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ASYMMETRIC MONETARY POLICY RATE TRANSMISSION TO DEPOSIT AND LENDING RATE IN NIGERIA

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Abstract

This study focuses on the interest rate transmission from the monetary policy rate to interest rates in Nigeria, recognising the presence of asymmetries within the framework of a nonlinear autoregressive distributed lag (NARDL) model. The findings indicate a long-run asymmetry, as the lending rate shows less responsiveness to a negative fluctuation in the monetary policy rate (MPR) than a positive one. This asymmetry, known as downward rigidity or positive asymmetry, could be attributed to the inflexibility of prices in downward movements. The study underscores the significance of considering the type of credit analysed and the direction of the monetary policy adjustment in understanding interest rate pass-through. Policymakers should consider these asymmetries when designing interventions, especially when implementing monetary tightening measures to manage inflation.

Keywords: Monetary policy, Interest rate transmission, Nonlinear autoregressive distributed lag (NARDL), Nigeria
JEL: E43, E52, E58

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1. Introduction

The Central Bank of Nigeria (CBN) has been responsible for maintaining the purchasing power of the Nigerian currency, the naira. Over the years, Nigeria has experimented with different monetary regimes. The primary tool used for monetary policy has been the interest rate. The interbank interest rate, influenced by the CBN's rates on loans and deposits, serves as the initial connection for transmitting the central bank's policy interest rate to other interest rates. Changes in the monetary policy rate are expected to impact retail rates within the financial sector ultimately and subsequently influence overall aggregate demand.

Understanding the functioning of monetary policy channels is crucial for central bankers to adjust their policy decisions and reaction functions effectively. It is ideal for the transmission of interest rate changes to be quick, symmetrical, and complete. However, this may not always be the case in practice due to various market frictions that can lead to slow and incomplete adjustments.

Furthermore, traditional monetary policy models often assume that changes in policy rates have a uniform and linear impact on retail rates, regardless of whether they are positive or negative. However, this assumption may not hold in reality, andmonetary policy transmission can be asymmetrical. The adjustment speed and magnitude of retail rates may differ depending on whether the policy impulse is positive or negative. Therefore, using a linear specification may not be appropriate, and policymakers may need to adopt a nonlinear asymmetric approach when designing monetary policies.Considering these factors requires formulating, implementing, and communicating monetary policies to ensure their effectiveness and avoid unintended consequences.

From an empirical perspective, there are multiple approaches to understanding how the pass-through mechanism operates. In this study, we utilise nonlinear autoregressive distributed lag (NARDL) models, which enable us to capture the asymmetric effects of retail rate responses to changes in the monetary policy rate. These models allow us to examine the speed and completeness of adjustments more thoroughly. An econometric advantage of NARDL models is their ability to simultaneously capture both the long- and short-term dynamics of the relevant variables within a cointegration framework without making restrictive assumptions about the order of integration. Additionally, this methodology provides consistent estimates of the long-run model and valid test statistics, even when faced with potential endogeneity issues from the regressors commonly encountered in this type of analysis.

Despite the significance of studying the likely asymmetries in the monetary policy transmission process in an economy, only a few studies investigate this issue in Nigeria. Using interest rate data for the Nigerian financial sector available between 2002 and 2022, this paper examines the transmission of monetary policy rate changes to deposit and lending retail rates.

The rest of the paper is organised as follows: Section 2 discusses the theoretical underpinnings of the paper, Section 3 describes thedata used in the study, and Section 4 describes the methodology. Section 5 reports findings, and Section 6 explores robustness byincluding additional regressors to address remaining concerns related to endogeneity. Section 7 concludes.

