AN ESTIMATION OF MONETARY POLICY REACTION FUNCTION IN PAKISTAN

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ABSTRACT

This study has analyzed the monetary policy reaction function of Pakistan's economy. To attain the objective of the estimation of the Taylor rule, we have used quarterly data from 2005q1-2020q3.Static and dynamic rules for the closed and open economy are estimated to investigate the monetary policy reaction function. For this purpose, we have used the OLS technique. We also have investigated the issue of non-linearity of the monetary policy reaction function in terms of the output gap and inflation rate, assuming asymmetric monetary authority preferences. The monetary policy tool has a lot of inertia and the exchange rate highlights fluctuation in interest rate. The State bank of Pakistan does not consider the nominal exchange rate in its monetary policy. In the first rule, we find the consumer price index appears to be significantly positive with average treasury bills and average call money rate but insignificant with an average coupon rate. In the second rule, we find the nominal effective exchange rate insignificant to the average Treasury bill, average coupon rate and average call money rate which shows that the state bank of Pakistan does not consider the nominal exchange rate in its monetary policy. In the third Rule, we find the lag of the average Treasury bill which appears positive and significant with all variables which reflects that the lag of the average Treasury bill has a more powerful impact than other variables to estimate the monetary in Pakistan.

Keywords: Taylor Rule, Treasury bills, Coupon rate, Call money rate, Output gap, inflation
JEL Codes: E31, E43, E52, E58

I. INTRODUCTION

Inflation targeting refers to a monetary policy framework that includes quantitative targets or targeting ranges for inflation rate horizons. In comparison to another monetary policy framework, inflation targeting is a potent tool for achieving price stability in specific circumstances. The priority of price stability does not restrict central banks from undertaking other monetary policy goals. Inflation targeting is a monetary policy framework for working in a constrained discretion environment, not a guideline. Inflation targeting is simple to grip, adaptable, and effective in ensuring central bank responsibility as well as providing insight into inflation costs. Moreover, the outcome appears to be quite good and acceptable. Inflation targeting like exchange rate and monetary aggregates targeting is beneficial in the form of accessibility. The literature defined a variety of ways to inflation targeting. An explicit objective of inflation is a point target or a range target and the central bank utilizes instruments on its own to meet that target. According to Svensson (1997), the loss function of the central bank is subjected to the restriction of the economy's transmission mechanism and the first-order conditions generated are implicit monetary policy reaction functions. The monetary policy reaction function gives the value of a monetary policy tool chosen or recommended to be chosen by a central bank in response to a given indicator of economic conditions.

The main objective of monetary policy is to stabilize certain aggregate price indexes, as well as to stabilize “real economic activity and financial sector’. An effective reaction function policy is helpful to accomplish certain objectives of the monetary authorities of an economy. The monetary policy reaction function is a powerful instrument to stabilize economic activity. Different monetary authorities of different countries manipulate reaction function policy according to their targeted variable. In the short run, there is a trade-off between inflation and unemployment. As a result, monetary authorities must create a proper monetary policy rule that will assist in achieving the economy's inflation targeting aim (Taylor, 2019). The problem of choice targeting of convenient

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variables faced by policymakers during the formulation of the monetary policy rule. The production gap may be chosen to measure the real activity, but the growth of gross domestic product (GDP) is an alternative choice at the same time. While central banks have great freedom in establishing price stability through inflation targeting, additional objectives must be considered (Berg and Jonung, 1999; Audi et al., 2022; Audi and Ali, 2017; Audi and Ali, 2017; Audi et al., 2021; Audi and Ali, 2016. Moreover, the choice of variables that into account depends on the type of rule (either backwards looking or forward-looking) being used by the policymakers. Taylor (1993) the functional form of reaction function is another issue. However, the monetary policy instrument can be presented as a linear function of the variables to be targeted. Researchers have been trying to find an appropriate policy reaction function for different countries.

