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Beyond Taylor Rule: Decoding interest Rate Corridor and monetary policy Transmission in Pakistan

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ABSTRACT

This paper studies empirically the drivers of monetary policy reaction function in Pakistan from 1972 to 2024, assessing the influence of the Interest Rate Corridor (IRC) and reserve requirements on an augmented open economy Taylor Rule. The dynamic effects of the IRC and quantitative reserve requirements are assessed via three different econometric specifications: the base augmented Taylor rule, interaction model capturing changes in inflation responsiveness of the central bank under IRC, and interaction model assessing cyclical output stabilization through IRC. The econometric model incorporates partial adjustment dynamics of interest rates, external currency pressures, and statutory reserve requirements. Testing for non-stationarity and applying the bounds test establishes the need for estimating the dynamic model in short run, which is done using HAC standard errors. Diagnostics after estimation tests the model for serial correlation, heteroskedasticity, functional form specification, and structural parameter stability across policy regimes in history.

Introduction

The monetary policy is the main tool for maintaining price stability, managing systemic liquidity, and moderating business cycle swings (Agénor & Montiel, 2015). However, in developing and emerging market economies, the implementation of monetary policy is complicated due to presence of fiscal deficit, supply-side rigidities, undeveloped debt markets, and foreign exchange restrictions (Saghir & Malik, 2017; Nasir et al., 2021). Therefore, central banks in emerging market countries

deviate from a traditional closed economy reaction framework and implement multi-target framework addressing both domestic output-inflation dynamics and vulnerability of the external sector (Choudhri & Malik, 2015; Hussain & Ejaz, 2022).

In Pakistan, management of macroeconomic performance over the post-1972 period has been affected significantly by balance of payments problems, structural devaluations, and inflationary episodes. Responding to such macroeconomic problems, the State Bank of Pakistan (SBP) has made some fundamental reforms moving from the administrative direct credit allocation system to the market-based indirect system of monetary management (State Bank of Pakistan, 2023). One of the key reforms associated with operational modernization of the monetary policy framework is the introduction of the Interest Rate Corridor (IRC) in August 2009, and subsequently the introduction of the policy target rate at the corridor midpoint in May 2015, aiming at anchoring interbank overnight repo rate and reducing money market rate volatility (Mahmood 2015; Malik & Din, 2021). Evaluation on whether the central bank follows the reaction rule-based augmented reaction function or follows discretionary intervention is of great significance for macroeconomic predictability and private investments. An important empirical issue is whether the SBP's policy interest rate reacts to the deviations of inflation from the target (inflation gap), deviations of the actual output from the potential (output gap), nominal depreciation of the exchange rate, and quantity regulation instrument such as Cash Reserve Ratio (CRR) (Saghir & Malik, 2017; Hussain & Ejaz, 2022). In addition, an important empirical issue is whether the implementation of the IRC regime changed the structural reaction of the central bank to macroeconomic shocks (Mahmood, 2015).

In order to solve the empirical issues raised above, this paper sets up three different dynamically estimated econometric models. The first model sets up the baseline augmented Taylor reaction function which includes interest rate persistence, gaps of macroeconomic variables, currency depreciation, regulatory measure of CRR, and intercept change of the IRC regime. The second model introduces an interaction term between the indicator of the corridor regime and the inflation gap (IRC × Inflation gap) to examine whether monetary authorities become more accommodative or aggressive to the inflationary deviations after introducing the IRC regime. The third model sets up an interaction term between the indicator of the IRC regime and the output gap (IRC × output gap) to test whether cyclical output gap smoothing changes after introducing the IRC regime. The empirical analysis uses continuously annual data from 1972 to 2024 and conducts a bound testing approach (Kripfganz & Schneider, 2020). The dynamic Newey west HAC standard errors estimation approach is applied to make sure of robustness of the analysis. This study makes four specific contributions to the literature. First, it examines an uninterrupted 53 years sample period (1972–2024), providing comprehensive empirical evidence on the monetary development in Pakistan. Second, it incorporates both price-based interest rates and quantitative regulation into an open economy reaction function. Third, it develops and estimates Model 1, Model 2, and Model 3 to identify the differences between the level shift and slope change generated by the IRC regime. Fourth, it conducts a series of econometric tests for confirmation of the stability of the parameters and absence of misspecification problem.

