector Autoregression (SVAR) model without uncertainties shows the contemporaneous relationships between TBR, PSC, and CPI. Here, TBR is primarily influenced by its own shocks, with no immediate effect from PSC or CPI. PSC is weakly influenced by its own shocks and is also affected by TBR to the same extent. CPI displays a stronger negative contemporaneous relationship with both TBR and PSC, suggesting that CPI is more responsive to changes in these variables than to its own past values.

The impulse response analysis indicates that a shock to TBR causes a highly variable response in PSC, with large positive and negative fluctuations. This suggests that PSC is highly sensitive to changes in TBR, though the response is erratic. In contrast, a shock to PSC leads to a strong and mostly positive response in CPI, with the effect starting at a high level and gradually decreasing over time, implying that an increase in PSC initially leads to a significant rise in CPI, but this effect diminishes over time.

The forecast error variance decomposition (FEVD) shows that the variance of TBR is almost entirely explained by its own shocks initially, with PSC contributing slightly over time, while CPI has a negligible effect. PSC's variance is primarily driven by its own shocks, with a minor but consistent contribution from CPI, and minimal influence from TBR. CPI's variance decomposition indicates that it is mostly driven by its own shocks, with very little contribution from PSC and TBR over time.

Incorporating uncertainties into the SVAR model adds complexity to the interactions between TBR, NUI, PSC, and CPI. The estimated NUI, and PSC exhibit relatively similar coefficients, suggesting a degree of contemporaneous interdependence among these variables. The negative coefficients in the CPI row imply that increases in these variables lead to a reduction in CPI contemporaneously.

The impulse response functions (IRFs) highlight the volatility introduced by uncertainty. For instance, a shock to TBR results in significant fluctuations, with an initial negative response in NUI, followed by large positive and negative swings. This suggests that the impact of TBR on the economy is associated with uncertainty.

The FEVD analysis in the model with uncertainties further reveals that, in the short term, TBR's variance is almost entirely self-explained. However, as time progresses, PSC's influence on TBR's variance increases significantly, indicating that private sector credit becomes a more influential factor over time. CPI's minimal contribution to the variance of other variables suggests that its impact may be more autonomous or driven by factors outside the model's scope.

The SVAR model without uncertainties suggests that TBR operates somewhat independently in the short run, with PSC and CPI being more interconnected. Inflation, as measured by CPI, shows a strong response to changes in financial variables like TBR and PSC, highlighting the significant role of monetary and credit conditions in influencing inflation dynamics. On the other hand, the model with uncertainties introduces more volatility and interdependence, particularly through the impact of uncertainty (NUI) on the dynamics between the variables. The results emphasize the importance of considering uncertainty in understanding the broader economic landscape, as it can significantly alter the interactions between key economic indicators.

VI. Recommendations

We proffer recommendations based on the findings from both the SVAR model without uncertainties and the model incorporating uncertainties, several recommendations emerge for policymakers and researchers.

First, the analysis without uncertainties underscores the relatively autonomous behavior of the of monetary policy as captured by Treasury Bill Rate (TBR) in the short run, while highlighting the interconnectedness between Private Sector Credit (PSC) and the Consumer Price Index (CPI). Policymakers should be mindful of the strong influence that monetary and credit conditions have on inflation dynamics. Efforts to stabilize inflation should consider the direct and substantial impact of changes in PSC on CPI. This suggests that credit control measures could be an effective tool in managing inflation.

Second, incorporating uncertainties into the SVAR model reveals the heightened volatility and interdependence among the variables, particularly with the inclusion of the Nigerian Economic Policy Uncertainty Index (NUI). The significant influence of uncertainty on the interactions between TBR, PSC, and CPI indicates that policymakers need to account for economic uncertainties when designing monetary policies. Managing uncertainty, therefore, becomes crucial to mitigating its destabilizing effects on the economy. For researchers, this highlights the importance of including uncertainty indices in econometric models to capture a more accurate picture of economic dynamics, especially in volatile environments like Nigeria.

