

IDENTIFICATION OF ACTIVE AND PASSIVE REGIMES OF FISCAL AND MONETARY POLICIES IN PAKISTAN

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Abstract. *Fiscal and monetary policies are two important macroeconomic policies which work by adopting different policy regimes to achieve the desired objectives. The present study is an endeavor to identify active and passive policy regimes and attempts to reveal the relatively more dominant policy in case of Pakistan. The study by utilizing time series annual data from 1972 to 2022 uses monetary and fiscal policy reaction functions to reveal the overall active or passive behaviors of fiscal and monetary policies. The study further uses recursive estimation technique and empirically estimates the fiscal and monetary policy reaction functions to identify the year-to-year policy regimes adopted by authorities in Pakistan. Money market rate in taken as proxy for monetary while budget deficit as a percent of GDP is taken for fiscal policy. Output gap, inflation rate, debt as a percentage of GDP, and nominal exchange rate are the study variables. The study finds that both policies interact 40 times out of which monetary policy remained active for 29 and passive for 11 times. Similarly, fiscal policy remained active for 30 and passive for 10 times. Both policies remained pro-cyclical for 19 and counter-cyclical for 21 times. Using the max-min and min-max criteria of pay-off matrix, it is found that monetary policy is Pakistan is more dominant policy as compared to fiscal policy. To ensure the increasing effectiveness of both policies, it is recommended that the authorities should adopt the optimal policy mix by working in coordination while formulating the policies.*

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1. Introduction

Implementation of the appropriate and effective economic policies is an immense need of the countries when they aim to achieve the desired economic objectives. The effectiveness of economic policies in economic activity is one among the unsettled issues in the field of economics that requires proper concentration of

economists, researchers and policy makers. Fiscal and monetary policies are the important macroeconomic policies which perform a fundamental role in the process of growth especially in developing countries like Pakistan and therefore serve as the most important instruments to accelerate the pace of their macroeconomic performances. Both policies are used by authorities to influence economic activity and to achieve the non-inflationary sustained economic growth (Shah et al., 2021). These policies affect consumptions, investments, government expenditures and volume of exports and imports in the country which in return lead to influence the country's economic activity (Fisher, 1988). Monetary policy is primarily used to target inflation, while fiscal policy is designed to respond the state of public finances (Philippopoulos et al., 2015). Monetarists (e.g., Friedman & Meiselman, 1963; Friedman & Schwartz, 2008) believe in monetary policy whereas, Keynesians, believe that fiscal policy is more efficient to boost the economic activity in the country. However, to keep the economy on a right track, there is a dire need of well- functioning, sound and well- coordinated fiscal and monetary policies in the country. Monetary policy in Pakistan has a number of objectives, including price stability and a non-inflationary growth, as well as maintaining the stable exchange rate and favorable current account balance which are achieved through the State Bank of Pakistan (Akhtar, 2006). The monetary authority in this context requires a suitable policy stance to ensure the alignment of policy objectives with overall economic activity (Shaheen, 2013). However, the SBP gives greater attention to inflation control as compared to output growth, financial and exchange rate stabilities (Qayyum, 2008). Similarly, role of fiscal policy is prominent in influencing the policy outcomes by bringing variations in the aggregate demand's components. Hence, to ensure the policy effectiveness, a better interactive coordination between them is necessary both in terms of achieving the policy objectives and the country's economic performance (Ozer & Karagol, 2018; Shaheen, 2013). Both policies adopt different policy regimes time by time to make their operations effective and desirable. It is therefore the main concern of this study to unveil the active and passive fiscal and monetary policy regimes and to explore which policy is relatively more dominant in case of Pakistan.

1.1 Active and Passive Policy Regimes of Fiscal and Monetary Policy

Fiscal and monetary authorities are two agents who work together. Who will set the policy first? This opens the debate for the selection of appropriate policy regimes in the country. Both fiscal and monetary policies continue their coordinated operations by framing different policy regimes. These regimes shift regularly over time which is a continuous process of regime switching (Chung et al., 2007; Davig et al., 2006). Active and passive policy regimes of these policies are studied by several researchers (e.g., Afonso et al., 2019; Bianchi & Melosi, 2019; Bhattarai et al., 2014; Davig & Leeper, 2011; Juhro et al., 2022; Leeper & Leith, 2016; Sharma et al., 2022) among others. Fiscal policy can be active in one

time along with passive monetary policy while it can be passive in other time along with active monetary policy. Similarly, both policies may operate actively in some time while both can be passive in any other time. Policy effects on economy therefore come differently under different policy regimes. Moreover, long term stability can be achieved by using two scenarios of combined monetary-fiscal regimes. According to Leeper (1991), one is the "active monetary policy" (AM) in combination of "passive fiscal policy" (PF) and the other is the "passive monetary policy" (PM) in combination of "active fiscal policy" (AF). In Taylor rule, interest rate is actively adjusted to achieve the objectives of output and price stability which represents active monetary policy. But when the Taylor principle is violated and monetary policy reacts in a passive manner to rising inflation, it is referred to as passive policy. Similarly, in terms of fiscal policy, the government responds slowly to changes in debt levels during the active regime and focuses on the primary goal of economic growth.