An issue related to the Taylor rule is the objectives of the policy. There are two objectives of monetary policy which are output and inflation, but monetary authorities have other concerns rather than these objectives like stabilization of exchange rate and interest rate. One of the main reasons for adopting such a structure is Pakistan's lengthy history of being under IMF supervision (Khan, 2010). According to the financial programming framework of the fund, the annual targeting is set to the net foreign assets which estimate the money demand, required change in domestic credit (money supply component) and the balance sheet of banks. Fiscal dominance is the most highlighted issue of the monetary policy of Pakistan. The Ministry of finance may force the State Bank of Pakistan to keep the rate of interest low, as the burden of govt. When the economy's inflation rate falls below the target rate of inflation or real GDP falls below the potential level of GDP, monetary authorities lower the short-term nominal interest rate by a certain amount, and vice versa (Taylor, 1993). For the last decade, SBP has depended on the discount rate to meet its objectives. SBP targets Karachi Inter-Bank Offered Rate (KIBOR) through adjustments in the discount rate and its operating aim for KIBOR is the average of the reverse repo rate and discount rate (repo rate). In this context, the interest rate has become the main target in monetary policy (Khan, 2010; Abdullah et al., 2013; Roussel et al., 2021; Audi et al., 2021; Audi et al., 2021; Audi et al., 2021).

II. LITERATURE REVIEW

In general, monetary and macroeconomic policies have their primary goals are to stabilization of aggregates prices, actual economic activities and the financial sector. These goals can be achieved with the use of optimal monetary policy guidelines. The phrase "optimal monetary policy" relates to the traditional definition of successfully stabilizing inflation around a low average level while also taking into account real stability. Mehra (1999) explored the reaction function of a forward-looking monetary policy and how the Federal Reserve responds to its policy regarding economic development. The study used quarterly data that covered the period from 1997Q1 to 1998Q2. The study considered to work in Taylor (1993) a simple reaction function and included the variables (Bond rate, Output gap; Inflation target, Actual Fund rate, Nominal fund rate, and inflation rate) and the GMM technique is used to estimate the model of monetary policy reaction function for short-term. The fund rate is significant and positive to changes in long-term inflation as demonstrated by the reaction of the bond rate.

Sanchez-Fung (2000) examined monetary policy reaction function for developing economies like the Dominican Republic using time series data from 1969-to-2000. The study analyzed how the central bank of the Dominican Republic responds to its variables, which is the monetary base between official and parallel market exchange rate differential. The gap between actual and potential output, and deviations of inflation from its long-run trend. The study used the OLS technique to estimate the model and suggested that Central Bank had been preferred against targeting the gap between parallel and official exchange rates. It was considered costly economically and politically that undertaken at that point. Remarkably, these results are in line with the Central Bank's long-standing establishment of a multiple exchange rate and may indicate a process of learning, considering the monetary authorities' preferences.

Otero and Ramírez (2009) worked on the Colombian Central Bank’s monetary policy reaction function using time series data from 2001 to 2007. The study included relevant variables foreign interest rate, Unemployment rate, Nominal exchange rate, Gap between Observed Inflation and targeted Inflation and Bank Rate in the small and open economies like Colombia. This study used ordered probit model to estimate the variables. The study showed that once Central Bank increases the bank rate during observation (the positive gap between observed inflation and targeted inflation) did not decrease when it is negative. During forecasting the efficiency of the model, it appeared strong for both within and outside the estimated period. External variables and economic activity are also considered during setting the interest rate of interference. It is also found that Central Bank is more responsive to achieving targeted inflation rather than reducing the inflation.

Astar (2010) examined that Tylor’s rule may be suitable for economies endorsing inflation targeting. It is also indicated that it does not work well when the exchange rate is introduced in the model while estimating the Tylor

rule for developing countries. As Ahmad and Malik (2011), found non-linearity in the reaction function because behavior to inflation rate was more than 6.4% which is more threatening than low inflation. Çaglayan and Yasmin and Afzal (2012) Keynesian model of inflation worked well in Pakistan and paved a way for inflation targeting to be implemented because inflation and output have a certain sign in the Tylor-type interest rate rule although exchange rate depreciation and real exchange rate are also Significant for the economy of Pakistan. Agu (2007) found that the Monetary authorities of Nigeria considered the inflation rate as the primary variable in the policy and there is no evidence of the impact of oil prices on the policy framework.

Aleem and Lahiani, (2011) examined the monetary policy reaction function rule for Pakistan's economy to examine the behavior of interest rate using the quarterly data from 1992 Q1 to 2008. Treasury bill, inflation, output gap, energy and food, CPI, discount rate, nominal exchange rate, call money rate, federal funds rate, and variables are selected to construct the model. GMM technique is used to estimate the policy model. To keep the currency rate stable, the State Bank of Pakistan's SBP affects the foreign exchange market. The federal funds rate must be included in the State Bank of Pakistan's response function as part of Pakistan's monetary policy. Developing countries' business cycles are substantially shorter than industrialized Countries. The central bank of a developing economy like Pakistan must take into account the length of the business cycle to set the behavior of the interest rate.