2. Theoretical underpinnings and literature review

Credit markets heavily influence the transmission of monetary policy. The credit channel's effectiveness relies on the impact of monetary policy on liquidity availability, the cost of funds, and the cost of credit. It also depends on how changes in monetary policy influence credit demand. Scholars pointed out that by adjusting money market interest rates and influencing inflation expectations, monetary policy rates can affect interest rates at the economy-wide level, thereby influencing aggregate demand. However, the extent and effectiveness of this mechanism mainly hinge on interest rate pass-through, which refers to how much of a change in the policy rate is transmitted to retail rates. Research has shown that various factors, including competition within the financial sector, macroeconomic conditions, and the characteristics of credit products, influence pass-through. In this paper, we explore possible time variation in the pass-through that arises from asymmetries in response to positive or negative movements in the central bank policy rate. Following Greenwood-Nimmo et al. (2013), the study hypothesises that financial sector interest rates are defined by a simple mark-up over the cost of funds:

$$\boldsymbol{r_t = \gamma + \beta\mu_t + e_t} \quad (1)$$

where $\boldsymbol{r_t}$ is the relevant lending interest rate, μt is the marginal cost of funds approximated by the central bank policy rate, γ measures the markup over the cost of funds, β is the pass-through coefficient of the cost of funds to the interest rate, and $\boldsymbol{e_t}$ is a disturbance term. In the absence of frictions, there should be a full (or complete) and rapid pass-through of monetary policy rate changes to retail rates (β=1). In practice, however, interest rates can be rigid due to the prevalence of implicit contracting in long-term credit relationships, transaction and menu costs specific to some financial products, and the strategic behaviour of financial intermediaries to preserve market share in contestable markets. In such cases, the pass-through could be lower than one (or incomplete) and sluggish.

Several studies have found that the differences in the pass-through and the speed of adjustment of retail rates to changes in monetary policy rates are conditional on the direction in which policy rates are adjusted. In Equation (1), there could be two pass-through coefficients (β+ and β−), one for a positive change and one for a negative change in μ. Empirical evidence supports such a hypothesis. Analysing data for Malaysia and Singapore, Scholnick (1996) found that deposit rates in Malaysia and Singapore are more rigid when they are below their equilibrium level than when they are above it. This suggests that banks in the two countries to alter their deposit rates down rapidly rather than upward. The argument is that this happens because, during recessions, the interest elasticity of credit demand falls, and borrowers become more attached to their traditional lenders. In that context, reducing the policy rate leads to a slight equilibrium adjustment of the interest rate in the credit market.

Conversely, the pass-through asymmetry can have a different effect due to issues related to adverse selection and asymmetric information in credit markets. When faced with such challenges, lenders may be cautious about entirely passing on an increase in the policy interest rate to their clients. This cautious approach aims to mitigate the potential increase in credit risk, which arises when the average default risk of clients rises alongside interest rate increments (as demonstrated in Stiglitz and Weiss, 1981).

It's important to note that this problem occurs when interest rates rise rather than fall. Furthermore, as De Bondt (2005) highlighted, raising retail rates could lead to losing clients to rival banks in intense market competition. This, in turn, might result in an upward rigidity in interest rates.

In practice, both asymmetries may be present, and one may dominate the other in the short or long run. The empirical literature exploring these asymmetries took a decisive turn after the methodological development of Shin, Yu, and Greenwood-Nimmo (2014), who proposed a method to estimate short- and long-run asymmetries within a single empirical cointegration

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framework: the nonlinear autoregressive distributed lag model (NARDL). Greenwood-Nimmo et al. (2013) used this methodology to estimate the passthrough of interest rates in the US and found evidence of asymmetries. Their findings suggest an incomplete passthrough, a long-run negative asymmetry (a more robust response to rate cuts than to rate increases) and a short-run positive asymmetry (a more robust response to hikes than to cuts).