Leith and Lewis (2000) revealed that monetary policy which satisfies Taylor rule is said to be active and dominating. In contrast to findings of Leeper (1991), the researchers argue that both policies should be active or passive at the same time when restoring the stability and assuring the long-term growth are desired. However, Melitz (2002) analyzed the fiscal and monetary policy reaction functions and indicates that both policies tend to move in different directions. Hence, a careful amalgamation of fiscal and monetary policies is important which can produce better prospects for boosting the momentum of economic activity. Therefore, countries have to determine the optimal policy regime of both policies to ensure the policy effectiveness in terms of economic growth. Therefore, to achieve the policy goals effectively, fiscal and monetary authorities in Pakistan need to establish suitable policy regimes with respect to prevailing economic conditions. It therefore needs to explore which regimes of monetary and fiscal are adopted by the fiscal and monetary authorities in Pakistan over the period of time. If the fiscal authority comes first to set the policy, chooses a specified combination of taxes, spending and debt and ignores the consolidated government budget constraint, in such case, fiscal policy remained active by leaving monetary policy passive. This is referred as active fiscal, passive monetary policy regime in literature. However, when monetary authority comes first to set the policy by adjusting a specific volume of money supply and the fiscal authority, after this and accordingly, moves to set the combination of taxes, spending and debt, this is known as active monetary passive fiscal policy regime in the literature. In Pakistan, fiscal and monetary policies have been working together under different policy regimes. There are broadly four classifications of these policy regimes: active fiscal active monetary (AF/AM) regime, active fiscal passive monetary (AF/PM) regime, passive fiscal active monetary (PF/AM) regime and passive fiscal passive monetary (PF/PM) regime. An endeavour is made through this study

to identify these policy regimes over the study period (1972 to 2022) and to conclude which policy is relatively more dominant in Pakistan.

2. Econometric Models and Methodology

This study attempts to identify active and passive regimes of fiscal and monetary policies throughout the study period in Pakistan. Which either active or passive, it depends on the coefficients of the estimated monetary and fiscal policy reaction functions (Models 1 and 2 respectively). The reaction functions are first used to identify the active and passive regimes of fiscal and monetary policies by looking at the average behavior of policies, rather than their period-to-period behaviors. These reaction functions are then used to identify different policy regimes on yearly basis over the study time period that when these policies remained either active or passive. The study identifies that how many numbers of times are there in which both fiscal and monetary policies in Pakistan have been found pro-cyclical i-e (active fiscal - active monetary or passive fiscal - passive monetary) and similarly, for how many periods, fiscal and monetary policies have been appeared counter cyclical i-e (active fiscal – passive monetary or passive fiscal – active monetary). The identified fiscal and monetary policy regimes are summarized with the help of a pay-off matrix which demonstrates the number of times where both policies have remained either active or passive in Pakistan. By using the max-min and min-max criteria of pay-off matrix, the study attempts to reveal which either monetary or fiscal policy in Pakistan remained more dominant relatively.

This study concentrates on the important objectives of output and price stability as these are the main targets of such policies. Besides these, some other variables which are expected to play role in explaining the behaviors of fiscal and monetary authorities regarding fiscal and monetary policy operations are also considered. In this connection, inflation, output gap, public debt and exchange rate are expected to have greater importance in explaining the interest rate in the monetary policy reaction function and the budget deficit in the fiscal policy reaction function.

2.1 Monetary policy reaction function

The present study uses the econometric model postulated in the following linear specification for the monetary policy reaction function, based on the Taylor (1993) framework.

$$r_t = \alpha_0 + \alpha_1 INF_t + \alpha_2 OG_t + \alpha_3 ER_t + \alpha_4 DR_t + \alpha_5 r(-1) + \mu_t \dots \dots \dots (1)$$

Where, r_t in the model represents the money market rate and used as an instrument of monetary policy in the reaction function. INF_t represents inflation, OG_t represents the output gap, ER_t is used for the nominal exchange rate and DR_t is for debt to GDP ratio.

The present study estimates the dynamic version of monetary policy reaction function because there is always inertia in policy decisions. Therefore, the lagged money market rate $r(-1)$ is introduced to allow a partial adjustment of the actual to the optimal interest rate with α_5 the coefficient of adjustment. In case $\alpha_5 = 0$ that will mean complete adjustment within each period. Moreover, equation 1 is a linear function; hence, it can be estimated by using simple OLS subject to the satisfaction of time series properties. If the properties of time series are not satisfied, the results would not be consistent (Enders, 2004). To get the consistent results, the study therefore conducted the ADF and PP tests to check and handle the unit root problem as stationarity is considered as an important precondition for time series analysis.

In terms of monetary policy, reaction functions are often based on interest rates. This study uses money market rate as proxy of monetary policy. Numerous studies in the literature (e.g., Bernanke & Mihov, 1998), among others, have used money market rate as proxy of monetary policy. There are some studies including Romer and Romer (2004) that used discount rate as policy variable but according to Mariyam and Malik (2020), it is not an appropriate proxy to represent the monetary policy as compared to money market rate. Altavilla (2003) analyzed numerous reaction functions to determine how the monetary authority should set the interest rates when real output level, inflation and the exchange rate change. Inflation and output are the main variables which are the key objectives of monetary policy (Romer, 2006). Both variables are also used by Malik and Ahmad (2010) in their study in case of Pakistan. However, several researchers (e.g., Corsetti & Pesenti, 2005; Gerlach & Smets, 2000; Kara & Nelson, 2003; Malik & Ahmad, 2010) have emphasized on the importance of external variables like exchange rate and debt in addition to objective variables in order to accomplish a better assessment of monetary policy dynamics. Monetary authority targets the inflation explicitly as well as targets the other related economic variables implicitly to achieve the policy objective (Svensson, 1997). This study uses CPI inflation which in case of Pakistan can be used as a potential indicator of inflation (Saghir, 2014). It is used as one of the important variables by Garratt et al. (2003) to examine the case of monetary policy. Moreover, in most traditional analysis, monetary policy is assumed to act freely to adjust the instrument of monetary policy which is termed as Ricardian Regime by Sargent (1982). Monetary policy is therefore modeled in a way that can ensure consistency with these objectives.