Tolulope and Ajilore (2013) investigated the inflation-targeting monetary policy method in Nigeria and evaluations of the policy response tasks. The paper used the quarterly data from 2000:1 to 2010:4 with the help of the Engle-Granger method and co-integrated. The study applied the monetary policy functions gives the desirable results like price stability in the country that is considered with determining inflation for a very long period. So, the conclusion of that paper was monetary policy needed the fiscal policy to give the desirable aims.

Tariq and Kakakhel (2018) analyzed the monetary policy reaction function for the (SBP) state bank of Pakistan using the Taylor rule for the open economy framework. In this study time, series data is used that covered the period of 1973 to 2015. Target variables are inflation rate, interest rate, GDP, exchange rate, money supply growth rate, the balance of trade, and the consumer price index of Pakistan is considered in the model. (OLS) ordinary least square technique is used to estimate the model. It appears that the state bank of Pakistan follows the open economy framework of the Taylor rule because it responds to both, the fluctuations in the rate of interest and exchange rate. It also appears that Pakistan's monetary policy looks constant in different exchange rate systems. The inclusion of a real exchange rate strengthens the effectiveness.

Taguchi and Khishigjargal (2018) highlighted the monetary policy framework for Mongolia under inflation targeting. This study used quarterly data from 2007 to 2017. Key variables are Exchange rate, output gap, inflation rate, policy interest rate and consumer price index added to construct the model and (GMM) generalized method of moments technique is used to estimate the model. The inflation-targeting policy appeared as a rule that responds to inflation in a forward-looking manner. However, inflation responsiveness appeared not powerful enough that the actual policy rate is still pro-cyclical to inflationary pressure. The policy rule of Mongolia appeared responsive to the movement of the exchange rate due to the floating fear.

Owusu (2020) tried to compare and estimated the monetary policy reaction functions between the Swedish central bank (SCB) and the European central bank (ECB) with the help of quarterly time series data from 2007 to 2017 and applied the Taylor rule. They found the three types of results. First, the predictable model shows that, compared to the ECB, the SCB is an invader based on its expected output gap and inflation. Second, the adopted model positively tracks both countries' banks with actual interest rates and through with positive absences. And the third one is related to arguments about the baseline model by exploring extra determinants that appropriately describe the SCB and ECB monetary policy. However, the short-term interest rate and real exchange rate of the European central bank impact the Sweden central bank's monetary policy. While the rate of interest explained both countries' MP, the real rate of exchange explained the SCB monetary policy instead of the ECB.

Mushtaq et al. (2020) analyzed the testing of modified and non-modified Taylor rules for inflation targeting in Pakistan. In this study treasury bills of 12, 6, and 3 months are used and the model is estimated by OLS and GMM techniques. The variables like Exchange rate, interest rate, and real GDP are used to construct the model. The State bank of Pakistan did not follow the Taylor rule in its monetary policy to target inflation. Interest rate smoothing and differenced lagged exchange rate, and short-term interest rate appeared Significant and positive only in GMM estimation. A flexible inflation targeting should be adopted to target inflation in Pakistan. The State Bank of Pakistan (SBP) should be independent in its decision-making.

In previous literature, we have observed that there is no perfect monetary policy for all economies, they have used different kinds of policies to meet their targets. Some studies have shown that the Taylor rule is preferable, and some studies showed that the McCullum rule is preferable in designing the monetary policy reaction function. In Pakistan, the Taylor rule is not preferred for inflation targeting but some studies preferred the Taylor rule to design monetary policy for inflation targeting. According to previous studies and literature review, Treasury bills of 3,6, and 12 months, coupon rates, and call money rates are used to estimate the model to test the inflation targeting in different economies as well as for the economy of Pakistan. In this study, we use Average Treasury bills, Average Coupon rates, and average call money rates as the dependent variable to estimate the model, and these variables are not considered in any previous study, certainly for the economy of Pakistan.

