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# Analyzing the Economic Growth of Pakistan: A Comprehensive Study of Fiscal and Monetary Policy Dynamics from 1991-92 to 2021-22

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*ABSTRACT*
***Purpose:*** *The present study was aimed at assessing the effectiveness of Fiscal Policy Dynamics in terms of Total Expenditure, Total Revenue and Fiscal Deficit Fiscal Deficit and Monetary Policy Dynamics in terms of Money Supply, Interest Rate, Inflation Rate and Exchange Rate towards GDP economic growth rate of Pakistan's economy during 1991-92 to 2021-22.*
***Method:*** *Time series data set ranges from 1991-92 to 2021-22 from authenticated sources were utilized for present research study. Econometric analysis was done i.e Augmented Dickey Fuller Test, Log-linear response functions, Autoregressive Distribute Lags Model, Bound Test, Error Correction Mechanism, Variance Inflation Factors for checking multicollinearity in the model, Heteroscedasticity test, Lagrange Multiplier (LM) Test, Normality Test, Granger Causality Test, Impulse Response Function and Walt Test were employed.*
***Results:*** *Findings revealed that almost all respective tested variables in the regression model were either found stationary at level I(0) or by taking at I$^{st}$ difference I(1). Since some of the variables were found stationary at level and some were also found stationary at 1st difference then application of Autoregressive distributed lag Model (ARDL) examined co-integrating relationships between tested variables in the regression model. F-Statisticss value of Bound Test revealed long run relationships of tested variables in the model. The value of Co-integrating equations was worked out almost negative and significant depicting adjustment speed from short run dynamics towards long run equilibrium. Application of Variance Inflation Factors almost indicated non-existence of severe multicollinearity in the model. With the application of Homoscedasticity Test, homoscedasticity was experienced among the explanatory variables in the model, because significant F-value rejected the HO hypothesis of no heteroscedasticity in the model. Lagrange Multiplier (LM) Test was employed to check serial correlation or autocorrelation in the model. Significant F-Value of LM Test confirmed the non-existence of serial correlation or autocorrelation in the model. Findings of Granger Causality Test revealed bi-directional, uni-directional or no granger causal relationship between tested variable in the*

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*model. Impulse Response Analysis indicated negative as well as positive responses; shock to GDP noticed symmetric impact on Fiscal Deficit, Current Account Deficit and Trade Deficit alongwith Components of Balance of Payments in short run and long run. Application of Wald test almost confirmed the significance of independent variables for a model.*

***Conclusion:*** *Results revealed positive and significant effects of Total Expenditure, Total Revenue and Fiscal Deficit Fiscal Deficit as proxies of Fiscal Policy Dynamics and Money Supply, Interest Rate, Inflation Rate and Exchange Rate as proxies of Monetary Policy Dynamics towards GDP economic growth rate of Pakistan's economy over a period of time 1991-92 to 2021-22.*

***Implications:*** *The study concludes the implications in terms of causes and effects of Fiscal Policy Dynamics and Monetary Policy Dynamics in relation with economic growth, which could be overcome, emphasizing the need to reduce the burden of deficits by boosting exports through good fiscal managerial strategy, provide employment and investment opportunities, generate capital accumulation so necessary to alleviate poverty and accelerate economic growth of Pakistan's economy.*

***Keywords:*** *Fiscal Deficit, Money Supply, GDP, ADF and Pakistan.*

## INTRODUCTION

The present study was aimed at focusing the impact of fiscal policy dynamics in terms of total expenditure, total revenue and fiscal deficit and impact of monetary policy dynamics in terms of money supply, Interest Rate, Inflation Rate and Exchange Rate on GDP Growth rate of Pakistan Economic with the help of time series analysis (Ali & Ahmad, 2010). Augmented Dickey Fuller Unit Root Test, Autoregressive Distributed Lag Models were utilized to test the parameters with a view to ensure order of integration as well as to establish short and long run association between tested indicators. Fiscal policy dynamics dealt with tax policy and government spending so as to promote sustainable economic growth and to reduce poverty. Monetary policy dynamics is basically concerned with measures, which aimed at regulating money supply and credit with a aim to achieve higher economic growth and price stability with a view to prevent excessive inflation. Previous results revealed that post 2008 investment, volatility of exchange rate, demand from abroad, consumer price level, consumption, imported inputs and export volume lessened the impact of currency depreciation on GDP which implied that depreciation was not reliable tool for the policy makers to stabilize economy and could not achieve growth objectives through strategy led by exports Ndou *et al.* (2024). The previous research aids policymakers in understanding and improving institutional quality for effective budget deficit control Arif & Arif (2023). Past results of combined analysis revealed that economic growth was promoted by government revenue when taken collectively with institutional quality for Sub Sahara African Countries Ayana (2023).