2.1.1 Testing for active and passive monetary policy

The average behaviour of monetary policy in Pakistan remained either active or passive; it depends on the values of coefficients in the monetary policy reaction function. Since the main concern of the monetary authority is the price stabilization, the present study therefore assumes that the coefficient of inflation i-e

α_1 is positive i.e. (> 0), it means that if the inflation increases, the monetary authority will adopt a tight monetary policy by increasing the rate of interest. According to Cioran (2014), a considerable relationship exists between interest rate and inflation rate and the former therefore is a useful instrument that central banks can use particularly to control inflation. Any positive response to inflation would indicate the counter inflationary monetary policy that is the policy in such case will be active rather passive. The presence of such counter cyclical monetary policy would lead to the desired expansion of output (Ireland, 2010). Output gap is the next variable in the monetary policy reaction function which is an important consideration for policymakers to take into account. It is the economic measurement to express the gap that exists between the actual output and potential output in an economy. Theoretically, the difference of actual and potential GDP reflects the economy's cyclical situation. When actual GDP exceeds potential GDP, unemployment falls and when real GDP falls below potential GDP, unemployment rises. According to Jahan and Mahmud (2013), the output gap suggests that the economy is running at an inefficient rate that is either over-working or under-working its resources. Because output gap indicates whether the economy is overheating or underperforming, it has therefore immediate implications for monetary policy (Mathai, 2012). In the monetary policy reaction function (Eq. 1), the coefficient value for the output gap is therefore assumed to be positive which if appears would mean that monetary policy is dominantly active rather passive throughout the span of study period. It would mean that monetary policy is capable to bring expansion in the output.

Moreover, public debt and foreign exchange rate also play a significant role in explaining the government policy. Changes in these variables have significant implications for the country's monetary policy, especially in developing countries like Pakistan. These variables may have considerable effects on interest rates; therefore, these are taken as independent variables in the monetary policy reaction function. Along with responding to inflation and the output gap, the SBP also reacts to changes in the level of country's debt. Debt variable may therefore be included in the interest rate rule of monetary policy reaction function to get robust results. Kumhof, et al (2010) included both inflation and debt in the interest rate rule. Hence, the variable of public debt is taken in the model by considering its proxy as debt to GDP ratio. The coefficient value provided by debt to GDP ratio will help in the identification of the monetary policy behaviour towards its policy objectives. An insignificant estimated value of debt to GDP ratio would indicate that monetary policy remained active over the sample period in terms of its primary objectives. It means that no response to debt will indicate about the active monetary policy regime in the policy perspective and vice versa.

2.2 Fiscal Policy Reaction Function

The present study uses the econometric model postulated in the following linear specification for the fiscal policy reaction function.

$$BD_t = \beta_0 + \beta_1 INF_t + \beta_2 OG_t + \beta_3 ER_t + \beta_4 DR_t + \beta_5 BD(-1) + v_t \dots \dots (2)$$

Where, BD_t represents the budget deficit and used as an instrument of fiscal policy in the reaction function. INF_t represents inflation, OG_t represents the output gap, ER_t is used for the nominal exchange rate and DR_t is for debt to GDP ratio.

The present study estimates the dynamic version of fiscal policy reaction function because there is always inertia in policy decisions. Therefore, the lagged budget deficit $BD(-1)$ is introduced to allow a partial adjustment of the actual to the optimal budget deficit, with β_5 the coefficient of adjustment. In case $\beta_5 = 0$ that will mean complete adjustment within each period. Moreover, equation 2 is a linear function; hence, it can be estimated by using simple OLS subject to the satisfaction of time series properties.

It is evidenced in the literature (e.g., Woodford, 2001) that fiscal policy affects inflation in economy. However, it is widely believed that output gap and inflation could be the short run objectives while debt is believed as the long run objective of fiscal policy. These are the key variables which this study uses in fiscal policy reaction function. Khalid et al. (2007) used output gap and inflation as the fiscal policy objectives and fiscal deficit as fiscal instrument. The evaluation of fiscal policy, especially in the case of developing countries like Pakistan, is typically focused on the budget balance, which is most commonly a budget deficit in these countries. In general, the aim of governments is to reach some specified level of primary surplus in order to reduce the total amount of outstanding public debt. Therefore, budget deficit (as results of budgetary process of fiscal authorities) is commonly used as the dependent variable for the regressions in such fiscal reaction functions. However, the explanatory variables used in such regressions differ from study to study. Researchers (e.g., Afonso et al., 2019; Bohn, 1998) have included the output gap and debt in the models to assess the case of fiscal policy.

2.2.1 Testing for active and passive fiscal policy

The primary objectives of fiscal authority are to ensure the output and debt stabilization. Any unanticipated expansion of the budget deficit can affect the volume of debt which then affects the other macroeconomic variables indirectly. The sign of β_1 is ambiguous since it depends on fiscal policy's preference for inflation. However, if the fiscal authority is concerned about inflation, β_1 is likely to be positive, implying that the budget deficit will grow as inflation rises.

However, if the fiscal authority is not concerned with inflation primarily, the sign of β_1 is likely to be negative, resulting in an excessive budget deficit. Since fiscal policy is more concerned with the fiscal sustainability, the main consideration of the fiscal policy reaction function will be upon the values of output gap and then on public debt. In the fiscal policy reaction function, the coefficient value for the output gap is therefore assumed to be positive, which if appears as positive (>0) would mean that fiscal policy is pro-cyclical rather counter cyclical over the sample period of time. The expected positive sign will indicate that as output gap grows, budget deficit also grows. Moreover, foreign exchange rate also plays a significant role in explaining the government policy that is therefore accompanied to the model. The variable of public debt is taken in the model by considering debt to GDP ratio. The coefficient value of the debt to GDP ratio will help to identify the behaviour of fiscal policy towards the policy objectives. A positive value of debt to GDP ratio would mean that fiscal policy remained active over the sample period and otherwise passive. A negative sign of the value will mean no response of debt that will indicate about the passive fiscal policy regime and vice versa.