III. MODEL SPECIFICATION

In this study, we have used an open and closed economy macroeconomic model for the economy of Pakistan. Broadly, researchers design their models in a way that they can accommodate linkages with empirical pieces of evidence. It is found in empirical studies that both the real output and the rate of inflation show inertia over the business cycle. So, both the variables are depended on their lagged values. Researchers have also found that monetary policy can affect the economy only in specific lags. The changes effects of monetary policy appear first in economic activity than in the prices. In this paper, we have illustrated these features.

Rule 1: Closed Economy Macroeconomic Model

$$ATB = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \varepsilon \quad (1)$$

$$ACR = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \varepsilon \quad (2)$$

$$ACMR = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \varepsilon \quad (3)$$

ATB represents the average treasury bills for three, six and twelve months, ACR is the Average coupon rate of three, five and ten years. ACMR represents the Average call money rate. OG is the Output gap[5] and CPI represents the consumer price index taken as the measure of inflation.

Rule 2: Open Economy Macroeconomic Model

We extend our model (backwards-looking macroeconomic model) to comprehend the external description of the economy. The discussion particularly about the open economy focuses on the formation of the economy which underlines the presence of indirect and direct effects of the real exchange rate on the inflation rate and real economic activity. Here, the key problem to be considered that how monetary policy studies the role of the rate of exchange, which functions as the framework of the backwards-looking model of the open economy.

$$ATB = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \alpha_3 DLOFNEER + \varepsilon \quad (4)$$

$$ACR = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \alpha_3 DLOFNEER + \varepsilon \quad (5)$$

$$ACMR = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \alpha_3 DLOFNEER + \varepsilon \quad (6)$$

In equation 4, ATB s for three, six and twelve months, DLOFNEER represents the Differenced log of the nominal effective exchange rate.

III.I. DYNAMIC LINEAR TAYLOR RULE

The main objective of monetary policy is to stabilize price fluctuations in the economy to maximize the welfare of society. To achieve this purpose policymakers assumed to minimize the loss function to restrain how the effect of change in the policy tool communicates to the economy. During the set of the current value of monetary policy tool, the central bank considers the future stream of the predictable OG and expected rate of inflation. Previous studies show the common estimation of Dynamic Taylor rules which are amplified with lagged interest and are fixed in a variety of macroeconomic models. These studies suggest predictable statistics about the movements of interest rate in the future than actual evidence in the yield curve. We have extended our research to study more generally the influences of the Taylor rule.

$$ATB = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \alpha_3 DLOFNEER + \alpha_4 ATB_i(-1) + \varepsilon \quad (7)$$

$$ACR = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \alpha_3 DLOFNEER + \alpha_4 ACR_i(-1) + \varepsilon \quad (8)$$

$$ACMR = \alpha_0 + \alpha_1 OG + \alpha_2 CPI + \alpha_3 DLOFNEER + \alpha_4 ACMR_i(-1) + \varepsilon \quad (9)$$

We estimated ATB, ACR, ACMR, OG, and CPI and in these equations, we added a lag of average treasury bills of one year. We have estimated NEEER (Nominal Effective Exchange Rate). We compared the certainty of these

[5] Output gap (OG) measures business cycle. Positive values of OG show boom while negative values exhibit recession. To measure output gap, we have applied Hedrick-Prescott (HP) filter method.

variables in the Dynamic Taylor rule model. The motive to study the performance of that particular equation is to explore that treasury bills and coupon rates are thought to carry a lot of information about market expectations.

IV. DATA AND METHODOLOGY

In this study, quarterly data is used from 2005q1 to 2020q3 for the economy of Pakistan. Variables ATB average of three, six, and twelve-month treasury bills, ACR average of three years, five years, and 10 years, coupon rate, ACMR, CPI, NEER, the difference of lag of nominal effective exchange rate (DLOFNEER), one year lag of average treasury bills (ATB-1) and OG. Databases like the world development indicators and the Statistical bulletin of the SBP (various issues) and the Pakistan Economic Survey (various issues) have been used to collect the data. We have converted monthly data (high frequency) into quarterly data (low frequency) by applying the average observation conversion method. The OLS technique is applied to estimate the models.

V. RESULTS AND DISCUSSIONS

In this paper, we have estimated static and Dynamic Taylor rules for the economy of Pakistan to postulate the behavior of SBP regarding its monetary policy. We have discussed in detail the techniques we use to estimate the models.