The rest of the paper is organized as follows. Section 2 provides review on literature. Section 3 provides theoretical framework and Model 1, Model 2, and Model 3. Section 4 describes data construction and variable definition. Section 5 describes econometric method. Section 6 presents empirical results and diagnostics. Section 7 presents conclusions and Section 8 provides policy implications.

Literature Review

The theoretical underpinning of monetary policy conduct emphasizes the importance of rule-based monetary policy rather than discretionary policy actions to avoid the dynamic time inconsistency problem and to anchor market expectation (Agénor & Montiel, 2015). The policy interest rates in the forward-looking reaction functions respond to the inflation and output gaps. But the use of conventional linear reaction rules is a major structural challenge in developing economies (Fatima & Malik, 2015). The structural environment that central banks of the developing countries are dealing with is the presence of fiscal dominance, the sensitivity to external shocks and shallow domestic capital markets (Choudhri et al., 2015; Fatima & Malik, 2015). Consequently, the monetary authorities of these countries are compelled to pursue several objectives: the stability of the exchange rate, fiscal debt sustainability and the solvency of the banking system. This changes completely the empirical features of the reaction function (Saghir & Malik, 2017). The sensitivity of policy rates to movements in the foreign exchange market is very high in emerging countries. Defensive responses by central banks to exchange rate changes to safeguard against imported inflation pressures, sudden capital flow stops and foreign currency liability-related balance sheet shocks are common in emerging economies (Choudhri et al., 2015; Hussain & Ejaz, 2022). Defensive interest rates are determined due to the fast propagation of depreciation of domestic currency in headline consumer prices via import of energy and commodities. The empirical findings from the developing countries indicate that foreign shocks and foreign exchange rate volatility lead to such forceful responses to policy interest rates (Fatima & Malik, 2015, 2018; Nasir et al., 2021). Empirical literature has

revealed that one of the most crucial operational targets of the State Bank of Pakistan (SBP) for Pakistan has been the nominal exchange rate depreciation (Hussain, 2022; Hussain & Ejaz, 2022).

In recent years, central banking has evolved from quantitative targets of reserves to interest rate operating corridors (Mahmood 2015; Mahmood, 2015). The operational corridor framework, which is a combination of ceiling of standing lending facilities and floor of standing deposit facilities, helps the central bank in controlling the liquidity in the money market and the volatility of overnight interest rates (Malik & Din, 2021). In Pakistan, the structural establishment of Interest Rate Corridor in 2009 and its further refinements in 2015 has changed the liquidity management of the country (Mahmood 2015; State Bank of Pakistan, 2023). Empirically, it has been found that corridor framework has helped in stabilizing interbank repo rates, lowered the spread of money market rates, and improved the predictability of liquidity provision in the banking sector of Pakistan (Mahmood, 2015). The efficiency of policy rate decisions in transmitting to retail banking benchmarks depends essentially on the level of competition and market depth in the financial market (Mahmood, 2015). Lower transaction risks in the overnight interbank repo market for the commercial banks due to symmetric boundaries of the policy rate led to consistent pass-through along the yield curves (Mahmood, 2015). However, in Pakistan, the allocation of credit by the banking sector is very biased towards risk free sovereign debt securities rather than private corporate lending (State Bank of Pakistan, 2023). Such heavy public debt exposure makes commercial banks insensitive to changes in policy rates, contributing to credit rationing in the private manufacturing sector (Bashir & Qayyum, 2024; Omer 2016).

The central banks of emerging economies do not use interest rate targets only, but operate multi-tool kits of policies using the combination of price-based operation rates and quantitative reserves requirements (Agénor & Montiel, 2015). The Cash Reserve Ratio (CRR) and Statutory Liquidity Requirement (SLR) are examples of macroprudential buffer and are effective instruments of liquidity management (Bashir & Qayyum, 2024). In Pakistan, the SBP is employing the CRR adjustment as the complementary tool to control the excess liquidity of commercial banks without causing excessive volatility in the interbank benchmark rates (State Bank of Pakistan, 2023).