2.3 Recursive Estimation Procedure for Policy Regimes Identification

The present study aims to examine that how many periods (within the sample period 1972 to 2022) are there where fiscal and monetary policies have remained either active or passive. The main concern of the first objective of the study is therefore to identify the active and passive regimes of fiscal and monetary policies over the years. Equations 1 and 2 are used for the purpose of recursive estimation to identify the active and passive regimes at periodic basis by looking at their period-to-period variations rather than their average behaviour. This method enables to estimate the equation repeatedly over period to period throughout the whole set of data. For example, if there are k coefficients to be estimated in the vector b , then the initial k observations are used to establish the first estimate of b . After this, subsequent observation is added to the set and $k + 1$ observations are then used to compute the second estimate of b . Procedure is repeated till the entire T sample points have been used to yield $T - k + 1$ estimates of the vector b . Monetary policy reaction function (Eq. 1) and similarly fiscal policy reaction function (Eq. 2) are used for recursive estimation purpose separately. Equations are repeatedly estimated over period to period throughout the sample set of the study period 1972 to 2022. The initial observations are used to establish the initial estimate of the vector of concerned coefficients in each equation. After this, the next consequent observations are added to compute the second estimate in the vector of coefficients in case of both functions. Coefficients of inflation, output gap, exchange rate and debt to GDP ratio are estimated for both functions for each year. The interest rate was taken as dependent variables in monetary reaction function while budget deficit was in case of fiscal reaction function to be regressed. The pattern of recursive estimation hence estimated the reaction functions repeatedly from the year 1972 to 2022 to provide the values against each

coefficient of the respective function throughout the whole set of data period. Examining t values of the objective variables (output gap and inflation) in case of both policies reveal the status of active and passive policy regimes.

2.4 Unit root analysis

The data utilized in this study for estimation of the models consists of annual observations for Pakistan over the period from 1972 to 2022. The study is hence based on time series data. Variables based on macroeconomic time series generally exhibit time variant movements which can be confirmed with the help of stationarity testing. The Augmented Dickey Fuller (ADF) and Phillips-Peron (PP) are the extensively used tests which are therefore employed with intercept and trend in this study to validate the OLS by verifying that the residuals of the reaction functions are stationary (Table 2).

The ADF test is performed using the following equation:

$$\Delta Y_t = \alpha + \delta t + \gamma Y_{t-1} + \beta \sum_{i=1}^p \Delta Y_{t-i} + \varepsilon_t \dots \dots \dots (3)$$

PP test is performed using the following equation:

$$Y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 (t-T/2) + \varepsilon_t \dots \dots \dots (4)$$

3. Data Classification and Sources

The data used for the estimation of models, consist of annual observations for Pakistan for the period 1972 to 2022. The study is hence based on time series data. The main data sources for the data used in this study are International Financial Statistics (IFS), World Development Indicators (WDI), World Bank Data Bank, State Bank of Pakistan (SBP) and Economic Survey of Pakistan.

Table 1 *Key Variables*

Variables	Status	Source
Interest rate	Money market rate	(IFS)
Budget deficit	as percent of GDP	(WDI)
Output gap	Difference between current and potential GDP (via HP Filter)	(WDI)
Inflation rate	Consumer price index (CPI)	(IFS)
Exchange rate	Nominal exchange rate (Rupee against US\$)	(IFS)
Public debt	Debt to GDP ratio	(WDI)

4. Results and Discussion

This study aims to identify the active and passive regimes of fiscal and monetary policies and to reveal which policy is more dominant in case of Pakistan. To identify the policy regimes (active and passive regimes) which took place with

respect to time in Pakistan, this study estimates the baseline models 1 and 2. For empirical estimation, the study uses recursive estimation technique to identify year to year status of active and passive regimes of both policies from 1972 to 2022 in Pakistan.

4.1 Results of unit root tests

The estimation is based on the time series data consist of annual observations over the period from 1972 to 2022. Time series-based variables generally exhibit time variant movements. Stationarity test is therefore employed for its confirmation. The Augmented Dicky-Fuller (ADF) and Phillips-Peron (PP) tests have been conducted for this purpose. Results of ADF and PP tests are reported in table 2.

Table 2 Results of Unit Root Tests

Variables	ADF (Drift and		PP (Drift and Trend)		Order
	Level	First Difference	Level	First Difference	
Money Market	-3.03	-6.40*	-3.23	-6.40*	I(1)
Budget Deficit	-2.53	-7.98*	-2.45	-8.57*	I(1)
Output Gap	-2.74	-5.01*	-2.33	-5.01*	I(1)
Inflation	-3.24	-8.24*	-3.68	-8.24*	I(1)
Debt to GDP	-2.28	-5.08*	-3.05	-5.06*	I(1)
Exchange Rate	-0.03	-5.12*	1.91	-5.06*	I(1)

**shows significance at 1% indicating the rejection of null hypothesis at this level*

The obtained results of ADF and PP tests in table 2 indicate that all the variables are non-stationary at conventional levels of significance. The variables are reverted to stationarity at first difference which become significant at 1% level of significance.

4.2 Results of monetary policy reaction function

To accomplish the main objective of the study, that is, the identification of monetary and fiscal policy regimes, models 1 is initially estimated by utilizing the annual data from 1972 to 2022 and by using ordinary least square. Money market rate being a dependent variable is regressed on inflation rate, output gap, exchange rate and debt to GDP ratio. Output gap and inflation in the model represent the main objective variables of monetary policy as per Taylor framework that has been taken as a base model for monetary policy reaction function. The dynamic version of monetary policy reaction function is estimated because of the prevalence of inertia in the monetary policy decisions. The reaction function is estimated to identify either monetary policy in Pakistan appeared active or passive during the study period. The model is used to determine whether the monetary policy has been following counter inflationary stance with respect to time in Pakistan. Table 3 reports the important regression results.

