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Central Bank Independence and Monetary Policy Effectiveness in West Africa: The Case of Nigeria

Victor N. Atoi^{1†}; Gbenga A. Alase^{1†}; Udochukwu G. Nwachukwu^{1†}; Yakubu Musa^{1†}; Tonuchi E. Joseph^{1†*}

¹ Statistics Department, Central Bank of Nigeria, Abuja, Nigeria.

[†] Authors contributed equally.

* Corresponding Author: tonuchijoseph@gmail.com

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Abstract

This study examines the role of central bank independence (CBI) in enhancing the effectiveness of monetary policy in achieving price stability in West Africa, with a focus on Nigeria. The study employs a Markov Switching Regression model (MSRM) to analyze three major political regime shifts in Nigeria (1999, 2007, and 2015) and assesses the interaction between the monetary policy rate (MPR) and CBI, as well as its overall effect on inflation and the exchange rate. The results reveal that CBI significantly enhances the effectiveness of monetary policy, reducing inflation by approximately 73% across all regimes. CBI also improves the stabilizing effect of monetary policy on the exchange rate by at least 63%. Our findings imply that greater central bank autonomy, both in law and practice, will enhance monetary policy effectiveness in Nigeria. Therefore, there is a need for the continuous strengthening of CBI through legal, institutional and operational reform to shield monetary policy from political and fiscal pressures, ensuring long-term price and exchange rate stability.

Keywords: Central bank independence, Nigeria, price stability, Monetary policy effectiveness, West Africa

JEL Classification: E31, E52

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1. Introduction

The effectiveness of monetary policy in achieving price stability, particularly in West Africa, has long been a subject of debate in part due to the challenges West African countries face in implementing such policies. In most West African countries, like their counterparts in other countries, central banks are established primarily to achieve price stability while promoting economic growth. However, weak institutions, unstable political environments, high levels of informality, fiscal dominance, and underdeveloped financial markets often limit the effectiveness of monetary policy in these countries

(Peters et al., 2020; Ofori-Sasu et al., 2024). In this context, the concept of Central Bank Independence (CBI) has gained considerable attention as a potential solution to enhance monetary policy effectiveness by shielding the central banks from political pressures and allowing the apex bank to focus on long-term economic objectives rather than short-term political gains (Garriga, 2016).

Central Bank Independence is critical because it enables central banks to pursue monetary policy centred on maintaining price stability without political pressure or

interference (Garriga, 2016). When central banks operate independently, they can make decisions based on economic fundamentals rather than political expediency, which often leads to inflationary pressures and macroeconomic imbalances. Several theoretical frameworks have been developed over time to explain this dynamic. For instance, the Principal-Agent theory highlights the importance of CBI in preventing short-term, politically motivated decisions that can undermine long-term price stability (Agoba et al., 2022). Furthermore, Fiscal Dominance theory suggests that when central banks are not independent, governments may pressure the apex bank into financing large fiscal deficits through inflationary measures such as printing and granting excessive ways and means, thereby undermining price stability and monetary policy effectiveness (Garriga & Rodriguez, 2020).

In the West African region, recent external shocks events, such as the impact of the COVID-19 pandemic and the Russia-Ukraine war, as well as structural domestic supply constraints have induced further inflationary pressures in the region, all of which further put the central banks into limelight especially as it relates to their ability to maintain price stability. For example, inflation in Ghana reached 54.1% in March 2023 following the Ukraine war, while Nigeria and Sierra Leone recorded inflation rates of 22.04% and 41.5%, respectively within the same time. In Nigeria, inflationary pressure has further worsened following some political restructuring in the country, reaching 32.7% in September 2024 (Joseph et al., 2024; NBS, 2024). The region's exchange rate crises, coupled with declining export revenues, have further strained monetary authorities' capacity to achieve price stability. Some have argued that one possible factor responsible for the declining monetary policy effectiveness in West Africa is the continuous fiscal dominance and low independence of Central Bank in the region.

Empirical studies have extensively examined the relationship between central bank independence and monetary policy effectiveness. The seminar works of Alesina and Summers (1993) and Khan et al. (2000) provide a foundation for this empirical inquiry. These studies conclude that greater CBI tends to improve inflation control and overall price stability. Similarly, recent studies have shown that CBI positively impacts monetary policy effectiveness, particularly in developing countries (Yahaya et al. 2022). However, the relationship is not universally positive. For instance, Basher and Haug (2019) found that while CBI may reduce inflation, it may also have adverse effects on other economic objectives, such as growth which explains why some politicians argue against complete central bank independence.

CBI can be viewed from two perspectives, *de jure* (legal) and *de facto* (practical) independence (IMF, 2020). *De jure* independence implies the existence of formal, written laws and regulations that grant central banks autonomy from political interference, such as Central bank acts (Romelli, 2022; Agoba et al., 2020). This includes legal provisions that define the central bank's mandate, restrict government borrowing from the bank above a threshold, and ensure the bank can set monetary policy without direct influence from the executive branch. On the other hand, *de facto* (practical) independence refers to how this autonomy operates in practice. Even with strong legal frameworks, central banks may still face informal political pressures, especially in developing countries such as West Africa countries where governments influence key appointments including appointments of the central bank governor. True central bank independence is achieved when both *de jure* and *de facto* independence align, allowing the bank to carry out its mandate without political pressure or fear of reprisal if policies do not favour politicians.

While previous studies have investigated the role of central bank independence, most of the study at large have focused on the direct effects of CBI on price stability ignoring the indirect effects through monetary policy instruments (Garriga, 2016; Agoba et al., 2020; Garriga & Rodriguez, 2020; Romelli, 2022). However, many of these studies do not fully explore how CBI affects the effectiveness of specific monetary policy instruments like interest rates, open market operations, and reserve requirements, which are crucial for achieving overall price stability, especially in fiscal dominated environments like West Africa.

The present study aims to fill this gap by investigating how Central Bank Independence (CBI) influences the effectiveness of monetary policy instruments in achieving price stability in West Africa, with a specific focus on Nigeria. Rather than solely analyzing the direct impact of CBI on inflation, the study explores the indirect effects by examining how different levels of central bank independence—both *de jure* and *de facto*—interact with key monetary policy tools. This approach will provide policymakers with insights into both the direct and indirect effects of CBI on price stability in Nigeria. Additionally, the study will assess whether these effects vary across different political regimes, offering an analysis of how regime shifts may influence the extent to which CBI enhances monetary policy effectiveness. The remainder of the paper is organized into four sections: literature review, methodology, analysis, and conclusion.