Several studies used ARDL (autoregressive distributed lag) models to estimate the pass-through of monetary policy rates in advanced and emerging market economies. ARDL has been an attractive model for this purpose as it allows the estimation of long-run relationships between variables of unknown integration order, has a straightforward and intuitive error correction interpretation, makes it possible to handle serial correlation, and provides consistent estimates of the long-run parameters under the presence of weak endogeneity of the regressors. A few studies examined the nature of nonlinearities, especially in emerging market economies. In Nigeria, despite the significance of investigating the likely asymmetries in the transmission process of monetary policy in an economy, there are only a few studies investigating this in Nigeria. The few studies include Ogundipe and Alege (2013), Mordi et al., (2019) and Jibrilla & Balami (2022).

Jibrilla & Balami (2022) used asymmetric cointegration and error-correction modelling approaches to examine the pass-through of the Central Bank of Nigeria policy rate to commercial banks' retail rates in Nigeria. Their results indicate that the pass-through is incomplete during the periods examined.

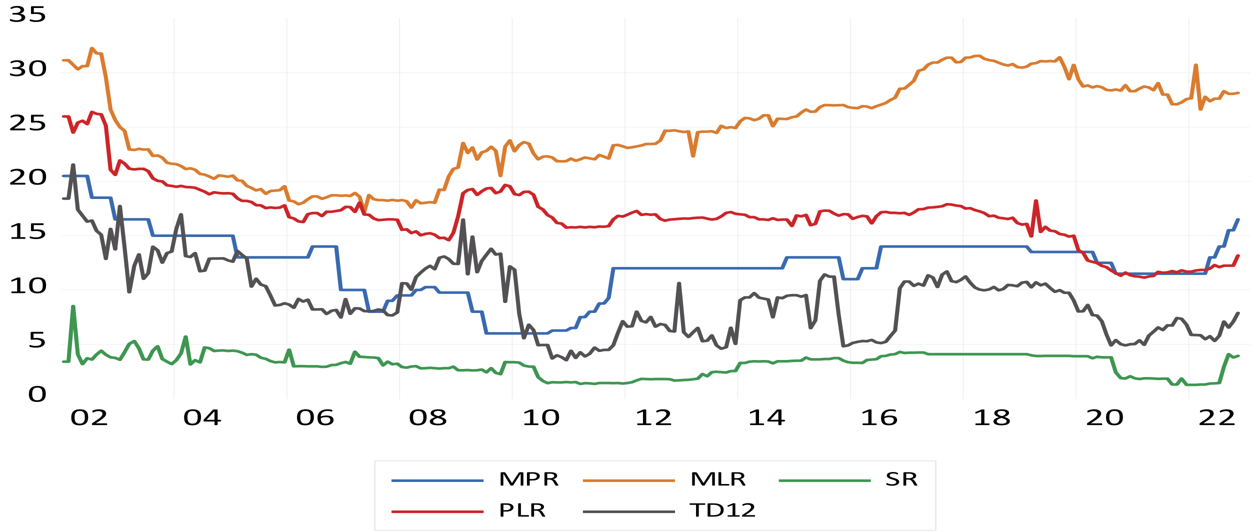
This paper contributes to the literature that explores asymmetries in the pass-through of monetary policy rate changes to deposit andlending interest rates by estimating NARDL pass-through models for different types of deposit and lending interest rates in Nigeria.

The choice of methodology for analysis is novel to explore this key element of the transmission of monetary policy in Nigeria and emerging markets in general. The paper provides evidence of possible disparity in the speed of adjustment using dynamic simulations of our estimated models. It provides estimates of asymmetric pass-throughs for the lending and deposit rate.

3. Data

This study uses the monetary policy and financial sector interest rates reported by the Central Bank ofNigeria. The sample is restricted by data availability. The five interest rates considered for the study are the monetary policy rate (MPR), Savings rate (SR), 12-month Time deposit rate (TD12),Prime lending rate (PLR) and Maximum lending rate (MLR).The data used covers 2002M01 to 2022M11.

Figure *1*: Monetary policy rate and interest rate.