Table 3 Results of Monetary Policy Reaction Function: DV: Money Market Rate

Variable	Coefficient (S.E)
Inflation	0.155* (0.038)
Output Gap	0.113** (0.049)
Exchange Rate	0.002 (0.005)
Debt to GDP	-0.007 (0.020)
Money Market Rate (-1)	0.739* (0.083)
Constant	1.271 (1.764)

R-squared = 0.74; Adjusted R-squared = 0.70; F-statistic = 22.48; F-statistic= 0.00

*, and ** represent significance at 1% & 5% respectively. Standard errors are given in parentheses

The residual series from the estimated equation of monetary policy is stationary as the null of the unit root in the ADF test as (as indicated by ADF-stats for residuals), it is therefore easily rejected at the standard level of significance; it can thus be concluded that the following results (taken from table 3) are super consistent.

$$r_t = 1.27 + 0.155\text{INF}_t + 0.113\text{OG}_t + 0.002\text{ER}_t - 0.007\text{DR}_t + 0.739\text{MMR}(-1)_t$$

(0.72) (4.07) (2.33) (0.38) (-0.37) (8.88) ...Respective t values

$$\text{ADF-stats for residuals} = -8.18 \quad \text{DW} = 2.33$$

There are some points related to these results which need further discussion. First, monetary policy remained either active or passive; it depends on the values of coefficients. Since the main concern of the monetary authority is the price stabilization, the more focus therefore puts on the coefficient of inflation. Table 3 reveals that the coefficient of inflation is positive as well as statistically significant at 1% level of significance. It means that when the inflation increases, the monetary authority in Pakistan adopts tight monetary policy by increasing the rate of interest. This positive response to inflation indicates that monetary policy in Pakistan is counter inflationary during the sample period of time. However, according to Taylor principle, the central bank's response to inflation must be at least one for one in order to prevent divergence in the system. This is because if the central bank continued its easy money policy when inflation appears above its target, prices might rise uncontrollably. The coefficient value of inflation is 0.16 that is less than 1 which means that the magnitude of inflation in this result is different than the magnitude prescribed by Taylor (1993). This indicates that monetary policy has a pro-cyclical reaction to the business cycle which could be attributed to the prevalence of economic shocks that were outside the scope of the monetary sector. However, this may not be attributed to the overall ineffectiveness of monetary policy only, but this might be due to a fact that the policy was also not pursued independently. In Pakistan, before 1990s, the SBP was primarily directed by the government. Monetary authority only gained quasi-independence as a result of financial sector reforms implemented in the early 1990s. Since then, the job has

been given to the SBP, but it is being carried out with considerable discretion. These results are in line with the findings of Shah et al., (2021).

Second, the output gap is a strong consideration for policymakers to take into account. Since the output gap indicates whether the economy is overheating or underperforming, it has therefore immediate implications for monetary policy (Mathai, 2009). Results given in table 3 shows that the coefficient value for the output gap is positive as well as statistically significant at 5% level of significance in the monetary policy function, which means that monetary policy remained active. Looking at the average behaviour of monetary policy rather than period to period variations, it can be concluded that monetary policy operated counter inflationary throughout the study period. The results support the findings of Malik (2007).

Fiscal Responsibility and Debt Limitation Act (2005) entitles the SBP as in-charge of managing the government debt. In this way, central bank has an additional role to prevent the economy from excessive government borrowing which can be done through raising the interest rates. The increasing cost of borrowing discourages the excessive government borrowings. Hence, along with responding to inflation and the output gap, the SBP also reacts to changes in the level of country's debt. Debt to GDP ratio is therefore an important consideration in the monetary policy reaction function. Kumhof, et al., (2010) included debt variable in monetary policy function by evaluating the interest rate rule. Thus, the third point related to the coefficient of the debt to GDP ratio reveals about the monetary policy response in terms of debt management. Table 3 shows that the coefficient value of debt to GDP ratio is insignificant which means that monetary policy remained active over the sample period in terms of inflation and output gap but not in terms of debt management. No response to debt indicates about the active monetary policy regime in terms of the primary objective of the policy.

Fourth point related to the result is the positive and statistically significant value of the lagged money market rate which confirms that there is inertia in the monetary policy decisions in Pakistan. The partial adjustment of the actual to the optimal money market rate takes place with 74 percent. The result has importance in the monetary policy reaction function and the same Romer (2006) also suggested that the lagged interest rate should be included in the monetary policy reaction function to better capture the dynamics of monetary policy. This result can be attributed to the statement of Mariyam and Malik (2020) who stated that in case of developing countries, the inertia in policy decisions prevails which prevents monetary policy from prompt response. This is mainly because of the time lags involving in the availability of data, the less than full or a partial autonomy of the central banks and due to frequent shocks to economy. In Pakistan, the monetary policy committee while designing the monetary policy gives a considerable weight to inflation forecast, but the inertia still prevails in the policy decisions that make the response

of monetary policy sluggish to target variables. This is in line with the arguments of researchers such as (Iacoviello, 2005) in this context.

Moreover, table 3 shows that R² value is 0.74 indicating that 74 percent of the variation in money market rate is explained by the independent variables. The model is free from serial correlation. Beside this, the more concerned variables for monetary policy which are inflation and output gap in the present monetary policy function are statistically significant. Investigating the Taylor rule for Pakistan, Malik and Ahmad (2010) focused just on inflation and output gap. The researchers with a low R² value concluded that only about one fifth of the variation in the interest rate is explained by inflation and output gap. The researchers therefore argued that it is essential to further identify the factors other than inflation and output gap which can play a defining role in the monetary policy in Pakistan. In this connection, Malik (2007) stated that it is well established that in developing countries including Pakistan, the monetary authority also worries about the exchange rate and financial stabilities. The present study, therefore, extended the specification of the monetary policy reaction function by including the variables of exchange rate and debt.

It is concluded that the periods marked by an inflation rate high than the long run average rate is termed as a high inflationary period in terms of the monetary authority's reaction to a price increase. It is thus revealed that when the economy remained in a high inflationary regime, the SBP has given more weight to price stability. Moreover, the interest rate in Pakistan responds counter-cyclically to inflation if the average behaviour is considered rather than period to period movements. These findings are in line with the findings of Malik (2007).