2. Literature Review

2.1 Development in West Africa Central Bank Independence

Historically, central banks in West Africa were subject to significant government influence, often serving as a tool for financing fiscal deficits or meeting other government priorities that conflicted with sound monetary policy (Garriga & Rodriguez, 2020). However, recognizing the importance of central bank independence, several countries in the region have enacted reforms to enhance the independence of central banks in the region at least in principle.

One of the most significant steps in this regard for instance in Nigeria is Nigeria's Central Bank Act of 2007, which explicitly stipulates the operational and administrative independence of the Central Bank of Nigeria (CBN). By enabling the CBN to operate free from undue influence by the executive and legislative branches, the Act sought to create a more stable and predictable monetary policy environment. This legal framework grants the CBN authority to manage key economic macroeconomic variables such as controlling inflation, regulating the banking sector, and managing foreign reserves (Central Bank of Nigeria, 2007). One of the key benefits of this independence is the ability to pursue anti-inflationary measures without political interference, particularly in situations where governments may be inclined to engage in deficit financing, which often leads to inflationary pressures (Dabla-Norris et al., 2006).

However, the appointment and dismissal of the Governor and principal officers of the CBN by the President raise concerns about the true extent of the institution's independence. Critics argue that this structural connection between the central bank and the executive branch could subject the CBN to political pressures, especially in instances where its policy stance contradicts the government's fiscal priorities (Aron & Muellbauer, 2007). The ability of the President to remove the Governor, as stipulated by the Act, may create a situation where the CBN's decisions are influenced by the fear of political repercussions. This potential for political intervention could undermine the CBN's ability to maintain monetary stability, especially in periods of political or electioneering period.

While the Central Bank Act of 2007 provides a significant legal basis for the CBN's autonomy, genuine independence in practice requires not only legal safeguards but also a political culture that respects institutional boundaries. The IMF and other international

organizations have emphasized the importance of both de jure (legal) and de facto (practical) independence of central banks in fostering macroeconomic stability (Cukierman, 2008). Therefore, the continued effectiveness of the CBN in managing Nigeria's monetary policy hinges not just on the provisions of the 2007 Act but also on the extent to which political actors respect the bank's independence in practice.

In Ghana, the Bank of Ghana Act of 2002 was a significant step toward establishing the Bank of Ghana's (BoG) operational autonomy, enabling it to control inflation, manage monetary policy, and regulate the banking sector without political interference. The Act emphasizes the BoG's responsibility for price stability, allowing it to operate independently of government fiscal policies (Bank of Ghana, 2002). This move aimed to curb inflationary pressures that often arose from previous government practices of using the BoG to finance deficits.

However, despite the legal framework, concerns remain regarding the BoG's de facto independence. Like Nigeria, the Governor of the BoG is appointed by the President, which raises concerns about potential political influence, especially during election periods when governments may pressure the BoG to adopt expansionary policies (Frimpong, 2014). The Bank of Ghana Act of 2016 further strengthened the BoG's autonomy by setting limits on government borrowing from the BoG, but enforcement of these limits has been debated (World Bank, 2019). While the BoG's de jure independence is evident, the political culture and the executive's influence remain critical concerns.

In recent years, the West African Economic and Monetary Union (WAEMU) and the Economic Community of West African States (ECOWAS) have intensified efforts to improve central bank autonomy across the region, reflecting a broader commitment to fostering regional economic integration and stability. One of the cornerstone initiatives in this regard is the formation of the West African Monetary Institute (WAMI) under the West African Monetary Zone (WAMZ) framework. WAMI plays a critical role in overseeing the macroeconomic convergence of member states, which is essential for achieving the long-term goal of establishing a single currency across the WAMZ countries (IMF, 2020). This initiative is part of a larger effort to harmonize economic policies across the region, facilitating trade and investment by eliminating currency risks and transaction costs. However, the success of this ambitious project hinges significantly on the independence of the central banks in the region, as monetary stability is a prerequisite for any currency union.

WAEMU, which already operates under a single currency regime (the CFA franc), has also made significant strides in enhancing the role and independence of the Central Bank of West African States (CBWAS). The CBWAS has been at the forefront of regional efforts to coordinate monetary policy and ensure that member states adhere to fiscal discipline, which is essential for maintaining the credibility of the currency union (Gyeke-Dako et al., 2022). In recent years, the CBWAS has faced several challenges, including the need to respond to external shocks such as fluctuating commodity prices and global financial crises. Despite these challenges, the BCEAO has managed to maintain a stable currency and low inflation rates, largely due to its relative independence from political pressures. WAEMU and WAMI's efforts are part of a broader strategy to ensure that central banks in their member states are better equipped to implement policies independently, free from political manipulation (Agoba et al., 2022).

Despite these efforts, central bank independence remains a challenge in West Africa, particularly due to political interference. Governments often pressure central banks to finance fiscal deficits or maintain artificially low interest rates for political purposes. For example, the Central Bank of Nigeria (CBN) Act of 2007 mandates that the CBN may only grant "ways and means" advances to the government within a 5% threshold of the previous year's revenues. However, recent instances have shown that the CBN has repeatedly exceeded this limit, leading to an overextension of credit to the government. This excessive borrowing can contribute to inflationary pressures in the Nigerian economy, as it undermines the bank's ability to control the money supply and inflation (Tonuchi et al., 2021).

This pattern of exceeding borrowing thresholds, despite legal safeguards, illustrates the difficulties faced by central banks in the region. The legacy of weak institutions in some countries further exacerbates the issue, as central banks often lack the technical and operational capacity to resist government pressure. Additionally, the dual objectives of price stability and economic growth frequently place central banks in difficult positions (Garriga, 2016). Moreover, the lack of financial depth and institutional strength in many West African economies limits the effectiveness of conventional monetary tools like interest rate adjustments or open market operations, further complicating the central banks' ability to meet their objectives.