Source: Central Bank of Nigeria

Table 1: Descriptive Statistics

	Observations	**Mean**	**Std. Dev.**	**Minimum**	**Maximum**
MPR	251	12.31	3.00	6.00	20.50
Deposit rates					
SR	251	3.14	1.06	1.25	8.51
TD12	251	9.16	3.37	3.53	21.54
Lending rate					
PLR	251	16.87	2.91	11.13	26.38
MLR	251	24.82	4.27	17.17	32.27

4. Empirical Methods

This paper employs the NARDL model that Shin et al. (2014) developed to estimate coherently theasymmetric responsesof deposit and lending rates to the policy rate. The model is an asymmetric extension of the ARDLcointegration approach developed by Pesaran and Shin (1999) and Pesaran *et al.* (2001). The empirical analysis starts by posing thefollowing asymmetric cointegration relationship:

$$\boldsymbol{r_t + \theta^+ + MPR_t^+ + \theta^t + MPR_t^- + \varepsilon_t} \quad (2)$$

where $\boldsymbol{r_t}$ is the relevant interest rate to be analysed, $\boldsymbol{MPR_t}$ is the monetary policy rate, and $\boldsymbol{\varepsilon_t}$ is an error term.$\boldsymbol{MPR_t}$ can be decomposed as follows:

$$\boldsymbol{MPR_t = MPR_0 + MPR_t^+ + MPR_t^-} \quad (3)$$

where $\boldsymbol{MPR_0}$ is the initial value of the time series and $\boldsymbol{MPR_t^+}$ and $\boldsymbol{MPR_t^-}$ are partial sums defined by:

$$\boldsymbol{MPR_t^+ = \sum_{i=1}^{t} \Delta MPR_i^+ = \sum_{i=1}^{t} maxMPR_i, 0)} \quad (4)$$

$$MPR_t^- = \sum_{i=1}^{t} \Delta MPR_i^- = \sum_{i=1}^{t} maxMPR_i, 0) \tag{5}$$

$\theta^+$and θ^- are the associated positive and negative asymmetric long-run parameters, and Δ is the firstdifference operator.

Shin et al. (2014) show that Eq. (2) can be reparametrized as an ARDL (p,q) model of the form:

$$\Delta r_t = c + ar_{t-1} + \beta^+ MPR_t^+ + \beta^- MPR_t^- + \sum_{i=1}^{p-1} \omega_i \Delta r_{t-i} + \sum_{i=0}^{q-1} \varphi_i^+ \Delta MPR_t^+ + \sum_{i=0}^{q-1} \varphi_i^- \Delta MPR_t^- + \varepsilon_t \tag{6}$$

Equation (6) is the NARDL (p,q) specification. Where, α measures the speed of adjustment, the long-run pass-through positive andnegative coefficients can be computed as: $\hat{\theta}^+ = \hat{\beta}^+/\hat{\alpha}$ and $\hat{\theta}^- = \hat{\beta}^-/\hat{\alpha}$respectively. If θ is equal to one, the long run pass-throughis complete; if θ is lower than one, it is incomplete. The ω_i and φ_i coefficients capture the short-run dynamics.

Pesaran et al.'s (2001) bounds test procedure to test for cointegration that Shin et al. (2014) showed can be extendeddirectly to the NARDL model. They propose an F statistic to test the null joint hypothesis that $\alpha = 0$ and that$\beta^+ = \beta^- = 0$. The rejection of the null hypothesis provides statistical evidence of cointegration. The bounds test lets the comparison of the F statistic withcritical values for I(0) and I(1) variables.Anadvantage of the NARDL co-integration model is that it allows one to jointly analyse nonstationary and nonlinearity issues when the underlying variables are either I(1) or I(0).