In the developing countries which have revenue deficit, monetary policy is limited by fiscal dominance (Saghir & Malik, 2017). When the sovereign debt is predominantly short term and locally financed, then a high rate of interest imposed by the central bank will cost the government and its debt service. In case of constant fiscal deficits, the cost of policy rates increases the debt service cost of sovereign debt, making trade-offs between price stabilization and sovereign debt sustainability (Agénor & Montiel, 2015; Mahmood, 2015). Apart from that, external vulnerabilities and depletion of foreign reserves can also restrict monetary policy autonomy, compelling authorities to implement contractionary interest rate hikes (Hussain & Ejaz, 2022; Ul Mustafa, Ansari, & Younis, 2012). Monetary authorities' non-linear and asymmetric preferences are emphasized by various empirical studies conducted in developing economies (Fatima & Malik, 2015; Khan et al., 2022). The monetary authorities react much stronger when there is inflation above the targets than the equivalent disinflationary shortfalls. The SBP in Pakistan also exhibits non-linear responses to various shocks where the SBP reacts much faster with rate increases in crisis periods and gradually decreases in recovery periods (Zeshan et al., 2019; Khan et al., 2022). Empirical long-term analyses must take into account the impact of operational regimes in order to prevent estimation biases (Kripfganz & Schneider, 2020).

There is more empirical evidence to support the addition of exchange rate movements to Pakistan's monetary policy reaction function. Using the open economy version of the Taylor rule, Muhammad et al. (2012) estimate the rule for Pakistan and conclude that the output gap and the exchange rate gap have significant effects on the behavior of monetary policy, whereas the traditional inflation-gap coefficient is relatively small. Their findings indicate that the SBP's policy decisions are not well captured by a closed economy Taylor rule, as exchange rate developments are a key consideration in the policy process. The implication of this finding for Pakistan is significant because exchange rate fluctuations have an impact on domestic prices via imported energy, intermediate goods, and other tradable inputs. The continued relationship between inflation and the exchange rate is also noted in more recent evidence. Based on bilateral exchange rate and price data of Pakistan, Zakaria et al. (2023) establish that there are strong relationships between the inflation differentials and exchange rate changes, suggesting that external price developments continue to be closely linked to currency adjustment. This strengthens the case for the exchange rate to be considered as an explicit variable in an extended monetary policy reaction function, and not just a transmission variable (Muhammad et al., 2012; Zakaria et al., 2023).

Monetary-policy effectiveness also is increasingly associated with institutional credibility and central-bank independence in developing economies. Garriga and Rodriguez (2020) demonstrate that higher legal independence of the central bank is negatively related to inflation for a broad cross-section of developing countries. Building on this, Garriga and Rodriguez (2023) show that central bank independence is also linked to lower inflation volatility, implying that institutional autonomy plays a role in stabilizing inflation dynamics as well as in reducing the level of inflation. The findings are significant for

Pakistan because the effectiveness of monetary policy relies on the capacity of the SBP to react to inflation and output conditions, without being constrained by too many fiscal or political factors. If the fiscal borrowing needs swamp the financial markets, raising policy interest rates can have less impact due to the fact that higher policy rates also increase the government's debt-servicing costs. Therefore, the reaction function of a developing country central bank (Garriga & Rodriguez, 2020, 2023) should be analyzed in conjunction with the other macroeconomic indicators, as well as institutional independence and monetary fiscal coordination and credibility.

Recent evidence further emphasizes the importance of monetary and output shocks in determining exchange rate behavior in Pakistan. Based on quarterly data for 1980 to 2022, and employing VAR, VECM, and structural VAR models, Xu et al. (2026) find that monetary-policy variables, especially the money supply and interest rate, play an important role in explaining the movements of the real effective exchange rate of Pakistan. They find that higher interest rates lead to appreciation of the currency, while higher money supply and inflation lead to depreciation. This evidence further supports the idea of including exchange rate changes in the empirical monetary policy framework, since there is bi-directional causality between monetary conditions and exchange rate developments. The central bank responds to pressures on the exchange rate, but monetary-policy instruments also affect the exchange rate. Hence, a reaction function that also includes the policy rate, exchange rate changes, inflationary conditions, and other policy instruments is more appropriate for the open economy context of Pakistan than a traditional reaction function that only includes inflation and output gaps (Xu et al., 2026).