4.3 Results of fiscal policy reaction function

To accomplish the first objective of the study, that is, the identification of monetary and fiscal policy regimes, model 2 is then estimated by utilizing the annual data from 1972 to 2022 and by using ordinary least square. Budget deficit being the instrument of fiscal policy is taken as dependent variable which is regressed on inflation rate, output gap, exchange rate and debt to GDP ratio. Following Khalid et al. (2007), output gap and inflation being the fiscal policy objectives and fiscal deficit as fiscal instrument are used in the fiscal reaction function as the decision variables. The dynamic version of fiscal policy reaction function is estimated because of the prevalence of inertia in the policy decisions. The reaction function is estimated to identify either fiscal policy in Pakistan appeared active or passive during the study period. The model is used to determine whether fiscal policy in Pakistan has been following pro-cyclical or counter cyclical behavior in its action. Table 4 reports the important regression results.

Table 4 Results of Fiscal Policy Reaction Function: DV: Budget Deficit

Variable	Coefficient (S.E)
Inflation	0.054 (0.038)
Output Gap	0.089** (0.044)
Exchange Rate	-0.003 (0.005)
Debt to GDP	-0.000 (0.019)
Budget Deficit (-1)	0.647*(0.109)
Constant	1.920 (1.591)

R-squared = 0.64; Adjusted R-squared = 0.59; F-statistic = 14.06

*, and ** represent significance at 1% and 5% respectively. Standard errors are given in parentheses.

The residual series from the estimated equation of fiscal policy is stationary as the null of the unit root in the ADF test as (as indicated by ADF-stats for residuals), it is therefore easily rejected at the standard level of significance; thus, the following results (taken from table 4) hold super consistency.

$$BD_t = 1.920 + 0.054IN_{Ft} + 0.089OG_t - 0.003ER_t - 0.000DR_t + 0.647BD_{(-1)t}$$

(1.21) (1.44) (2.01) (-0.48) (-0.01) (5.95)...Respective t values

ADF-stats for residuals = -7.54 DW = 2.24

Some points related to these results are important for further discussion. The coefficient values of the variables in the fiscal policy reaction function determine the either the policy remained active or passive over time. Since the main concerns of the fiscal authority are to ensure the output and debt stabilization in the country, the present part of the study therefore concentrates on the values of the coefficients of output gap and public debt. Table 4 reports the value of the coefficient of inflation as positive which implies that the budget deficit grows as inflation rises. This postulates that fiscal policy in Pakistan is also concerned about inflation in the country. This supports the findings of Woodford (2001) who argued that to effectively control inflation, not only an appropriate monetary policy is required, but it also needs a prudent fiscal policy. However, targeting inflation has not been the primary concern of the fiscal authority in Pakistan. The statistically insignificant value of inflation in table 4 supports this stance here. The positive coefficient value of inflation indicates that fiscal policy in Pakistan is mostly operates pro-cyclically. This is in line with the study of Khalid et al. (2007).

Since fiscal policy is more concerned with the fiscal sustainability, the main consideration of fiscal policy reaction function lies therefore on the values of output gap and public debt. Favero and Giavazzi (2007) studied debt dynamics in fiscal policy and argued that debt feedback cannot be ignored, it is important to be considered to avoid the incorrect estimation of the dynamic effects of fiscal shocks.

Table 4 shows that the coefficient value for the output gap is positive and statistically significant, which confirms that fiscal policy in Pakistan is pro-cyclical, rather counter cyclical over the sample period of time. The positive value of output gap indicates that as output grows, budget deficit also grows. This in other words means that the fiscal authority chooses to increase government spending and lower taxes during an economic expansion and reduces spending with rising taxes during a recession. These results support the findings of (Alesina et al., 2008). Moreover, the coefficient value of debt to GDP ratio is important consideration in the identification of the regime of fiscal policy whether active or passive in terms of debt stabilization. Table 4 reports that the coefficient value of debt to GDP ratio is insignificant which means that fiscal policy remained passive over the sample period. No response of debt indicates about the passive fiscal policy regime. It means that fiscal policy remained passive rather active over time in Pakistan. Looking at the policy's average behaviour rather than period to period variations, it can be concluded that fiscal policy is pro-cyclical throughout the study period. Further, the positive and statistically significant value 0.65 of the lagged budget deficit confirms that there is inertia in the fiscal policy decisions. The partial adjustment of the actual to the optimal budget deficit takes place with 65 percent. This result has importance in the fiscal policy reaction function to better capture the dynamics of fiscal policy. Moreover, the model is free from serial correlation. The value of R² is 0.64 which means that 64 percent of the variation in the budget deficit is explained by the independent variables.

4.4 Concluding the results of monetary and fiscal policy reaction functions

Looking at the average behavior of fiscal and monetary policies, rather than their period-to-period behaviors, it can be concluded that on average, monetary policy remained active whereas fiscal policy behaved passively in Pakistan. Monetary policy while responding to inflation is found relatively more responsive, however, its response to debt management remained insignificant in the reaction function. The positive sign of inflation coefficient shows positive response of monetary policy to inflation in Pakistan. It means that when inflation increases, the monetary authority adopts tight monetary policy for inflation control. It is therefore evident that the monetary authority in Pakistan remained more inclined towards price stabilization and hence the policy on average performed counter inflationary in this sense. Similarly, the positive value of output gap in the fiscal reaction function is evident that on average fiscal policy remained pro-cyclical in Pakistan. Fiscal policy while responding to debt is found non responsive. Hence primarily, the results of fiscal and monetary policy reaction functions, while looking at their average behaviour give indications that monetary policy is relatively more potent and dominant as compared to fiscal policy in Pakistan. These results support the findings of (Ali et al., 2008; Shah et al., 2021; Qayyum & Manzoor, 2018).