Based on equation (6), one can test the existence of long- and short-run asymmetries in the pass-through. Standard Wald tests under the nullhypotheses that $\theta^+ = \theta^-$and that$\sum_{j=0}^{q-1} \varphi_i^+ = \sum_{j=0}^{q-1} \varphi_i^-$ respectively, can be used. If the null hypotheses are not rejected, Equation (6) reduces tothe standard ARDL cointegration representation. If the nulls are rejected, there is evidence of long-run and/or short-run asymmetriceffects. In the case of long-run asymmetries, if $\theta^+ < \theta^-$, the asymmetry means that the pass-through of a reduction of the monetary policy rateis greater than that of an increase. This is referred to as a negative long-run asymmetry. The opposite is referred to as a positivelong-run asymmetry. The same holds for short-run asymmetries. In the case of retail deposit and lending rates, a negative long-run asymmetry means thatthe financial system reacts more strongly to a reduction in the monetary policy rate than to an increase of the same magnitude.

A key feature of ARDL and NARDL models is their ability to deal with endogeneity concerns adequately. Endogeneity may be present in exploring interest rate pass-through since common factors may simultaneously determine both policy and retail rates. For example, higher rates of inflation and higher unemployment may affect the policy reaction function and, hence, the policy rate's determination. At the same time, they may affect credit risks and other relevant financial risks, which in turn determine retail rates. Nonetheless, the methodology employed reduces this concern since, as shown by Pesaran and Shin (1999), potential endogeneity can be dealt with in this econometric modelling setup by appropriately augmenting the lag structure of the estimated model. With sufficient lags, serial autocorrelation and endogeneity concerns are simultaneously corrected.

5. Results and Discussion

We adopt the approach of Shin et al. (2014) in our analysis. Specifically, we employ a Wald test to examine whether there are any differences in the long- and short-run coefficients within a properly specified NARDL model. To begin, we estimate the lag lengths of a NARDL (p,q) model for each relevant variable. To determine the appropriate lag structure for each independent variable, we employ the Akaike information criteria (AIC). Furthermore, we conduct Wald tests to evaluate potential asymmetries, specifically focusing on the null hypotheses of equal long-run coefficients and equal short-run coefficients. If the null hypothesis is rejected, we favour the NARDL model as the preferred specification. Conversely, if the null hypothesis is not rejected, the correct specification would be an ARDL model.

Table 2: Asymmetry specification tests.

Dependent Variable	**Long-run Asymmetry**		**Short-run Asymmetry**	
	Wald Stat.	**P-Value**	**Wald Stat.**	**P-Value**
Deposit rates				
Savings rate	1.310	0.253	0.500	0.480
Time deposit rate	0.288	0.591	0.495	0.482
Lending rates				
Prime lending rate	0.026	0.870	2.494	0.115
Maximum lending rate	23.768	0.000	0.118	0.730

The long-run asymmetry test is a Wald test under the null hypothesis that $\theta+ = \theta-$. *The short-run asymmetry test is a Wald test under the null hypothesis that* $\varphi+ = \varphi-$.

Table 2 reports the Wald tests on long- and short-run asymmetries and their p-value. The tests indicate that there is a significant long-run asymmetry in the Maximum lending rate model. However, no evidence of asymmetry is found for the other rates. The presence of long-term asymmetry suggests that the rates will converge to different levels in the long run following a policy rate adjustment. On the other hand, the absence of short-run asymmetries implies that, in the immediate months following a policy adjustment, regardless of whether it is positive or negative, the interest rates will exhibit similar dynamics. These asymmetries become evident as the rates converge to their long-run equilibrium after a policy adjustment.

Table 3 presents the results of estimating the ARDL and NARDL models using the specification tests mentioned earlier. The estimated results for the deposit and lending interest rates are shown in the columns. Additional information, including the outcomes of the cointegration bounds test, can be found in the lower section of the table. The test results indicate that cointegration is generally supported, except for the Time deposit interest rate. This suggests the presence of stable long-run relationships between the examined interest rates and the monetary policy rate, except for the Time deposit interest rate.