The recent literature also suggests that the response of the monetary-policy reaction function can vary significantly between institutional and macroeconomic regimes. The experience of Pakistan has been of managed exchange rates, financial liberalization, banking system reforms, changes in the reserve requirement, introduction of Interest Rate Corridor, and changes in the degree of operational independence of the SBP. These changes may alter the scale and scope of policy responses. The literature thus indicates that estimates based on rather short samples might only reflect a particular monetary regime and that they might not reflect the longer term evolution of policy behavior. In this regard, the use of an extended sample is especially important as it enables the empirical analysis to include high-inflation periods, external crises, exchange rate adjustments, monetary operating procedure changes, and fiscal dominance episodes. In addition to the evidence of asymmetric policy reactions and nonlinear exchange rate effects, these institutional developments are strong arguments for estimating an augmented and dynamic monetary policy reaction function, as opposed to imposing a fixed linear Taylor rule relationship over the entire period.

There are various studies carried out that investigate the monetary policy in Pakistan (Choudhri et al., 2015; Mahmood 2015; Saghir & Malik, 2017; Ahmad & Khan, 2018; Zeshan et al., 2019; Omer 2016; Malik & Din, 2021; Khan et al., 2022; Mahmood, 2015; Hussain & Ejaz, 2022; Mahmood, 2015). The studies, however, have some empirical drawbacks because the previous studies have concentrated on short time frame after 2000 but did not provide any general picture of monetary policy of Pakistan since 1972. In addition to that, the previous studies have not considered the various channels such as open economy exchange rate channel, the regulatory CRR tool and interaction of IRC together. This study rectifies the limitations of this study by using a data set of 53 years (1972-2024) and applying different econometric tests to the data.

Theoretical Framework and Econometric Model Specifications

The theoretical foundation of this study is grounded in the monetary policy reaction function with partial adjustment and interest-rate smoothing (Saghir & Malik, 2017; Fatima & Malik, 2015). Central banks do not adjust policy rates instantaneously to desired targets because abrupt rate changes risk generating destabilizing volatility across financial markets and banking balance sheets. Consequently, the actual policy rate (policy ratet) adjusts toward its target rate (policy rate*_t) through a partial adjustment process:

$$PRt=1-\rho PRt*\rho\ PRt-1+\varepsilon t$$

where $\rho \in [0, 1]$ denotes the interest rate persistence (smoothing) parameter and policy rate*t is the desired policy rate in function of various domestic cyclical shocks, foreign exchange pressure, quantitative tools and various operational corridor regimes. The empirical testing of the behavior of monetary policy in Pakistan and how Interest Rate Corridor regime affects the monetary policy is addressed by using three distinct regression equations as follows:

Model 1: Baseline Augmented Taylor Rule

Model 1 establishes the benchmark empirical reaction function, augmenting the classical Taylor rule with open economy exchange rate depreciation, the Cash Reserve Ratio, and an IRC intercept dummy:

$$PR_t = \beta_0 + \beta_1 PR_{t-1} + \beta_2 IG_t + \beta_3 OG + \beta_4 \Delta ER_t + \beta_5 CR_t + \beta_6 IRC_t + \varepsilon_t \quad \text{..... (1)}$$

where β1 measure interest rate persistence, β2 measures central bank sensitivity to inflation gaps from target, β3 measures countercyclical output response, β4 measures central bank defense against nominal exchange rate depreciation, β5 measures stance of reserve requirement, and β6 captures institutional-level shift in nominal interest rates due to Interest Rate Corridor.

Model 2: IRC-Inflation Interaction Specification

Model 2 extends the baseline framework by incorporating a multiplicative interaction term between the Interest Rate Corridor indicator and the inflation gap (IRC × inflation gap):

$$PR_t = \beta_0 + \beta_1 PR_{t_1} + \beta_2 IG_t + \beta_3 IRC_t + \beta_4 IRC_t \times IG_t + \beta_5 OG_t + \beta_6 \Delta ER_t + \beta_7 CR_t + \varepsilon_t \text{.....(2)}$$

The coefficient β4 measures if the central bank's sensitivity to inflation gap became structurally higher (β4 > 0) or lower (β4 < 0) after the adoption of corridor framework.