4.5 Recursive estimation for identification of fiscal and monetary policy regimes

To accomplish the first objective of the study, the monetary policy reaction function (model 1) and fiscal policy reaction function (model 2) are further used for the purpose of recursive estimation. This identifies the active and passive regimes of both policies like active fiscal - active monetary policy regime (AF/AM), passive fiscal - passive monetary policy regime (PF/PM), active fiscal - passive monetary policy regime (AF/PM) and passive fiscal - active monetary policy regime (PF/AM) in case of Pakistan at periodic basis. The recursive estimates of the coefficients provided separate values for each year during the study period (1972 - 2022). This method separately identified active and passive regimes of both policies and determined the periods where the policies behavior remained either pro-cyclical and (or) counter cyclical. Figure 1 represents the results of recursive estimation and indicates the years when monetary policy remained either active or passive. Figure 2 shows the status of fiscal policy regimes and Figure 3 indicates the years when both policies behaved either pro-cyclically or counter cyclically. However, no conclusive evidence is found that the fiscal and monetary authorities in Pakistan are following a particular type of regime during the study sample period. Studies (e.g., Javid & Arif, 2014; Javid et al., 2008) also revealed that there is no specific type of policy regime which was followed by the authorities over the years in Pakistan.

Monetary policy is either active or passive; it depends on resultant recursive coefficients of inflation. Year to year t values are calculated from the coefficients of recursive estimates. Insignificant values are assigned with 0 which means monetary policy is passive and 1 is assigned to significant values which mean monetary policy is active. Similarly, the significant recursive coefficients in case of fiscal policy are assigned with 1 and otherwise 0. This determined the years when the monetary policy remained active and counter inflationary and similarly the years when the policy remained passive. Same is in the case of fiscal policy. The coefficients of recursive estimates of the output gap are observed to understand the policy behaviors in terms of growth potential. The significant recursive coefficients of output gap are assigned with 1 which justifies the activeness of policies in terms of output while insignificant values are assigned with 0 which identify the passiveness of the policies in terms of output. Romer (2006) argued that inflation and output both are the main objectives of monetary policy. Both are considered as the main objectives of monetary policy in Taylor (1993) rule. Both the variables are tested for monetary policy in Pakistan by (Malik 2007; Nasir & Malik, 2011; Malik & Ahmad, 2010) in case of Pakistan. However, Qayyum (2008) stated that the SBP gives greater attention to inflation control as compared to output growth. Similarly, Mundell (2000) also argued that monetary policy is a useful strategy that is more inclined towards control of inflation. According to (Liu et al., 2021) monetary policy is said to be active when it significantly responds to inflation rate and passive otherwise. It implies that

monetary policy is active which it follows the Taylor rule and if it violates the rule, the policy is passive. Moreover, researchers (e.g., Friedman et al., 1996; Blanchard, 2003) stated that inflation targeting is a strategy which has a distinction for focusing entirely on the inflation objective. Alvarez et al, (2001) also stated that inflation should be the primary focus of monetary policy. Therefore, for regime of monetary policy, the recursive coefficients of inflation are considered. Khalid et al. (2007) considered output gap and inflation as the fiscal policy objectives and fiscal deficit as fiscal instrument. These objectives can easily be achieved when the policy is responsive in terms of debt management. In this context, Bohn (1998) established that fiscal authority reacts to increasing debt burden. The main objective of the fiscal policy is therefore to ensure the debt control in order to manage the increasing budget deficit (Bohn, 1998, 2007; De Mello, 2008). Therefore, for regime of fiscal policy, the recursive coefficients of debt are considered.

4.6 Results of active and passive regimes of monetary and fiscal policy

Using the monetary and fiscal policy reaction functions for recursive estimation, the active and passive regimes of both policies which took place over time in Pakistan are identified. There are some points related to the results that need further discussion. Data used in the discussion sections is sourced from Economic Survey of Pakistan (Various Issues), State Bank of Pakistan’s Statistical Handbook and World Development Indicators WDI, 2019.

Figure 1 and Figure 2 represent the monetary and fiscal policy regimes respectively with respect to the study sample time. Fig. 3 presents the status of regimes of both policies with respect to time which indicates for how many years both policies performed either active at the same time or behaved in opposite stances.