Table 3: Estimation results

Coefficient	**Saving rate**	**Time deposit rate**	**Prime lending rate**	**Maximum lending rate**
Adjustment coefficient (α)	-0.311*** (0.064)	0.070 (0.554)	-0.143*** (0.023)	-0.197*** (0.063)
		Long-run relationship ($\theta = -\beta/\alpha$)		
MPR (θ)	0.084 (0.045)	0.100** (0.045)	0.026* (0.014)	
MPR + ($\theta+$)				0.101** (0.045)
MPR − ($\theta-$)				0.011 (0.013)
		Short-run Dynamics		
Δ interest rate(t-1) (ψ 1)	0.026 (0.071)	0.222*** (0.078)	0.770 (0.067)	-0.197 (0.129)
Δ interest rate(t-2) (ψ 1)	0.086 (0.070)	-0.069 (0.080)	0.163 (0.085)	-0.102 (0.100)
Δ interest rate(t-3) (ψ 1)	0.031 (0.069)	0.046 (0.078)	-0.136 (0.085)	0.057 (0.064)
Δ interest rate(t-4) (ψ 1)	0.107 (0.071)	0.078 (0.077)	0.040 (0.085)	0.079 (0.091)
Δ interest rate(t-5) (ψ 1)	0.213*** (0.063)	-0.025 (0.075)	0.131 (0.086)	-0.034 (0.089)
Δ MPR (θ)	0.045 (0.033)	-0.016 (0.171)	0.077 (0.065)	-0.543** (0.268)
Δ MPR + ($\theta+$)				-0.658 (0.451)
Δ MPR − ($\theta-$)				-0.539** (0.242)
Constant	0.269 (0.168)	0.409 (0.405)	2.190*** (0.445)	5.047*** (1.623)
R^2	0.210	0.200	0.182	0.212
Bounds test	6.440***	2.621	11.347***	4.618***
P-Value of Long-Run Symmetry a				0.000
P-Value of Short-Run Symmetry b				0.162
Model Specification	ARDL	ARDL	ARDL	NARDL

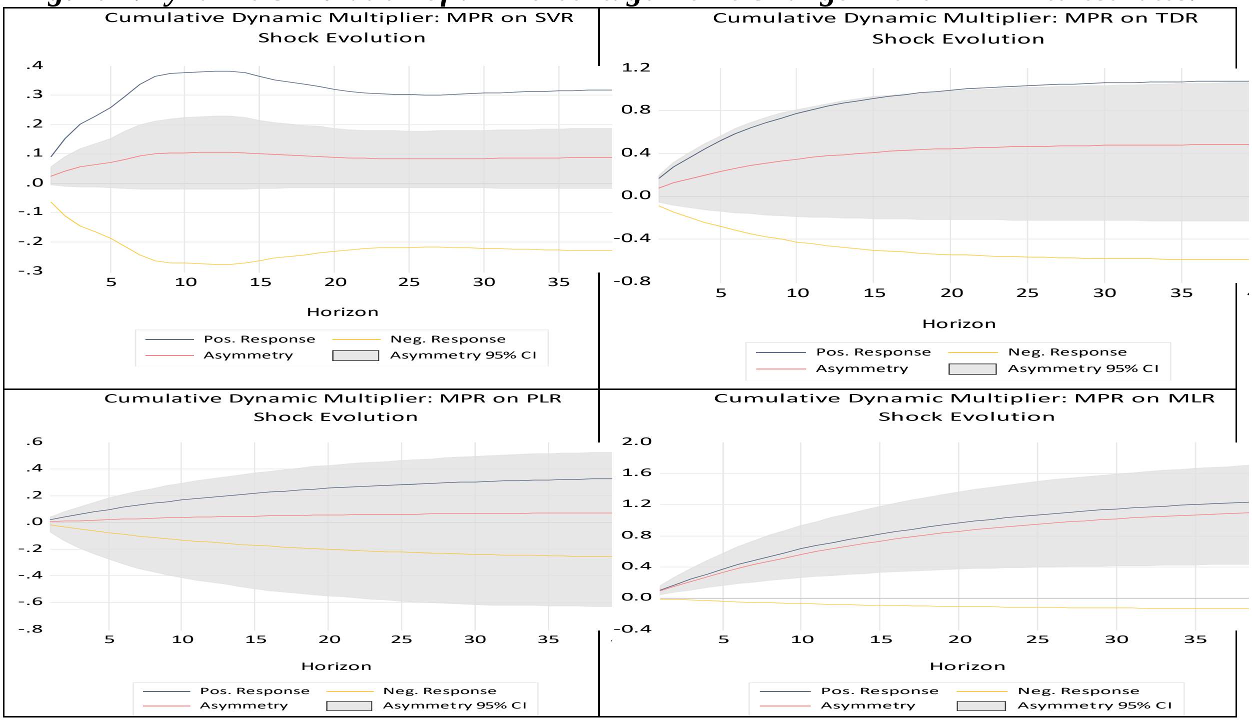
Notes: Newey-West standard errors in parentheses. ∗∗∗ significant at 1%, ∗∗ significant at 5%, ∗ significant at 10%. a is the long-run asymmetry test is a Wald test under the null hypothesis that $\theta+ = \theta-$. b is the short-run asymmetry test is a Wald test under the null hypothesis that $\varphi+ = \varphi-$.