## JUSTIFICATION

This study was unique in sense which covered almost prominent dynamics of fiscal and monetary policy towards economic growth of Pakistan. Though each and every tested indicator was found significantly important and recorded long lasting contributions towards GDP Growth and empirical

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evidences provided basis to influence the growing issues such as fiscal deficit, inflation, poverty, unemployment, poor investment in terms of fiscal and monetary policy dynamics towards GDP Growth rate of Pakistan Economy.

## OBJECTIVES

Major Objectives are;

1. To have impact assessment of Fiscal Policy Dynamics in terms of Total expenditure, Total Revenue and Fiscal Deficit on GDP Growth Rate of Pakistan Economy.

2. To have impact assessment of Monetary Policy Dynamics in terms of Money Supply, Interest rate, Inflation rate and Exchange rate on GDP Growth Rate of Pakistan Economy.

## HYPOTHESIS

Ha1: Impact of Fiscal Policy Dynamics in terms of Total Expenditure, Total Revenue and Fiscal Deficit on GDP Growth Rate of Pakistan Economy.

Ha2: Impact of Monetary Policy Dynamics in terms of Money Supply, Interest rate, Inflation rate and Exchange rate on GDP Growth Rate of Pakistan Economy.

## RESEARCH METHODOLOGY

### I.

### II. METHOD, STRUCTURE OF DATA, RANGE OF DATA AND SOURCES OF DATA:

Time series data set ranges from 1991-92 to 2021-22 from authenticated sources (i.e Pakistan Economic Surveys and Federal Bureau of Statistics) were utilized for present research study. Inferential statistics was used for basic empirical analysis. In this regard, various statistical techniques and tests were used such as Augmented Dickey-Fuller (ADF) Test for Unit Root (Dickey & Fuller, 1981), Log Linear Response Function based on Ordinary Least Square (OLS) Regression were employed to describe the relationship between tested variable, Autoregressive Distributed lag (ARDL) Model to examine co-integrating relationships between parameters, Bounds Test to test long run relationships, Error Correction Mechanism (ECM) to make adjustment from short run dynamics towards long run equilibrium (Pesaram & Shin, 1998), Variance Inflation Factors to check the presence of Multicollinearity, Heteroskedasticity Test to identify the existence of heterogeneity, Lagrange Multiplier (LM) Test to inspect Serial Correlation/ Autocorrelation, Normality test to assess whether sample data drawn from normally distributed population or not, Granger Causality

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Test to verify the usefulness of one variable to forecast another, Impulse Response Function to indicate the direction and magnitude of causal relationship (Pesaran & Shin, 1998), At the end, Wald Test was used to confirm whether a set of independent variables are collectively or individually found 'significant' for a model or not. EViews, being relevant statistical package was employed for time series econometric analysis throughout research study.

## Econometric Model

The study was conducted to assess impact of fiscal policy dynamics in terms of total expenditure, total revenue and fiscal deficit and the impact of Monetary Policy in terms of Money Supply, Interest rate, Inflation rate and Exchange Rate on GDP growth rate of Pakistan economy. To determine the impact of fiscal and Monetary policy dynamics on GDP growth rate of Pakistan economy, the following econometric model is symbolically expressed as;

$$GDP_t = \alpha_0 + \alpha_1 TE_t + \alpha_2 TR_t + \alpha_3 FD_t + \alpha_4 MS_t + \alpha_5 IR_t + \alpha_6 IFR_t + \alpha_7 EXR_t + e_t \text{ ----------} \quad \text{--i}$$

Where,

$GDP_t$ = GDP Growth Rate of Pakistan in year t.

$\alpha_0$ = Constant Coefficient.

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ *and* $\alpha_7$ = Slopes Coefficient

$TE_t$ = Total Expenditure in year t.

$TR_t$ = Total Revenue in year t.

$FD_t$ = Fiscal Deficit in year t.

$MS_t$ = Money Supply (%) in year t.

$IR_t$ = Interest Rate (%) in year t.

$IFR_t$ = Inflation Rate (%) in year t.

$EXR_t$ = Exchange Rate (%) in year t.

$e_t$ = Stochastic term in year t.