Model 3: IRC-Output Interaction Specification

Model 3 incorporates the following interaction term:

$$PR_t = \beta_0 + \beta_1 PR_{-1} + \beta_2 OG_t + \beta_3 IRC_t + \beta_4 IRC_t \times OG_t + \beta_5 IG_t + \beta_6 \Delta ER_t + \beta_7 CR_t + \varepsilon_t \text{.... (3)}$$

The interaction term β4 measures if institutional stabilization of interbank repo rates influenced the probability of stabilizing domestic economic activity cycle by the central bank.

Data and Variables

The regression is estimated using a time series of annual data on Pakistan from 1972 to 2024. Thus, there are at most 53 annual observations. The data are sourced from official historical records of the State Bank of Pakistan (SBP Statistical Handbook, Annual Reports, and Monetary Policy Statements) and Pakistan Bureau of Statistics (PBS).

Table 1: Variable Definitions and Measurement

Variables	Description	Measurement
PR	SBP Policy Rate	End-of-period nominal discount/policy interest rate (% per annum)
IG	Inflation Gap (π - π*)	Deviation of annual CPI headline inflation from the long-run target/trend (%)
OG	Output Gap (y - y*)	Cyclical deviation of log real GDP from HP-filtered potential output (%)
ΔER	Delta Exchange Rate	Annual percentage change in the bilateral PKR/USD exchange rate (%)
CRC	Cash Reserve Ratio	Statutory Cash Reserve Ratio required from scheduled commercial banks (%)
IRC	Interest Rate Corridor	Binary regime dummy: 1 for IRC regime (2009–2024); 0 otherwise (1972–2008)

Source Authors Estimation

Econometric Methodology

Descriptive Statistics and Correlation Matrix

Descriptive statistics are analyzed to check data distributions, central tendency, and historical variability of all data series.

Table 2: Descriptive Statistics

Variables	Mean	Maximum	Minimum	Std. Dev.	Obs.
PR	10.963	22.000	5.750	3.425	53
IG	4.717	25.768	-2.471	5.970	53
OG	0.000	4.610	-4.210	2.153	53
ΔER	5.142	77.010	-3.460	12.609	52
CRC	5.292	9.000	5.000	0.771	48
IRC	0.302	1.000	0.000	0.463	53

Source Authors Estimation

Table 2 displays summary statistics. The average level of the policy rate is 10.96%. The maximum level is 22.00% observed in 2023 when there was the monetary policy contraction. The average value of the inflation gap is 4.72%. This implies structural inflation in Pakistan. The output gap is zero on average with values varying from -4.21% in cyclical bottom to 4.61% in the peak of the cycle. The change of the exchange rate averages 5.14% per annum reaching 77.01% historical maximum in 1972.

Table 3: Correlation Matrix

Variables	PR	IG	OG	ΔER	CRC	IRC
PR	1.0000					
IG	0.4131***	1.0000				
OG	-0.0721	0.1591	1.0000			
ΔER	0.5167***	0.5083***	0.0451	1.0000		

CRC	0.2021	0.3884***	0.2897**	0.1848	1.0000	
IRC	-0.0352	0.1122	-0.0962	0.4195***	-0.0386	1.0000

Authors of Source Estimation 1% Significant *; 5% Significant **; 10% Significant ***

Unit-Root Testing

In order to determine the existence of integration properties and avoid spurious regressions, augmented Dickey-Fuller (ADF) tests are applied at levels I(0) and at first differences I(1).

Table 4: Results of Augmented Dickey Fuller (ADF) Unit Root Test

Variables	**I (0)**		**I (1)**		**Results**
	C	**C+T**	**C**	**C+T**	
PR	-2.99**	-3.02**			I (0)
IG	-4.19*	-4.25*			I (0)
OG	-4.03*	-4.08*			I (0)
Δ ER	2.96	1.12	-5.55*	-5.58*	I (1)
CRR	-3.20**	-3.24**			I (0)

Source Authors Estimation; 1% Significant *; 5% Significant **; 10% Significant ***

ADF tests confirm the stationarity of PR, IG, OG, and CRC at levels I(0), while the ΔER possesses a unit root at levels, but is strictly stationary at first differences I(1) with the value of the test statistics -5.545 ($p<0.001$). The results obtained from Phillips-Perron tests confirm the existence of $Z(t)=-4.787$ ($p=0.0001$) for ΔER. Such combination of I(0) and I(1) variables meets the requirement of integration for ARDL bounds testing.