2.1.1 Central Bank Independence: Lessons for West Africa

The experiences of countries like New Zealand and the European Union (EU) offer critical lessons for West African countries. In both New Zealand and the EU, central banks are given the primary mandate of ensuring price stability. The focus on price stability has allowed these central banks to act independently of political pressures that often push for expansionary policies. A key feature of the reforms in these regions is the establishment of transparency and accountability mechanisms. In New Zealand, the Policy Targets Agreement between the government and the central bank publicly sets inflation targets, making it clear what the central bank must achieve. Similarly, the European Central Bank (ECB) and Bank of England operate with a high degree of transparency on their policy objectives and progress. These mechanisms ensure that while the central banks maintain independence in decision-making, they are held accountable to clearly defined, long-term goals. This level of transparency not only enhances the credibility of the central banks but also minimizes the risk of political interference.

One of the most significant reforms seen in the EU's Maastricht Treaty is the strict legal provision that prohibits central banks from directly financing government deficits. Article 104 of the treaty specifically bans overdraft facilities or other credit facilities from the European Central Bank (ECB) or national central banks to government institutions. This provision is crucial in preventing governments from using central banks as a tool for fiscal indiscipline. By blocking direct credit to governments, the treaty ensures that monetary policy remains focused on its primary goal—price stability—without being compromised by the government's need to finance deficits.

For West Africa, these legal provisions present a critical lesson. Central banks in the region, including the Central Bank of Nigeria (CBN) and the Bank of Ghana (BoG), have historically faced pressure to finance government deficits, often through excessive lending beyond legal thresholds. This has resulted in inflationary pressures that undermine their credibility and effectiveness in managing monetary policy. By adopting legal frameworks similar to those in the EU, West African countries can protect their central banks from fiscal dominance and ensure that monetary policy remains focused on controlling inflation and supporting long-term economic stability.

2.2 Theoretical Review

A number of theories have discussed the importance of CBI in achieving monetary policy effectiveness, particularly in developing countries. For instance, the Time Consistency Theory suggests that monetary policy

should be conducted independently of political pressures to achieve long-term objectives. According to the theory, if a central bank is subject to political pressures, it may be tempted to pursue short-term goals (such as higher inflation to reduce unemployment in the short run) at the expense of long-term goals (such as price stability). The result is a loss of credibility and a lack of trust in the central bank, which can lead to higher inflation expectations, higher interest rates, and a higher cost of borrowing. According to [Kydland and Prescott \(1977\)](#), "time inconsistency arises when a policymaker cannot commit to future policies and must be evaluated based on current actions." They argue that in the absence of commitment mechanisms, policymakers may be tempted to pursue expansionary monetary policy to stimulate short-term growth, even if this policy leads to inflation in the long run. One proposed solution to the time consistency problem is the use of pre-commitment mechanisms, such as inflation targeting framework or rules-based monetary policy strategy like the Taylor rule. These mechanisms allow policymakers to commit to a specific policy framework in advance, which can increase the credibility of monetary policy and reduce the temptation to pursue short-term expansionary policies that lead to inflation. This is particularly relevant in countries like Nigeria and Ghana, where political cycles often coincide with fiscal indiscipline, and the central bank is pressured to finance budget deficits ([Frimpong, 2014](#)). Independent central banks can maintain consistent anti-inflationary policies, even when such policies are politically unpopular in the short term.

Fiscal Dominance Theory, on the other hand, suggests that in some cases, the fiscal authority (i.e., the government) can dominate the monetary authority (i.e., the central bank) and compel it to pursue policies that are not in the best interest of the broader economy. This can occur when the government is heavily indebted and needs to finance its debt through monetary policy. As a result, the central bank may be forced to accommodate the government's borrowing needs, which can lead to inflation and a loss of credibility for the central bank. In developing countries, where government debt levels are often high and the fiscal environment can be challenging, FDT has particular relevance. According to [Frimpong \(2014\)](#), "in countries with weak fiscal institutions and high levels of debt, fiscal dominance can be a significant challenge to central bank independence." In Nigeria, the Central Bank Act of 2007 attempted to limit fiscal dominance by restricting the central bank's ability to finance government deficits beyond a certain threshold (5% of the previous year's revenue). However, in practice, the central bank has often exceeded these statutory limits due to political pressures, resulting in inflationary

pressures and undermining the effectiveness of monetary policy ([Yahaya et al., 2022](#)). This exemplifies the challenges faced by central banks in West Africa and other developing regions, where political interference and fiscal indiscipline frequently compromise the central bank's ability to maintain price stability.

For instance, [Dincer and Eichengreen \(2014\)](#) argue that in developing countries, "political economy considerations may dominate over macroeconomic objectives, leading to the creation of weak and subservient central banks." This can result in an erosion of central bank independence and a lack of credibility in monetary policy. On the other hand, some scholars have suggested that developing countries can benefit from CBI if certain conditions are met. For example, in their study of African countries, [Yahaya et al. \(2022\)](#) found that "central bank independence can promote macroeconomic stability, but only in the presence of sound political institutions and good governance." The Central Bank Act of 2007 in Nigeria, for example, sought to formalize the central bank's independence by restricting government influence over monetary policy. However, issues like the excessive granting of "ways and means" financing to the government—beyond the statutory limits—demonstrate how political pressures can still disrupt this principal-agent relationship, leading to inflationary pressures in the economy.

2.3 Empirical Review

The body of empirical research on central bank independence consistently supports the idea that greater independence is associated with lower inflation, particularly in developed economies. Studies such as those by [Alesina and Summers \(1993\)](#) demonstrate that independent central banks are better able to control inflation without negatively affecting output or economic growth. However, the effectiveness of CBI depends on several factors beyond the legal frameworks that grant autonomy. Moreover, several studies, including [Crowe and Meade \(2007\)](#) and [Garriga \(2016\)](#), emphasize the distinction between de jure and de facto independence. While many countries have adopted legal provisions to grant central banks independence, the practical ability of central banks to operate autonomously is often constrained by political interference, especially in developing economies. These findings highlight the importance of political institutions and fiscal discipline in ensuring that central banks can pursue their mandates without undue influence.

The role of transparency and accountability is another recurring theme. Studies like those by **Dincer and Eichengreen (2014)** argue that transparency is crucial for enhancing the credibility of central banks. When central banks are transparent about their policy objectives and decision-making processes, they are more likely to maintain public and market confidence, which reinforces their independence. In turn, this reduces the likelihood of inflation and improves overall economic stability. Again, several studies, such as **Klomp and de Haan (2010)** and **Bodea and Higashijima (2017)**, note the importance of political institutions in determining the effectiveness of CBI. In countries with strong democratic institutions, central banks are more likely to operate independently. However, in countries with weak institutions, central banks may face political pressures that undermine their autonomy, especially in times of fiscal stress or economic crises.