Taking logarithm on both sides of equation i, hence log-linear form of model specified becomes;

$$LogGDP_t = \alpha_0 + \alpha_1 LogTE_t + \alpha_2 LogTR_t + \alpha_3 LogFD_t + \alpha_4 LogMS_t + \alpha_5 LogIR_t + \alpha_6 LogIFR_t + \alpha_7 LogEXR_t + e_t \text{ ----------} \quad \text{ii}$$

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## RESULTS AND DISCUSSION

**Unit Root Tests for Tested Variables:** Augmented Dickey-Fuller (ADF) Test has been employed for assessing Unit Roots of tested variables ($GDP_t$, $MS_t$) have firmed the integration order of stationary at I(0) level in case of variables ($TE_t$, $TR_t$, $FD_t$ $MS_t$, $IR_t$, $IFR_t$, $EXR_t$) *are* at I(1) level, when 1st difference applied as presented in Table 1.

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Table 1. Unit Root Test for Tested Variables (*$GDP_t$, $TE_t$, $TR_t$, $FD_t$ $MS_t$, $IR_t$, $IFR_t$ $EXR_t$*)

| *Variables* | *ADF (Levels)* | | *ADF in 1st Differences* | | *Integration order through differencing approach I( )* |
|---|---|---|---|---|---|
| | *Intercept* | *Intercept & Trend* | *Intercept* | *Intercept & Trend* | |
| *$GDP_t$* | *-4.07* | *-3.95* | *-6.56* | *-6.42* | *I(0)* |
| *$TE_t$* | *-1.65* | *-2.21* | *-4.62* | *-4.43* | *I(1)* |
| *$TR_t$* | *-0.68* | *-2.84* | *-5.43* | *-5.29* | *I(1)* |
| *$FD_t$* | *-2.74* | *-2.67* | *-5.51* | *-5.38* | *I(1)* |
| *$MS_t$* | *-3.01* | *-3.01* | *-5.14* | *-5.04* | *I(0)* |
| *$IR_t$* | *-1.83* | *-2.50* | *-5.81* | *-5.67* | *I(1)* |
| *$IFR_t$* | *-2.42* | *-5.21* | *-6.47* | *-6.39* | *I(1)* |
| *$EXR_t$* | *1.81* | *-2.34* | *-4.26* | *-4.85* | *I(1)* |

Note: All parameters estimated in logarithms;
Critical values at 95 percent = -2.96 (without constant and without trend); and
Critical values at 95 percent = -3.57 (with constant and trend)

Table 2. Log-linear response functions for Tested Variables (*$GDP_t$, $TE_t$, $TR_t$, $FD_t$ $MS_t$, $IR_t$, $IFR_t$ $EXR_t$*)

Response Variable: GDP
Method: Least Squares
Sample: 1991-92 to 2021-22
Counted observations after adjustments: 31

| Variable(s) | Co-efficient | Standard Error | t-Statistics | Probability |
|---|---|---|---|---|
| *Total Expenditure (TE)* | *0.719528* | *0.797548* | *0.902176* | *0.3763* |
| *Total Revenue (TR)* | *-0.560281* | *0.776027* | *-0.721986* | *0.4776* |
| *Fiscal Deficit (FD)* | *-0.737119* | *0.845358* | *-0.871960* | *0.3922* |
| *Money Supply (MS)* | *-0.018961* | *0.111243* | *-0.170450* | *0.8661* |
| *Interest Rate (IR)* | *-0.451060* | *0.160163* | *-2.816250* | *0.0098**** |
| *Inflation Rate (IFR)* | *0.070453* | *0.112277* | *0.627494* | *0.5365* |
| *Exchange Rate (EXR)* | *-0.027212* | *0.016255* | *-1.674126* | *0.1077** |
| *Constant (C)* | *9.149118* | *5.425082* | *1.686448* | *0.1052* |
| $R^2$ | 0.439714 | Durbin-Watson Statistics | | 1.324686 |

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| | |
|---|---|
| Adjusted $R^2$ | 0.269192 |
| F-statistics | 2.578633 |
| Prob (F-statistics) | 0.040613 |

***Significant at 1%
*Significant at 10%

The estimated econometric equation to assess the impact of Total Expenditure, Total Revenue, Fiscal Deficit, Money Supply, Interest Rate, Inflation Rate and Exchange Rate on GDP Growth Rate of Pakistan in long run is presented as follows;

$$LGDP_t = \alpha_0 + 0.719528^* LTE_t - 0.560281^* LTR_t - 0.737119^* LFD_t - 0.018961^* LMS_t - 0.451060^* LIR_t + 0.070453^* LIFR_t - 0.027212^* LEXR_t + e_t \text{ ----------iii}$$

Table 2 indicated negative but significant impact of Interest Rate ($IR_t$) ($P<0.01$) and Exchange Rate ($EXR_t$) ($P<0.10$) on GDP Growth Rate of Pakistan ($GDP_t$) over a period of time 1991-92 to 2021-22. The perusal of Table 2 provides that $R^2$ value is 0.44 which indicated that independents variable such as $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$ are predicting 44% Dependent Variable as $GDP_t$. F value is worked out as 2.58 ($P<0.05$) revealing overall significant relationships between dependent and independent variables in estimated model, which tells us overall combined effects and overall fitness of the Model. The study is in agreement with previous study conducted by Ali & Ahmad (2010).