Empirical Estimation Results

ARDL(2,0,0,0,2,2) model is estimated on the sample 1979-2024 (46 observations) chosen according to the AIC (169.72) and BIC (191.67). Results of the bounds c

Table 5: ARDL Bounds Test for Cointegration

Test Statistic	Value	10% I(0)	10% I(1)	5% I(0)	5% I(1)	1% I(0)	1% I(1)
F-statistic	24.104	2.425	3.709	2.912	4.357	4.061	5.871
t-statistic	-1.157	-2.508	-3.815	-2.861	-4.232	-3.574	-5.071

Authors Source Critical values from Kripfganz & Schneider (2020). Decision: Fail to reject Ho (No cointegration).

As demonstrated in Table 4, although the value of F-statistic (24.104) is larger than the upper bound, the value of t-statistic (-1.157) fails to exceed the lower bound (-2.861) at the 5% level of significance, p = 0.592 for I(0)). Also, the value of the adjustment speed parameter in the error correction model is statistically insignificant (t = -1.16, p = 0.255). Cointegration is not detected when either F-statistic or t-statistic is closer to zero than the critical value. Therefore, a stable cointegrating relationship does not exist, which confirms the importance of studying dynamic short-run models. Table 5 shows the main empirical estimation results of this research. Model 1 is the baseline augmented Taylor rule; Model 2 includes the interaction between the IRC regime dummy and the inflation gap (IRC × IG); Model 3 contains the interaction between the IRC dummy and the output gap (IRC × OG). All models have been estimated using the Newey-West HAC standard errors (lag = 1) in order to exclude heteroskedasticity and residual autocorrelation.

Table 6: Monetary Policy Reaction Function: (Newey–West HAC)

Variables	(1) Baseline	(2) IRC × IG	(3) IRC × OG
l.PR	0.6074*** (0.1207)	0.6161*** (0.1327)	0.6495*** (0.1220)
IG	0.1999** (0.0770)	0.2184*** (0.0745)	0.2427*** (0.0761)
OG	0.2450** (0.1107)	0.2343** (0.1095)	0.1112 (0.1057)
ΔER	0.0951*** (0.0287)	0.1045** (0.0511)	0.0752** (0.0299)
CRC	-0.3933 (0.3854)	-0.4105 (0.4005)	-0.3471 (0.3424)
IRC	-1.8052*** (0.6058)	-1.6477** (0.6060)	-1.5444** (0.6494)
IRC × IG	—	-0.0538 (0.1767)	—
IRC × OG	—	—	0.5380 (0.3483)
Constant	5.8360** (2.4863)	5.7533** (2.5236)	5.0209** (2.3907)

Observations	48	48	48
F-statistic	35.22***	31.46***	60.58***
Prob > F	0.0000	0.0000	0.0000
HAC Lag Truncation	1	1	1
Estimation Method	Newey–West HAC	Newey–West HAC	Newey–West HAC

Source Authors Estimation Newey-West HAC standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Model 1 (Baseline Augmented Taylor Rule): The coefficient of the lagged policy rate of 0.6074 (p < 0.001) confirms high interest rate smoothing by the State Bank of Pakistan. The inflation gap is positive and significant (β = 0.1999, p = 0.013), which confirms that the central bank increases the nominal interest rates in response to excess inflation. The output gap is also positive and significant (β = 0.2450, p = 0.032), which means that the demand management is conducted in a countercyclical way. The coefficient of the nominal exchange rate depreciation is positive and highly significant (β = 0.0951, p = 0.002), which serves as an indication of defensive rate adjustment in response to currency pressure. The coefficient of Cash Reserve Ratio is negative but statistically insignificant (β = -0.3933, p = 0.314). Importantly, the institutional IRC dummy has statistically significant negative coefficient (β = -1.8052, p = 0.005), which means that introduction of the corridor decreased the average nominal policy rate spread by 181 bps because of low interbank liquidity risk premia.

Model 2 (IRC × Inflation Interaction): In Model 2, the interaction term (IRC × IG) gives the following coefficient (-0.0538, p = 0.762 (t = -0.30)). The coefficient is statistically insignificant and equal to zero, while the coefficient of the baseline inflation gap is positive and significant (β = 0.2184, p = 0.006). It is clear from the results above that adoption of the corridor framework did not change the fundamental response coefficient of SBP to inflation.