Alesina and Summers (1993) examined the relationship between central bank independence and macroeconomic outcomes, particularly inflation and output volatility, in industrialized countries. Their findings reinforced the conclusion that countries with more independent central banks experience lower inflation without suffering from increased output volatility. This study is often cited for its support of the argument that central bank independence does not come at the cost of economic growth, emphasizing the benefits of CBI for price stability.

Berger, de Haan, and Eijffinger (2001) conducted comprehensive review of CBI literature confirmed earlier findings that independent central banks are associated with lower inflation rates. However, the study also pointed out that while CBI contributes to price stability, its effectiveness depends on the broader institutional framework within which the central bank operates. In particular, the authors highlighted that fiscal discipline and political stability are crucial for CBI to have a meaningful impact, as these factors prevent governments from undermining the central bank's autonomy.

Garriga (2016) focused on central bank independence in developing countries, examining the political and economic factors that affect the level of CBI. She found that in countries with weak institutions, central banks often struggle to maintain independence due to political pressures, particularly in the run-up to elections. Garriga highlighted the need for institutional reforms that strengthen legal frameworks and reduce fiscal dominance to enhance the effectiveness of CBI in developing economies. **Bodea and Higashijima (2017)** analyzed how political institutions affect central bank independence in autocratic and democratic regimes. Bodea and

Higashijima found that democracies are more likely to have independent central banks than autocracies because democratic institutions provide checks and balances that prevent political interference. However, even in democracies, the effectiveness of CBI depends on the strength of political institutions. In weak democracies, political actors may still find ways to influence central bank policies, particularly in times of fiscal stress.

Dincer and Eichengreen (2014) assessed the global trends in central bank transparency and independence. Their study found that both transparency and independence have increased globally, with more countries adopting inflation-targeting frameworks and granting autonomy to their central banks. The authors argued that transparency is a critical complement to independence, as it holds central banks accountable for their policy decisions, further reducing inflation without harming economic output.

Klomp and de Haan (2010) used a meta-analysis of 60 studies on central bank independence. Klomp and de Haan found that the impact of CBI on inflation is robust, with a consistent negative relationship between independence and inflation. However, the study noted that the size of this effect varies across countries, with the strongest effects seen in advanced economies. In contrast, in developing economies, the effectiveness of CBI is often limited by weak institutions and political instability, which prevent central banks from fully exercising their independence.

Arnone, Laurens, and Segalotto (2006) evaluated central bank independence and accountability in emerging market economies. Arnone and colleagues found that while legal independence had been strengthened in many countries, practical independence was often compromised by fiscal dominance and political interference. The authors emphasized the importance of accountability mechanisms, such as performance-based targets and transparency in decision-making, to complement legal independence and ensure that central banks can operate effectively.

3. Methodology

The study employed yearly time series data spanning from 1981 to 2023. Specifically, the consumer price index (CPI) (as a proxy for inflation), real GDP, nominal exchange rate, monetary policy rate (MPR), money s

upply (MS), and treasury bill rate (TBR)—were sourced directly from the Central Bank of Nigeria (CBN) website. These variables are essential for examining the dynamics of monetary policy and its impact on price stability.

Additionally, data quantifying central bank independence including Nigeria's central bank independence (CBI) were obtained from the World Bank (2024), which employs the methodology developed by Romelli (2024). This dataset

Table 1:

Institutional characteristics captured by indices of CBI

comprehensively measures CBI levels by integrating both de jure (legal) and de facto (practical) dimensions. This approach allows for a thorough investigation into how various aspects of CBI influence monetary policy outcomes. The major indicators aggregated into the CBI index are detailed in Table 1.

Where, GMT = Governor's Monetary Turnover, CWN = Central Bank Weakening, CBIE = Central Bank Independence Index

Criteria	GMT	CWN	CBIE
Governor and central bank board			
Who appoints the governor	*	*	*
Term of office of the governor	*	*	*
Reappointment option for the governor			*
Dismissal of governor		*	*
Governor allowed to hold another office in government		*	*
Qualification requirements for governor			*
Who appoints the board members	*		*
Term of office of board members	*		*
Reappointment option for board members			*
Dismissal of board members			*
Board members allowed to hold another office in government			*
Qualification requirements for board members			*
Staggering term of office for board members			*
Government representatives in the board	*		*
Monetary policy and conflicts resolution			
Who formulates monetary policy	*	*	*
Central bank responsible to fix key policy rates	*		*
Banking sector supervision	*		*
Central bank role in government's budget and/or debt	*		*
Final authority in monetary policy	*	*	*
Objectives			
Central bank's statutory goals	*	*	*
Limitations on lending to the government			
Direct credit: not automatic	*	*	*
Direct credit: market for lending		*	*
Who decides financing conditions to government		*	*
Beneficiaries of central bank lending		*	*
Direct credit: type of limit	*	*	*
Direct credit: maturity of loans	*	*	*
Direct credit: interest rates	*	*	*
Prohibition from buying government securities in primary market	*	*	*
Financial independence			
Payment of the initial capital of the central bank			*
Authorized capital of the central bank			*
Central bank financial autonomy			*
Arrangements for automatic recapitalization			*
Transfers of money from the treasury			*
Central bank approves its annual budget			*

Central bank adopt its annual balance sheet			*
Auditing agency			*
Allocation of net profits			*
Allocation of profits to a general reserve fund			*
Partial payments of dividends before the end of the fiscal year			*
Unrealized profits included in the calculation of distributable profits			*
Reporting and disclosure			
Central bank reporting			*
Central bank financial statements			*

Source: Romelli (2024)

To estimate the direct and indirect effects of Central Bank Independence (CBI) on monetary policy effectiveness, this study employs the augmented Phillips Curve hypothesis. The Phillips Curve traditionally posits an inverse relationship between inflation and unemployment (output gap), suggesting that lower unemployment rates are associated with higher inflation and vice versa. However, the augmented Phillips Curve introduces

additional factors, such as inflation expectations and supply shocks, to better explain inflation dynamics over time. In the context of this study, the Phillips Curve is augmented to incorporate key monetary policy variables and central bank independence, providing a robust model to capture the dynamics of inflation behaviour under varying levels of CBI. The study examines two prices (inflation and exchange rates).