Table 1: OLS Estimates of Static Linear Taylor Rule

Explanatory Variables	Rule 1: Closed Economy Macroeconomic Model Results: A Static Analysis		
	ATB	ACR	ACMR
Intercept	7.4617(0.0000)	9.7385(0.0000)	7.9846(0.0000)
OG	-0.1284(0.1627)	-0.1278(0.0389)	0.1028(0.3809)
CPI	0.2132(0.0000)	0.0301(0.3395)	0.1414(0.0224)
Diagnostics Statistics			
Adj-R^2	0.27	0.04	0.07
DW	0.15	0.14	3.45
ADF-Residuals	-2.09(0.0487)	-1.74(0.0016)	-2.28(0.0791)
F-stat (Prob)	(0.0001)	(0.0925)	(0.0382)

Note: Values in parentheses are probability values.

Table 2: OLS Estimates of Static Linear Taylor Rule

Explanatory Variables	Rule 2: Open Economy Macroeconomic Model Results: A Static Analysis		
	ATB	ACR	ACMR
Intercept	7.4496(0.0000)	9.7226(0.0000)	7.9662(0.0000)
OG	-0.1275(0.1683)	-0.1266(0.0402)	0.1042(0.3767)
CPI	0.2146(0.0000)	0.0319(0.3115)	0.1435(0.0214)
DLOFNEER	0.0286(0.5579)	0.0376(0.2451)	0.0436(0.4851)
Diagnostics Statistics			
Adj-R^2	0.23	0.05	0.06
DW	0.16	0.21	0.49
ADF-Residuals	-2.06(0.0587)	-2.03(0.0704)	-2.33(0.0633)
F-stat (Prob)	(0.0003)	(0.1071)	(0.0730)

Note: Values in parentheses are probability values.

We have estimated the macroeconomic model for the economy of Pakistan. This model is based on static analysis using ATB of 3, 6, and 12 months as the dependent variable. The Treasury bill is a short-term government debt agreement backed by the monetary authority of a country with the maturity of 3, 6, and 12 months are usually sold at $1000 face value, their value may reach the maximum face value of $5Million in non-competitive bids. The results indicate that the OG has a negative and insignificant relationship with the dependent variable ATB as the probability value is (0.162) which exceeds the level of significance of 5% but CPI has a positive significant impact on the dependent variable ATB. OG has a negative insignificant impact on ATB. All the models have autocorrelation problem which is represented by DW statistic. ATB and ACR models have negative autocorrelation because their values are close to zero while positive autocorrelation in ACMR model because its calculated value approximately approach to 4. The variables are cointegrated in all the models because the probability values of ADF of residuals are significant. OG has a negative but significant impact on ACR and the probability value of CPI shows that CPI has a positive but insignificant impact on ACR. OG has an insignificant but positive impact on the dependent ACMR. Results in the table also indicate that CPI has a positive and significant impact on the dependent variable ACMR as the probability value lies in the significance level.

We have extended our model (backwards-looking macroeconomic model) in this section to comprehend the external description of the economy. The discussion, particularly about the open economy focuses on the formation of the economy which underlines the presence of indirect and direct effects of the real effective exchange rate on the inflation rate and real economic activity. OLS test is applied to the static linear Taylor rule for the open economy (Rule 2).

In the second rule, we have added the DLOFNEER which is positively correlated but has an insignificant impact on the dependent variable ATB. CPI has a positive and significant impact on ATB, and we found an insignificant and negative impact of OG on the dependent variable ATB. The results obtained by the OLS test are not satisfactory which means that monetary authorities do not follow the Taylor rule. DW statistics represent problem of autocorrelation. ADF statistic of residuals reflects that the variables are cointegrated and thus results of the model are reliable. We have found OG has a significant but negative impact on ACR. CPI and DLOFNEER have a positive but insignificant impact on the dependent variable ACR. CPI has a positive and significant impact on ACMR. OG and DLOFNEER have a positive but insignificant impact on ACMR.

We have discussed the macroeconomic model of an open economy with the inclusion of (LAGOFATB) the lag average treasury bills. When frequently estimated dynamic Taylor rules with a lagged interest are integrated into several macroeconomic models, recent research demonstrates that they suggest a higher amount of predictable information about future interest rate movements than is visible in the yield curve. In addition to the Lag of average treasury bills, we broaden the analysis to incorporate the predictability of the Taylor rule's arguments—CPI as a measure of inflation, a difference in the lag of nominal effective exchange rate and the output gap—in a broader sense.