Model 3 (IRC × Output Interaction): In Model 3, the interaction term (IRC × OG) is estimated to have a positive coefficient of 0.5380 (p = 0.130, t = 1.54). Though the interaction term is not significant at traditional levels, the overall model fit is still very strong (F = 60.58, p < 0.0001). The estimation results from Model 2 and Model 3 show the Interest Rate Corridor to be a successful institutional mechanism for anchoring short-term liquidity, but it did not alter the structure of central bank macroeconomic response weights.

In order to establish the econometric validity of the estimated specifications, post-estimation diagnostic tests are presented in Table 6 below.

Table 7: Post-Estimation Diagnostic Tests

Diagnostic Test	**Null Hypothesis (Ho)**	**Test Statistic**	**p-value**	**Statistical Decision**
Breusch–Godfrey LM Test (lag 1)	No serial correlation	chi2 = 0.987	0.3205	Cannot reject Ho (No Autocorrelation)
Breusch–Pagan / Cook–Weisberg	Constant variance (Homoskedasticity)	chi2 = 0.50	0.4795	Cannot reject Ho (Homoscedastic)

Ramsey RESET Test	Model has no omitted variables	F (3, 31) = 2.01	0.1324	Cannot reject Ho (Correct Functional Form)
Cumulative Sum (CUSUM) Test	Parameter stability across sample	Test stat = 0.1959	Critical (5%) = 0.9479	Stable parameters (No Structural Break)

Source Authors Estimation based on Stata output.

The set of post-estimation diagnostic tests confirms the validity of the estimated empirical model. The Breusch–Godfrey LM test shows that there is no first-order serial correlation (p = 0.3205). The Breusch–Pagan test gives the result of 0.4795 and confirms homoskedasticity. The Ramsey RESET test statistic of 2.01 (p = 0.1324) is evidence of correct functional form and absence of omitted variables. The recursive CUSUM test statistic of 0.1959 stays well within 5% critical bound of 0.9479 and confirms the stability of structural parameters.

Conclusion

This paper makes an econometric assessment of the monetary policy reaction function in Pakistan for the period 1972–2024 for three related specifications of the open economy Taylor rule, with Newey–West HAC standard errors. The findings show some significant characteristics of monetary policy implementation in Pakistan. First, the lagged policy-rate coefficients are significant, at 0.6074 and 0.6495, which shows that the State Bank of Pakistan (SBP) has a gradual approach when making policy decisions to prevent financial market volatility. Second, the strong positive reactions to inflation and output gaps suggest a countercyclical policy stance to keep prices stable and to respond to economic activity shocks. Thirdly, the policy rate rises quite sharply with the depreciation of the exchange rate, underscoring the significance of external stability in an import-dependent economy where depreciation of the exchange rate can lead to inflationary pressures. Fourth, the implementation of the Interest Rate Corridor (IRC) is a key operational change, resulting in a substantial downward level shift and a decrease in the equilibrium operating spread of around 154-181 bps. The IRC has enhanced liquidity management, anchored short-term rates and lowered liquidity risk premiums by setting clear boundaries on overnight interbank rates. Lastly, the interaction models indicate that the IRC mainly enhanced the effectiveness of monetary policy operations without altering the basic policy stance of the SBP.

Policy Recommendations

The State Bank of Pakistan (SBP) should further enhance the effectiveness of monetary policy by ensuring a transparent, symmetric and predictable interest rate corridor, and regular two-way open market operations to keep the interbank overnight rate in close alignment with the policy rate. Meanwhile, a higher level of foreign exchange reserve buffers, increasing export competitiveness, introducing appropriate hedging mechanisms, and rationalizing unnecessary imports can help alleviate exchange rate pressures and diminish the need to resort to the policy rate to fend off currency depreciation. There is also a need for greater fiscal discipline in monetary policy transmission, since high levels of government borrowing can lead to the banks keeping relatively safe government securities, instead of offering loans to the private sector. Thus, better fiscal management and a longer maturity of domestic public debt can help mitigate crowding-out effects, improve private sector credit transmission and improve the effectiveness of the monetary policy reaction function.

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