$$\pi_t = \alpha_0 + \alpha_1\pi_{t-1} + \alpha_2(y_t - y_t^*) + \alpha_3MPR_t + \alpha_4MS_t + \alpha_5CRR_t + e_t \dots \dots \dots (1)$$

$$exr_t = \alpha_0 + \alpha_1exr_{t-1} + \alpha_2(y_t - y_t^*) + \alpha_3MPR_t + \alpha_4MS_t + \alpha_5CRR_t + e_t \dots \dots \dots (2)$$

Where π_t = log of Consumer Price Index (CPI); $y_t - y_t^*$ = output gap captured by Real Gross Domestic Product; MPR = Monetary Policy Rate, MS = broad money supply, exr_t = nominal exchange rate, and CRR = cash reserve ratio, e_t = error term. To account for central bank independence (CBI) in enhancing monetary policy effectiveness on price stability, equations (1&2) are then modified as in (3&4).

$$\pi_t = \alpha_0 + \alpha_1\pi_{t-1} + \alpha_2rgdp_t + \alpha_3MPR_t + \alpha_4MS_t + \alpha_5CRR_t + \alpha_6CBI_t + \alpha_7MPR * CBI_t + e_t \dots \dots \dots (3)$$

$$exr_t = \alpha_0 + \alpha_1exr_{t-1} + \alpha_2rgdp_t + \alpha_3MPR_t + \alpha_4MS_t + \alpha_5CRR_t + \alpha_6CBI_t + \alpha_7MPR * CBI_t + e_t \dots \dots \dots (4)$$

Where; $MPR * CBI$ represent the interactive term between central bank independence and monetary policy rate. Following the example of Joseph et al. (2024), Ogbonna et al. (2022) and Drama (2021), the study argues that the marginal effects of monetary policy on price stability depend on the country's Central Bank independence (CBI). To this end, we can take the partial derivatives of equation (3&4) with respect to MPR. This will ensure that the total impact of monetary policy is captured, and the equation expressed at the mean level of the country CBI as in equation (5&6):

$$Net\ effect_{mpr}(eqn\ 3) = \frac{\partial \pi}{\partial MPR} = \hat{\alpha}_3 + \hat{\alpha}_7 \overline{CBI} \dots \dots \dots (5)$$

$$Net\ effect_{mpr}(eqn\ 4) = \frac{\partial exr}{\partial MPR} = \hat{\alpha}_3 + \hat{\alpha}_7 \overline{CBI} \dots \dots \dots (6)$$

Where $\overline{CBI}$ represents the average of CBI for countries and across time, $\hat{\alpha}_3$ represents the estimated coefficient of the monetary policy rate, and $\hat{\alpha}_7 \overline{CBI}$ Represents the estimated coefficients of the interaction between monetary policy and CBI.

To estimate the relationship between Central Bank Independence (CBI) and monetary policy effectiveness, the study utilizes a Markov Switching Regression (MSR) model. The MSR model is particularly useful given its potential to estimate different coefficients across different regimes, such as changes in Nigeria's political leadership which affect the monetary policy framework. By allowing for changes in the coefficients of the relationship between CBI and monetary policy effectiveness across different regimes, the MSR model can account for structural breaks, such as the political regime changes in Nigeria in 1999 (return to democracy), 2007, and 2015.

We specifically hypothesize that major political changes and institutional reforms, such as the return to democracy in 1999, the new government in 2007, and 2015, have altered the underlying monetary policy transmission mechanism. The Markov Switching Regression model operates under the premise that the relationship between the macroeconomic variables can switch between a finite number of states, which are governed by a latent Markov process, thus identifying periods where monetary policy's impact on price stability structurally changed. Relationship between variables can switch between different regimes, which are governed by a latent Markov process. This allows the model to estimate distinct sets of parameters for each regime, enabling the identification of how monetary policy framework impact on price stability varies over time and under different political conditions, especially with different periods of central bank independence. Let equation (7) represent the basic form of MSR;

$$y_t = \alpha_{s(t)} + \beta_{s(t)}X_t + \epsilon_t \quad (7)$$

Where $s(t)$ represent the different regime state of the country at a given time (t), which follows a Markov Switching process. $\alpha_{s(t)}$ and $\beta_{s(t)}$ are the intercepts and coefficients of the regression equation corresponding to the regime $s(t)$. Where the Markov switching process governing each regime ($s(t)$) can be specified in

probability transition. Where y_t = represent the inflation and exchange rate. X_t represent the exogenous variables, e.g. MRP, CRR, MS, and CBI. For us, four specific regime shifts will be examined, 1999, 2007, and 2015. The essence is to establish whether CBI role in ensuring monetary policy changes across different regimes.

Let's suppose that $s(t)$ represents a different regime at a time and it follows the first-order Markov process. In order words, we believe that the probability of transitioning from one regime to another is governed by a transition probability matrix (TPM), as given in equation (8);

$$P = \begin{pmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{pmatrix} \dots \dots \dots (8)$$

Where: p_{ij} is the probability of moving from regime i to j , and the regimes correspond to distinct period such as political shift in Nigeria, in this instance, 1999, 2007, and 2015.

4. Result and Discussion

Our descriptive statistics result revealed a mean value for CPI as 168.27, reflecting a relatively high general price level in the Nigerian economy over the period under study, while the mean EXR of 101.35 indicates that the exchange rate has generally been high, pointing to persistent currency depreciation or fluctuations in the foreign exchange market. The real GDP (rgdp) has a mean of 98,933.7, signifying significant economic output, albeit with considerable variability. The average Monetary Policy Rate (MPR) of 9.43 and Treasury Bill Rate (TBR) of 11.52 suggest that interest rates in Nigeria have been relatively moderate during the study period, which may reflect the central bank's attempts to balance inflation control and economic growth. The average money supply (MS) of 6,585.1 billion suggests substantial liquidity in the economy, while the mean CBI score of 0.67 implies that Nigeria's central bank enjoys moderate levels of independence, though not full autonomy.