Table 3: OLS Estimates of Dynamic Linear Taylor Rule

Explanatory Variables	Rule 3: Open Economy Macroeconomic Model Results: A Dynamic Analysis		
	ATB	ACR	ACMR
Intercept	0.0102(0.1652)	0.1066(0.3875)	0.0085(0.9290)
OG	-0.0005(0.3605)	0.0019(0.7336)	0.0049(0.5810)
CPI	0.0003(0.3797)	0.0005(0.8554)	0.0001(0.9812)
DLOFNEER	0.0002(0.4189)	-0.0015(0.6047)	-0.0031(0.5077)
LAGOFATB	0.9984(0.0000)	---	---
LAGOF ACR	---	0.9904(0.0000)	---
LAGOF ACMR	---	---	1.0016(0.0000)
Diagnostic Statistics			
Adj-R^2	0.99	0.99	0.99
DW	1.11	1.04	1.04
LM Stat	1.11(0.2840)	0.10(0.9008)	0.15(0.8599)
ADF-Residuals	-2.44(0.0346)	-1.44(0.0549)	-1.27(0.0360)
F-stat (Prob)	(0.0000)	(0.0000)	(0.0000)

Note: Values in parentheses are probability values.

We have analyzed the dynamic Taylor rule for an open economy by adding (LAGOFATB) with a lag of one year. We have estimated the dynamic model by applying the OLS test and found LAGOFATB positive and significant. OG is negatively insignificant but CPI and DLOFNEER have a positive but insignificant impact on the dependent variable ATB. DW statistic is not applicable due to lag of dependent variables are as a independent variable in each respective model. Values of the LM test are insignificant which shows the problem of autocorrelation does not exist in the models. ADF-Residuals reflects that the variables are cointegrated. LAGOFATB is also positive and significant like the previous, but DLOFNEER is negative and insignificant. CPI and OG have a positive but insignificant impact on the dependent variable ACR. DLOFNEER is negatively insignificant, but CPI and OG are positive but insignificant to the dependent variable.

VI. CONCLUSIONS AND POLICY IMPLICATIONS

In this paper, we examined static and dynamic Taylor rules to analyze the inflation targeting in Pakistan with the help of nominal exchange rate and treasury bills. In this study, we have used quarterly data from the period 2005q1 to 2020q3. OLS is applied and found that the SBP did not follow the Taylor rule because the results are not satisfactory. In this paper, we have obtained mostly insignificant results which show that monetary authorities do not follow the Taylor rule in their monetary policy to target inflation. The policy has not been consistent during

the sample period because parameters in the policy reaction function have been discovered to be unstable. The study has examined various specifications of the Taylor rule to test the behavior of SBP during the setting of monetary policy. We have estimated rule 1 by OG and CPI with ATB, ACR, and ACMR. We use OLS to estimate the rule. We have found OG negative and insignificant with ATB but significant with ACR and positively insignificant with ACMR. CPI appears positive and significant with ATB and ACMR but insignificant with ACR. These results highlight that the Taylor rule is not being followed by SBP to estimate the reaction function in Pakistan. In rule 2 we added the DLOFNEER the difference of lag of nominal effective exchange rate to expand our study. In this section, we find DLOFNEER insignificant to ATB, ACR, and ACMR which highlights that SBP does not consider the nominal exchange rate in its monetary policy reaction function. OG and CPI have the same results as in Rule 1. We have extended and estimated rule 3 by adding LAGOFATB which appears positive and significant with ATB, ACR, and ACMR. We find all other variables insignificant with ACMR, ATB, and ACR which reflects that LAGOFATB has a more powerful impact than other variables to estimate the monetary in Pakistan. The underlying study presents the following policy suggestions based on findings:

- First, monetary authorities may put more emphasis on price stability and economic activity stabilization rather than interest rate smoothing and exchange rate stability.
- The policymakers may defer interest rates and currency depreciation in the reaction as this function is helpful in the stability of the financial system and international trade.
- Financial and external sector stability is justifiable if it benefits social welfare. As a result, the exchange rate management and interest rate smoothing may be included in the policy reaction function if only social welfare is not compromised.

Monetary authorities' opportunistic behavior does not promote societal welfare, and the simple Taylor rule can accomplish rationally better than the non-linear rule with stable parameters. For this purpose, SBP may implement linear rules in its monetary policies as it minimizes uncertainty.

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