In Table 3, the first row presents the adjustment coefficient for deposit and lending rates. The results show that there are no meaningful differences in the speed of adjustment among the rates. The adjustment coefficient, represented by α, indicates the extent to which a long-term deviation is corrected within a single period. It can be used to calculate the number of months required to absorb a specific fraction of a shock that disrupts the equilibrium of the system. This duration represents the time it takes for the system to converge to a new long-term equilibrium. However, in the case of the maximum lending rate, the estimated asymmetry suggests that convergence will occur at different levels for positive and negative changes in the monetary policy rate.

The estimations indicate that, in the long run, the maximum lending rate is less responsive to a negative fluctuation in the monetary policy rate (MPR) compared to a positive one. This positive asymmetry or downward rigidity in interest rates can potentially be attributed to the fact that prices tend to be inflexible in downward movements. The presence of asymmetry in the response of interest rates to changes in the MPR suggests that, when monetary policy is eased, the interest rate spread tends to decrease incrementally. Conversely, during periods of monetary contraction, the interest rate spread may widen.

To provide a visual representation of the adjustment of relevant rates to changes in the monetary policy rate, dynamic simulationsof the NARDL and ARDL models estimated and reported in Table 3 are plotted in Figure 2. The figure reports the effect of a counterfactual change of the MPR (in the case of the NARDL, a change to the MPR+ and the absolute value of the change of the MPR−) of 1 percentage point on the relevant interest rate.

Figure 2:Dynamic Simulation of a 1-Percentage-Point Change in the MPR interest rates.



Note: MPR= Monetary policy rate, SVR= Savings rate, Time-deposit rate, PLR= prime lending rate, MLR= maximum lending rate

The dynamic simulations yield insights into the adjustment process of deposit and lending rates in response to monetary policy changes. The results demonstrate a rapid short-term adjustment of both rates following a monetary policy change. However, in the long run, the rates stabilize at different levels depending on the direction of the monetary policy rate (MPR) movement. As observed in Table 3, the long-run pass-through of MPR changes is higher for deposit rates following positive MPR adjustments. It is noteworthy that although the rates take approximately 12 to 16 months to stabilize at their new levels after the MPR shock, a substantial portion of the adjustment occurs shortly after the policy rate change. For negative MPR changes, around 75% of the impact is reflected in interest rates after ten months and approximately 80% after 20 months. In the case of positive MPR changes, these percentages are close to 80% and 90%, respectively. The dynamic simulations also indicate that the asymmetry is less significant in the short term, aligning with the absence of evidence for short-term asymmetries found in Table 2.