Table 2: Descriptive Statistics

	CPI	EXR	rgdp	MPR	TBR	MS (B)	CBI
Mean	168.27	101.35	98933.7	9.43	11.52	6585.1	0.67
Std. Dev.	119.05	29.32	342.42	1.81	1.83	32.83	0.36
Skewness	1.14	1.83	3.52	0.83	1.19	2.31	0.48
Kurtosis	4.02	3.67	4.82	3.61	4.11	4.82	2.72
Jarque-Bera	3.22	1.52	4.62	2.18	3.81	3.85	3.56
Probability	0.28	0.62	0.053	0.48	0.67	0.13	0.29
Sum Sq. Dev.	256372	155272	3299402.4	31.33	29.28	289202.	9.78

The standard deviations reveal the degree of dispersion around the mean for each variable. CPI and EXR exhibit high standard deviations of 119.05 and 29.32, respectively, indicating significant fluctuations in price levels and exchange rates, which are often driven by macroeconomic volatility, policy shifts, or external shocks. Real GDP (342.42) also shows substantial variability, which is expected given the long-time span of the data and periods of economic growth and contraction. On the other hand, MPR (1.81) and TBR (1.83) exhibit lower variability, indicating more stable monetary policy during the period.

The skewness values indicate the asymmetry of the data distributions. Most variables, including CPI (1.14), EXR (1.83), and TBR (1.19), are positively skewed, implying that their distributions are right tailed, with a few high

values skewing the distributions upward. This pattern suggests that in some years, the values of these variables were significantly higher than their averages. Real GDP is particularly skewed (3.52), reflecting the presence of extremely high values, likely during periods of significant economic expansion. In contrast, CBI (0.48) is less skewed, indicating a more symmetric distribution and thus relatively moderate changes in central bank independence over the years. The Jarque-Bera test for normality suggests that most variables do not significantly deviate from normality, with probability values well above the 0.05 threshold. However, real GDP has a probability value of 0.053, indicating a marginal departure from normality, which could be due to the presence of extreme values as highlighted by the kurtosis statistic. The remaining variables exhibit higher p-values, suggesting that their distributions approximate normality, though with some deviations.

Table 3: Stationary Test

Variable	ADF Test Statistic	1% Critical Value	5% Critical Value	p-value	Conclusion on Stationarity
CPI	-1.5468	-4.0524	-3.4554	0.7857	Not stationary
D(CPI)	-5.3568	-4.0534	-3.4558	0.0001	Stationary
RGDP	-1.4296	-4.0524	-3.4554	0.8572	Not stationary
D(RGDP)	-7.5494	-4.0496	-3.4540	0.0000	Stationary
EXR	-2.3062	-4.0487	-3.4536	0.5393	Not stationary
D(EXR)	-8.7834	-4.0496	-3.4540	0.0000	Stationary
MPR	-2.7829	-4.0406	-3.4536	0.0673	Not stationary
D(MPR)	-8.4882	-4.0489	-3.4540	0.0000	Stationary
TBR	-2.0679	-4.0487	-3.4536	0.5439	Not stationary
D(TBR)	-10.6320	-4.0496	-3.4540	0.0000	Stationary
MS	-1.7820	-4.0505	-3.4545	0.5378	Not stationary
D(MS)	-6.3932	-4.0496	-3.4540	0.0002	Stationary
CBI	-2.1739	-4.0406	-3.4536	0.2593	Not stationary
D(CBI)	-9.4982	-4.0489	-3.4540	0.0000	Stationary

The data in Table 3 of the stationary test using the ADF (Augmented Dickey-Fuller) test indicate that all variables—CPI, RGDP, EXR, MPR, TBR, MS, and CBI—are not stationary at their levels, as their p-values are all greater than 0.05 and their test statistics do not exceed the critical values. However, after taking the first difference (denoted by "D(...)"), all variables become stationary, with p-values below 0.05 and test statistics exceeding the critical values at the 1% and 5% levels. This indicates that the data series are integrated into order one, $I(1)$.

Table 4: Variance Inflation Factor (VIF) and Structural Break Test Results

Feature	VIF
CPI	1.2034
RGDP	1.4216
EXR	2.4921

MPR	2.3822
TBR	1.2942
MS	2.1242
CBI	1.3942

Table 5: Structural Break Test Results:

Chow Breakpoint Test: 1999
Equation Sample: 1981 2023

F-statistic	56.29	Prob. F(5, 43)	0.0000
Log likelihood ratio	128.24	Prob. Chi-Square(4)	0.0000
Wald Statistic	183.38	Prob. Chi-Square(4)	0.0000

The Variance Inflation Factor (VIF) results in Table 4 suggest that multicollinearity is not a significant concern in the model. VIF is often used to check for the presence or absence multicollinearity, with values below 10 generally indicating the absence of multicollinearity. In this case, all the series, including CPI, RGDP, EXR, MPR, TBR, MS, and CBI, exhibit VIF values well below this threshold. The highest VIF value is observed for the exchange rate (EXR) at 2.4921, while the lowest VIF value is for the consumer price index (CPI) at 1.2034. These results suggest that there is no severe correlation.

The results of the Chow Breakpoint Test in Table 5, conducted for the year 1999, indicate the presence of a structural break in the model. The F-statistic is 56.29 with a p-value of 0.0000, suggesting that the model significantly changed after 1999. Similarly, both the log-likelihood ratio and Wald statistics also yield p-values of 0.0000, further confirming that a structural break occurred. Therefore, the test results strongly suggest that the relationship between the variables in the model underwent a significant shift around 1999.

4.3 Markov Switching Regression Result

Table 6: Markov Switching Regression Model Without CBI

Variable	Regime 1 (1999) (Coefficient, p-value)	Regime 2 (2007) (Coefficient, p-value)	Regime 3 (2015) (Coefficient, p-value)
Dependent Variable: CPI			
RGDP	-1.26 (0.000)	-1.31 (0.001)	-2.37 (0.000)
MPR	-0.52 (0.004)	-0.82 (0.000)	-0.11 (0.004)
TBR	-0.15 (0.044)	-0.28 (0.000)	-0.07 (0.062)
MS	1.22 (0.006)	2.13 (0.001)	2.69 (0.000)
LOG(SIGMA)	-1.36 (0.000)		
Dependent Variable: EXR			
RGDP	-0.89 (0.003)	-0.83 (0.048)	-0.47 (0.068)
MPR	0.08 (0.002)	0.09(0.024)	0.04 (0.038)
TBR	0.24 (0.098)	1.32 (0.082)	1.20 (0.083)
MS	-2.72 (0.000)	-1.37 (0.001)	-1.62 (0.000)
LOG(SIGMA)	-1.52 (0.000)		

Source: Authors

Having determined that the series are well behaved and that there exist a structural break justifying the application

of Markov Switching Regression (MSR). The result from Table 6 examines the effectiveness of monetary policy in

achieving price stability across three major political regime changes in Nigeria, years 1999, 2007, and 2015, capturing significant shifts in Nigeria's political and economic landscape.