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Appendix

Table 1: Estimated A matrix:

	tbr	psc	cpi
tbr	1.00E-01	0.00E+00	0.00E+00
psc	1.53E-02	1.53E-02	0.00E+00
cpi	-2.96E-01	-2.96E-01	1.23E-06

Table 2 The Forecast Error Variance Decomposition (FEVD)

	tbr			psc		
	tbr	psc	cpi	tbr	psc	cpi
[1,]	1.00E+00	1.44E-30	0	1.28E-12	0.997326	0.002674
[2,]	6.06E-10	9.97E-01	0.002674	1.25E-12	0.997326	0.002674
[3,]	4.40E-12	9.97E-01	0.002674	1.24E-12	0.997326	0.002674
[4,]	3.58E-12	9.97E-01	0.002674	1.23E-12	0.997326	0.002674
[5,]	2.96E-12	9.97E-01	0.002674	1.21E-12	0.997326	0.002674
[6,]	2.74E-12	9.97E-01	0.002674	1.20E-12	0.997326	0.002674
[7,]	2.59E-12	9.97E-01	0.002674	1.19E-12	0.997326	0.002674
[8,]	2.51E-12	9.97E-01	0.002674	1.17E-12	0.997326	0.002674
[9,]	2.21E-12	9.97E-01	0.002674	1.16E-12	0.997326	0.002674
[10,]	2.25E-12	9.97E-01	0.002674	1.16E-12	0.997326	0.002674

FEVD for model without uncertainty

Table 3: SVAR A-MATRIX WITH UNCERTAINTY

	tbr	nui	psc	cpi
tbr	0.1	0	0	0.00E+00
nui	0.1	0.1	0	0.00E+00
psc	0.01531	0.01531	0.01531	0.00E+00
cpi	-0.29561	-0.29561	-0.29561	1.23E-06

Table 4: The Forecast Error Variance Decomposition (FEVD)-Model with uncertainty

tbr	tbr	nui	psc	cpi	**psc**	tbr	nui	psc	cpi
[1,]	1.00E+00	2.26E-32	9.84E-32	6.95E-65	[1,]	2.04E-12	2.29E-02	0.977106	7.05E-35
[2,]	8.26E-11	2.66E-12	9.97E-01	2.67E-03	[2,]	4.12E-12	2.32E-12	0.997326	2.67E-03
[3,]	4.07E-12	4.11E-12	9.97E-01	2.67E-03	[3,]	2.63E-12	6.42E-12	0.997326	2.67E-03
[4,]	3.70E-12	4.17E-12	9.97E-01	2.67E-03	[4,]	2.86E-12	7.75E-12	0.997326	2.67E-03
[5,]	4.51E-12	3.24E-12	9.97E-01	2.67E-03	[5,]	3.52E-12	1.04E-11	0.997326	2.67E-03
[6,]	5.31E-12	3.18E-12	9.97E-01	2.67E-03	[6,]	1.43E-12	9.94E-12	0.997326	2.67E-03
[7,]	4.61E-12	3.82E-12	9.97E-01	2.67E-03	[7,]	2.37E-12	7.87E-12	0.997326	2.67E-03
[8,]	7.46E-12	4.42E-12	9.97E-01	2.67E-03	[8,]	2.72E-12	8.57E-12	0.997326	2.67E-03
[9,]	5.48E-12	5.19E-12	9.97E-01	2.67E-03	[9,]	3.21E-12	9.22E-12	0.997326	2.67E-03
[10,]	7.19E-12	5.62E-12	9.97E-01	2.67E-03	[10,]	4.56E-12	1.22E-11	0.997326	2.67E-03
nui	tbr	nui	psc	cpi	**cpi**	tbr	nui	psc	cpi
[1,]	5.00E-01	5.00E-01	3.94E-31	1.54E-33	[1,]	2.83E-12	3.06E-12	0.997326	0.002674
[2,]	9.09E-09	9.56E-09	9.97E-01	2.67E-03	[2,]	2.96E-12	2.89E-12	0.997326	0.002674
[3,]	3.54E-09	3.71E-09	9.97E-01	2.67E-03	[3,]	3.57E-12	2.64E-12	0.997326	0.002674
[4,]	6.03E-10	6.34E-10	9.97E-01	2.67E-03	[4,]	3.46E-12	2.71E-12	0.997326	0.002674
[5,]	1.22E-10	1.22E-10	9.97E-01	2.67E-03	[5,]	3.60E-12	2.60E-12	0.997326	0.002674
[6,]	8.31E-11	7.80E-11	9.97E-01	2.67E-03	[6,]	3.49E-12	2.73E-12	0.997326	0.002674
[7,]	7.73E-11	7.14E-11	9.97E-01	2.67E-03	[7,]	3.39E-12	2.79E-12	0.997326	0.002674
[8,]	7.70E-11	7.08E-11	9.97E-01	2.67E-03	[8,]	3.15E-12	3.11E-12	0.997326	0.002674
[9,]	7.69E-11	7.07E-11	9.97E-01	2.67E-03	[9,]	3.04E-12	3.21E-12	0.997326	0.002674
[10,]	7.67E-11	7.07E-11	9.97E-01	2.67E-03	[10,]	3.04E-12	3.35E-12	0.997326	0.002674