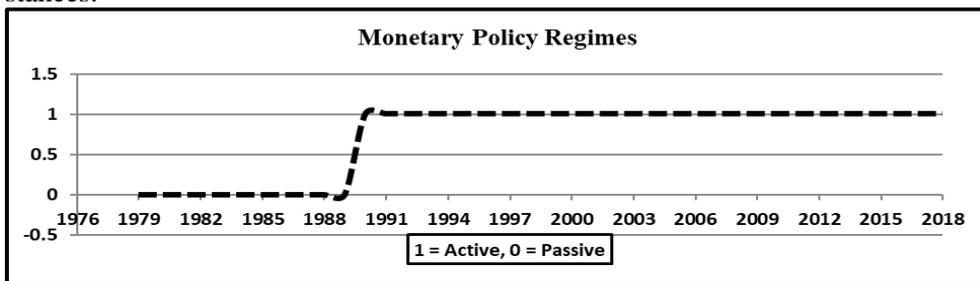


Figure 1: Active and Passive Regimes of Monetary Policy

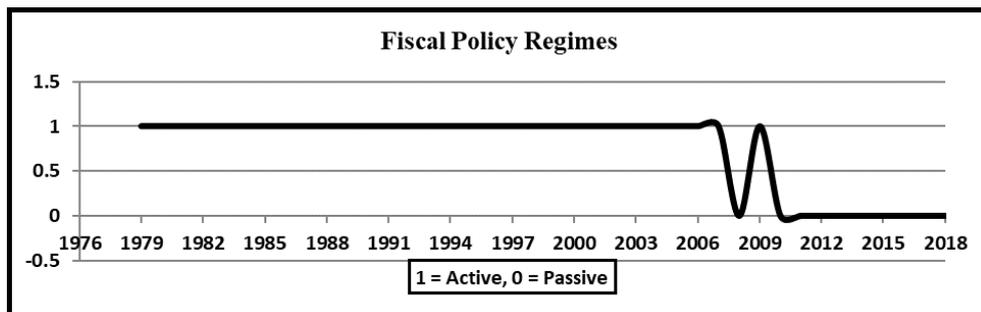


Figure 2: Active and Passive Regimes of Fiscal Policy

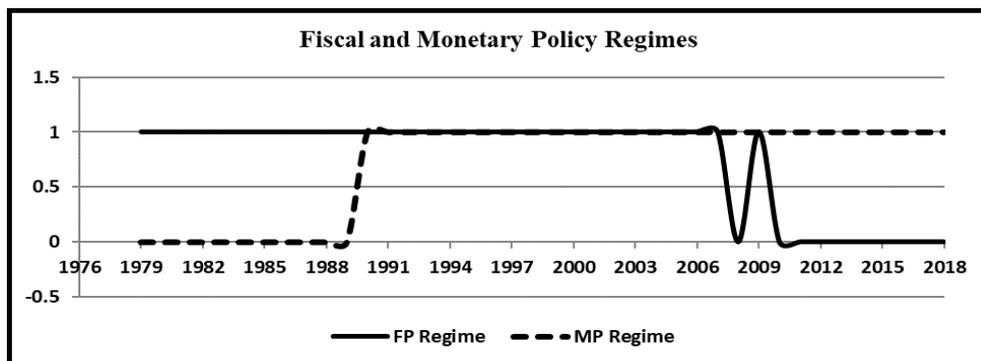


Figure 3: Fiscal and Monetary Policy Regimes

Recursive estimation results indicate that monetary policy remained passive in the initial years of the study period (Fig. 1). However, fiscal policy is identified with active behavior consecutively to continue its operations in the country (Fig. 2). A pro-cyclical behavior is established by fiscal and monetary policies when both policies were active at the same time from 1990 to 2007 and in then 2009. However, the rest years when both policies worked in opposite direction show the counter cyclical behavior of policies (Fig. 3). Insignificant recursive coefficients of inflation in recursive estimation results indicate that monetary policy did not perform actively to control inflation in the country in initial years particularly up to the year 1989. Similarly, significant recursive coefficients of debt imply that fiscal policy was performing actively in terms of debt management particularly up to the year 2007. This can be attributed to the fact that the years 1972-73 and 1989-90 in the history of Pakistan are recognized by financially suppressed periods particularly in terms of credit ceilings, lending and deposit rate regulations and subsidized as well as directed credits. The State Bank of Pakistan employed the direct monetary control strategy, which hampered banks' capacity to respond to credit demand in the economy in a smooth and flexible manner (Hanif, 2003). The passive behavior of monetary policy can be attributed to numerous problems lacking monetary and fiscal policy coordination, least effective response of policy instruments, least developed credit markets, discretionary stance of SBP on

monetary policy, political influences and excessive government intervention in policy conduct have made successful implementation of monetary policy in Pakistan difficult. In initial phase of monetary policy in Pakistan, there was a civilian government in the country which lasted from the year 1973 to 1977. The country during this period was confronted to the failure of crops, reduction of aids inflows and the consequences of first oil crisis of 1970s which caused high fiscal imbalances in the economy. To meet these imbalances, the government was forced to opt for deficit financing by keeping the stance of fiscal policy active which led to monetary expansion in the country. This was therefore a phase where the expansion of the monetary base was largely faster.

5. Conclusion

Table 5 presents a pay-off matrix to summarize the above analysis of fiscal and monetary policy regimes in a compact form. This matrix is a game theoretic approach to conclude about the number of times when each policy either remained active or passive. Pay-off matrix is useful to make columns and rows for both active and passive cases of both policies. By counting the number of regimes, the matrix highlights the high number which shows the dominance of the concerned policy. The matrix also reveals the number of times in which both policies have appeared pro-cyclical and similarly counter cyclical. The max-min and min-max criteria of the pay-off matrix is used for the combination of both policies to generate an optimal pay-off of a specific number which appeared as high in the active column. This number decides about the policy which is more dominant in the case of Pakistan during the period of study time.

Table 5 Pay-off Matrix for Fiscal and Monetary Regimes

Policies Interaction	Monetary Policy				Maxi-Min Criteria
	Pay-off	Passive	Active	Total	
Fiscal Policy	Passive	0	10	10	10
	Active	11	19	30	19
	Total	11	29	40	
Mini-Max Criteria		11	19		19

Table 5 provides a concise summary of the active and passive behaviour of monetary and fiscal policies over the sample period. Table shows that the total time periods for monetary fiscal policy interactions are 40. Out of 40, monetary policy remained active for 29 times and passive for 11 times. Similarly, fiscal policy remained active for 30 times and passive for 10 times. Table further demonstrates that both the policies remained active for 19 times which means that the both policies appeared pro-cyclical for 19 times. The rest of the 21 times, fiscal and monetary policies are found counter-cyclical. The number of periods when

both policies are counter-cyclical are more (21 times) than the time periods when both policies are pro-cyclical (19). It implies that both policies interact with each other but lack effective coordination yet. However, no conclusive evidence is found that the fiscal and monetary authorities in Pakistan are following a particular type of regime during the study sample period. Moreover, no regime of passive fiscal passive monetary policy is identified throughout the study period which means that it does not happen in Pakistan that both policies are passive at a time. However, Leeper (1991) while working on equilibria under active and passive monetary and fiscal policies argued that in case both policies are passive, policy would be incompletely specified. This regime is therefore not under consideration in the present study. Using the max-min and min-max criteria, combination of both policies generates a pay-off of the 19.19 appeared in active columns. However, fiscal policy in the active columns appeared to be active for 11 times. This implies that monetary policy in Pakistan is more dominant policy as compared to fiscal policy. The findings are consistent with the related studies on Pakistan (e.g., Ali et al., 2008; Shah et al., 2021; Qayyum & Manzoor, 2018).

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