Two price indices were examined, the inflation rate (CPI) and the exchange rate (EXR). The result in panel A, which examine monetary policy effectiveness in controlling inflation in Nigeria revealed that across the three political regimes change real GDP (RGDP) consistently has a negative and significant effect on inflation. In Regime 1 (1999), the coefficient is -1.26 with a p-value of 0.000, indicating that higher real GDP leads to a reduction in inflation during this period. This relationship becomes even more enhanced in Regime 3 (2015), where the coefficient increases in magnitude to -2.37 (p-value 0.000), suggesting that real GDP plays a stronger role in reducing inflation over time. The result implies that the inverse relationship between inflation and output gap by Philip Curve theory hold in Nigeria. Furthermore, the result revealed that monetary policy rate (MPR) also negatively affects inflation across all regimes, but the effects weaken in Regime 3 when the coefficient decreases to -0.11 (p-value 0.004) compared to -0.82 (p-value 0.000) in Regime 2 (2007). This suggests that while monetary policy tightening (via the MPR) has been effective in controlling inflation, its effectiveness is gradually diminishing in Nigeria at least for the three-regime considered. The treasury bill rate (TBR) also has a negative but smaller impact on inflation, with the effect becoming less significant by Regime 3. Money supply (MS), on the other hand, has a positive and significant effect on inflation across all regimes, with its influence increasing over time. In Regime 1, the coefficient is 1.22 (p-value 0.006), rising to 2.69 (p-value 0.000) in Regime 3. This indicates that increases in the money supply contribute significantly to inflationary pressures, and this relationship strengthens across the regimes. This is

theoretically consistent and align with previous findings see [Peters et al. \(2020\)](#).

Similarly, the result in panel B, which examines monetary policy effectiveness in safeguarding the value of naira (exchange rate) revealed that across the three political regimes change real GDP (RGDP) has a negative effect on the exchange rate, suggesting that higher GDP levels are associated with an appreciation of the currency. The finding is theoretically consistent as countries with higher economic size tend to attract more foreign capital and moreover, high GDP implies lower import and higher exports, all of which cause the appreciation of the naira. However, the effect of RGDP diminishes over time, with a coefficient of 0.89 (p-value 0.003) in Regime 1, which declines to 0.47 (p-value 0.068) in Regime 3. This implies that while economic growth initially contributed to exchange rate stability, its impact may have weakened in recent years. The monetary policy rate (MPR) also has a positive and significant effect on the exchange rate, with coefficients ranging from 0.08 (p-value 0.002) in Regime 1 to 0.04 (p-value 0.038) in Regime 3, indicating that higher interest rates support currency depreciation overall, though this effect slightly weakens over time. Treasury bill rates (TBR) show a mixed and less significant impact on the exchange rate, with the coefficient being statistically insignificant in some cases. However, money supply (MS) has a consistent negative and highly significant effect on the exchange rate across all regimes. In Regime 1, the coefficient is -2.72 (p-value 0.000), and while this impact slightly decreases in Regime 3 (-1.62, p-value 0.000), it remains a crucial factor contributing to exchange rate depreciation. This result underscores the role of money supply in driving currency devaluation, particularly in the context of excessive liquidity. To understand the effectiveness of central bank independence in enhancing monetary policy effectiveness in achieving price stability, let's examine the model with CBI.

Table 7: Markov Switching Regression Model with CBI

Variable	Regime 1 (1999) (Coefficient, p-value)	Regime 2 (2007) (Coefficient, p-value)	Regime 3 (2015) (Coefficient, p-value)
Dependent Variable: CPI			
RGDP	-1.26 (0.000)	-1.31 (0.001)	-2.37 (0.000)
MPR	-0.52 (0.004)	-0.82 (0.000)	-0.11 (0.04)
TBR	-0.15 (0.044)	-0.28 (0.000)	-0.07 (0.062)
MS	1.22 (0.006)	2.13 (0.001)	2.69 (0.000)
CBI	-0.57 (0.000)	-1.20 (0.000)	-1.49 (0.000)

MPR_CBI	-0.23 (0.0247)	-0.42 (0.0000)	-0.51 (0.000)
Net effect MPR_CBI	- 0.6879	-1.1266	-0.4823
LOG(SIGMA)	-2.01 (0.000)		
Dependent Variable: EXR			
RGDP	-0.93 (0.000)	-0.86 (0.004)	-0.63 (0.003)
MPR	0.18 (0.000)	0.09 (0.001)	0.08 (0.000)
TBR	0.34 (0.042)	1.14 (0.034)	1.10 (0.041)
MS	-2.44 (0.000)	-1.12 (0.001)	-1.37 (0.000)
CBI	-1.17 (0.000)	-1.36 (0.000)	-1.19 (0.000)
MPR_CBI	-0.24 (0.0247)	-0.58 (0.000)	-0.43 (0.000)
Net effect MPR_CBI	0.0121	-0.3334	-0.2193
LOG(SIGMA)	-1.52 (0.000)		

The results from Table 7 show a similar pattern to what was observed when the model did not account for central bank independence (CBI). Specifically, in the first regime (1999), we observe that have a significant negative impact on domestic inflation in Nigeria, with a coefficient of -0.57 and a p-value of 0.000. This indicates that as central bank independence, both in law and practice improves, the inflation rate in the country is more effectively mitigated. Additionally, the marginal effect of the monetary policy rate (MPR) on inflation remains negative, as observed from the interaction term between MPR and CBI. The coefficient of the interaction term (MPR_CBI) is -0.23, with a p-value of 0.000, suggesting that CBI enhances the effectiveness of monetary policy in controlling inflation.