The pass-through of monetary policy rates to deposit and lending rates may not be complete or immediate due to various factors such as implicit contracting in long-term credit relationships, transaction costs, and strategic behaviour of financial intermediaries aiming to maintain their market share. Additionally, studies have shown that the direction of policy rate adjustments can impact the degree and speed of retail rate adjustments. During economic downturns, the elasticity of credit demand tends to decline, and borrowers may become more reliant on their existing lenders. As a result, the adjustment of interest rates in response to monetary policy rate reductions may be relatively lower compared to adjustments following rate increases.

Conversely, due to adverse selection and asymmetric information, there may also be an opposite asymmetry in pass-through. Lenders, to avoid increased credit risk, might be more hesitant to fully transmit monetary policy rate changes to their clients. This issue typically arises when monetary policy rates rise, rather than when they are lowered. Additionally, upward rigidity in loan rates may stem from competitive markets in specific lending or deposit segments. In practice, both types of asymmetries may coexist, and empirical analysis is necessary to understand their prevalence and impact.

In summary, the evidence supports the presence of long-run asymmetries in the response of the maximum lending rate to changes in the monetary policy rate. Specifically, when there are negative changes in the policy rate, there is a narrowing of the interest rate margin. This finding potentially indicates that intense competition in the market prevents significant downward adjustments in interest rates, as borrowers could opt for alternative borrowing options. Additionally, it may reflect the fact that during periods of monetary expansion with abundant liquidity, interest rate margins can be lower due to reduced liquidity risk.

It is important to note that the estimated parameters in this study do not deviate significantly from those observed in other emerging market economies. The results indicate that interest rates respond symmetrically to both negative and positive changes in the monetary policy rate.

6. Conclusion

This study investigates the transmission of the monetary policy rate to retail interest rates in Nigeria using monthly data spanning from January 2002 to November 2022. It aims to identify any asymmetries in the adjustment process. The analysis begins by examining the pass-through of the monetary policy rate to both deposit and lending rates. It is found that maximum lending interest rate adjusts less to a negative policy rate movement than to a positive one.

The estimations indicate that, in the long run, the maximum lending rate is less responsive to a negative fluctuation in the monetary policy rate (MPR) compared to a positive one. This positive asymmetry or downward rigidity in interest rates can potentially be attributed to the fact that prices tend to be inflexible in downward movements. The presence of asymmetry in the response of interest rates to changes in the MPR suggests that, when monetary policy is eased, the interest rate spread tends to decrease incrementally. Conversely, during periods of monetary contraction, the interest rate spread may widen.

An important result of these estimations is that, in the case of preferential commercial credit, the long-run pass-through is greaterthan one. In the case of consumer and ordinary commercial credit, the negative pass-through is greater than one, while the positivepass-through is slightly incomplete. These asymmetries may be interpreted as evidence for contestable behaviours in those creditsegments and potential adverse selection effects that reduce incentives to increase lending rates significantly following a rise in thepolicy rate. These results are stable throughout time and are robust to the inclusion of additional macroeconomic controls.

Based on the findings of this study, it is evident that the pass-through of interest rates depends not only on the type of credit being analysed but also on the direction of the monetary policy adjustment. The implications for policymakers are noteworthy, highlighting the importance of considering these asymmetries in the design of policy interventions, particularly when implementing monetary tightening measures to control inflation. If policymakers rely on signals provided by retail rates, they should be aware that an increase in the monetary policy rate (MPR) may need to be larger in absolute terms to have an equivalent effect as a decrease in the MPR. However, it is important to note that these observations pertain solely to the initial stage of the credit transmission channel. Further research is required to investigate whether asymmetric effects persist throughout the complete credit channel mechanism, including the adjustment of credit demand and supply in response to changes in marginal interest rates.

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