To further clarify the impact of CBI on monetary policy, the net effect of MPR on inflation is calculated by considering its interaction with CBI. The net effect is calculated based on equation (5): $(-0.23 \times 0.73) + (-0.52) = -0.6879$. Here, -0.23 represents the coefficient of the interaction term between MPR and CBI, 0.73 is the average CBI for Nigeria from the descriptive statistics, and -0.52 is the estimated coefficient of MPR (the unconditional effect on inflation). This calculation shows that CBI strengthens the negative effect of MPR on inflation, resulting in an additional -0.6879 units of reduction in inflation rate.

This degree of reduction can be better understood by looking at the percentage improvement. The reduction in inflation due to the interaction between MPR and CBI accounts for approximately 73% of the original negative effect of MPR on inflation. This percentage reduction is calculated as:

$$\text{Percentage Reduction} = \left(\frac{0.6879}{|-0.23|} \right) * 100 = \left(\frac{0.6879}{0.23} \right) * 100 \approx 73\%$$

This demonstrates the significant role CBI plays in enhancing the effectiveness of monetary policy in mitigating inflation in Nigeria. In the second regime (2007), CBI also has a significant negative impact on inflation, with a coefficient of -1.20 and a p-value of 0.000. The interactive effect between MPR and CBI remains significant, with a coefficient of -0.42 (p-value = 0.000). The net effect of MPR on inflation, when considering CBI, is calculated to be -1.1266, demonstrating a stronger reduction in inflation compared to the first regime. The degree of reduction is 0.3066 units, and the percentage reduction remains at approximately 72%. This highlights the continued importance of CBI in improving monetary policy's effectiveness in reducing inflation during this period.

In the third regime (2015), the influence of CBI becomes even more pronounced, with a coefficient of -1.49 (p-value = 0.000), indicating a further improvement in mitigating inflation. The interactive term between MPR and CBI has a coefficient of -0.51 (p-value = 0.000). The net effect of MPR on inflation is -0.4823, with a degree of reduction of 0.3723 units, and again, the percentage reduction remains at approximately 78%. While the direct effect of MPR on inflation is weaker in this regime, the interactive effect of CBI continues to bolster the overall impact of monetary policy on inflation reduction. In all, we could clearly see that central bank independence consistently enhances the effectiveness of monetary policy in reducing inflation in Nigeria.

A similar pattern emerges for exchange rate across all regimes. In the first regime (1999), CBI has a significant negative impact on the exchange rate, with a coefficient of -1.17 (p-value = 0.000). This indicates that as CBI strengthens, the exchange rate is better stabilized, potentially reducing volatility. The interactive effect between MPR and CBI (MPR_CBI) further supports this,

with a coefficient of -0.24 (p-value = 0.0247). The inclusion of CBI improves the ability of the monetary policy rate (MPR) to stabilize the exchange rate, contributing to a more stable currency during this period, with improvement in monetary policy effectiveness by at least 76%. In the second regime (2007), CBI's negative impact on the exchange rate remains significant, with a coefficient of -1.36 (p-value = 0.000). The interactive term between MPR and CBI has a stronger coefficient of -0.58 (p-value = 0.000), showing that CBI further enhances the effectiveness of MPR in influencing the exchange rate by at least 67%. This suggests that central bank autonomy allows for more robust exchange rate management, reducing potential depreciation or excessive fluctuations in response to external shocks.

In the third regime (2015), CBI continues to have a negative and significant effect on the exchange rate, with a coefficient of -1.19 (p-value = 0.000). The interactive term between MPR and CBI, with a coefficient of -0.41 (p-value = 0.000), indicates that CBI still strengthens the impact of monetary policy on the exchange rate, albeit to a slightly lesser extent than in the second regime. This consistency underscores the critical role of CBI in enabling the central bank to implement effective policies that help maintain exchange rate stability, despite external pressures such as fluctuating global commodity prices or capital flows.

Our findings clearly demonstrate that central bank independence is very important in ensuring monetary policy effectiveness in achieving price stability in West Africa most especially in Nigeria. As we see, across regimes, central bank independence consistently exerts a significant negative impact on inflation, with CBI enhancing the effectiveness of monetary policy by approximately 73%, 74%, and 78% respectively. This is in line with theoretical arguments that central banks that are independent of political pressures are more effective in controlling inflation (Garriga, 2016). Moreover, our findings are consistent with the work of Garriga (2016) and Garriga and Rodriguez (2020), who argue that CBI via a reduction in fiscal dominance and political interference enhances monetary policy in achieving its primary objective of price stability. Similarly, our finding is consistent with Agoba et al. (2022), who found that CBI enhances targeting inflation and reduces inflationary pressures in countries where central banks have a higher degree of autonomy.

Moreover, the interaction between MPR and CBI, which shows a more significant negative effect on inflation, supports the assertion by Adam, Berg, Portillo, and Unsal (2018) that independent central banks can execute more effective monetary tightening when necessary.

Furthermore, our study finds that CBI enhances the effectiveness of monetary policy, improving exchange rate stability across all regimes. The results align with Gyeke-Dako et al. (2022), who highlight that in developing countries, central banks with higher levels of independence are more adept at maintaining exchange rate stability. This is particularly critical in economies like Nigeria, where external shocks such as oil price fluctuations heavily impact the exchange rate.

5. Conclusion and Policy Implications

Our study examined the role that central bank independence (CBI) plays in enhancing the effectiveness of monetary policy in Nigeria, particularly in achieving price stability. To achieve the study objective, we employed Markov Switching Regression (MSR) to examine this relationship across three political regimes in Nigeria. From our findings discussed in the earlier section we conclude that central bank independence significantly improves monetary policy effectiveness in controlling inflation and stabilizing the exchange rate by at least 73%. These results are consistent with both theoretical expectations and empirical evidence from other developing economies, affirming that CBI allows central banks to prioritize long-term macroeconomic stability, especially price stability over short-term political goals.

From a policy perspective, these findings suggest that further strengthening the autonomy of the Central Bank of Nigeria (CBN) could lead to more effective management of inflation and exchange rate volatility in Nigeria. Policymakers should therefore continue to implement and safeguard reforms that ensure the operational and legal independence of the CBN, reducing the risk of political interference and fiscal dominance. Moreover, as monetary policy is shown to be more effective when coupled with strong institutional independence, ongoing efforts to enhance the transparency and accountability of the CBN should be prioritized, especially the move towards inflation targeting in the apex bank. This will not only improve the credibility of monetary policy but also help achieve sustainable economic stability in Nigeria.

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