Table 3. Autoregressive Distributed Lags Model for Tested Variables ($GDP_t$, $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$)

Dependent Variable: GDP
Method: ARDL (1, 2, 2, 2, 2, 2, 2, 2)
Sample: 1991-92 to 2021-22
Counted observations after adjustments: 29
Dynamic regressors (2 lags, automatic): TE TR FD MS IR IFR EXR
Fixed regressors: C
Models evaluated: 2187

| *Variable(s)* | *Co-efficient* | *Standard Error* | *t-Statistics* | *Probability* |
|---|---|---|---|---|
| *GDP(-1)* | *-0.776595* | *0.383007* | *-2.027625* | *0.0890** |
| *TE* | *-3.123815* | *1.837225* | *-1.700290* | *0.1400* |
| *TE(-1)* | *0.062435* | *1.075687* | *0.058042* | *0.9556* |
| *TE(-2)* | *-2.441329* | *1.216460* | *-2.006912* | *0.0915** |

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| | | | | |
|---|---|---|---|---|
| *TR* | *2.186828* | *1.767389* | *1.237321* | *0.2622* |
| *TR(-1)* | *-0.550207* | *1.090284* | *-0.504645* | *0.6318* |
| *TR(-2)* | *3.184686* | *1.196503* | *2.661661* | *0.0374*** |
| *FD* | *3.176257* | *1.759641* | *1.805059* | *0.1211* |
| *FD(-1)* | *0.130115* | *0.868092* | *0.149886* | *0.8858* |
| *FD(-2)* | *2.273374* | *1.103642* | *2.059883* | *0.0851** |
| *MS* | *-0.050886* | *0.149509* | *-0.340353* | *0.7452* |
| *MS(-1)* | *0.415691* | *0.156904* | *2.649330* | *0.0381*** |
| *MS(-2)* | *0.560226* | *0.191931* | *2.918896* | *0.0267*** |
| *IR* | *-0.152245* | *0.259181* | *-0.587406* | *0.5784* |
| *IR(-1)* | *-0.095894* | *0.319347* | *-0.300281* | *0.7741* |
| *IR(-2)* | *-0.239334* | *0.303958* | *-0.787393* | *0.4610* |
| *IFR* | *-0.573678* | *0.207281* | *-2.767632* | *0.0325*** |
| *IFR(-1)* | *-0.010240* | *0.137506* | *-0.074473* | *0.9431* |
| *IFR(-2)* | *0.205803* | *0.194097* | *1.060307* | *0.3298* |
| *EXR* | *-0.074501* | *0.104872* | *-0.710399* | *0.5041* |
| *EXR(-1)* | *0.212924* | *0.162709* | *1.308618* | *0.2386* |
| *EXR(-2)* | *-0.208649* | *0.123643* | *-1.687511* | *0.1425* |
| *C* | *16.42008* | *11.46232* | *1.432528* | *0.2020* |

| | | | |
|---|---|---|---|
| $R^2$ | 0.937068 | Durbin-Watson Stat. | 2.430615 |
| Adjusted $R^2$ | 0.706316 | | |
| F-statistics | 4.060937 | | |
| Prob (F-statistics) | 0.044289 | | |

**Significant at 5%
*Significant at 10%

Perusal of Table 3 provided the application of Auto-Regressive Distribute Lags Model (ARDL) included lags of both dependent and independent variables as regressors. Since both order of integration at level I(0) and at 1st difference I(1) conditions are present, thereafter the findings of ARDL approach, revealed that Total Expenditure (P<0.10), Total Revenue (P<0.05), Fiscal Deficit (P<0.10), Money Supply (P<0.05) significantly influenced GDP Growth Rate of Pakistan, whereas Interest Rate, Inflation Rate and Exchange Rate are insignificantly impacted GDP Growth rate. Hence, ARDL examined co-integrating relationships between tested variables in the model. The perusal of Table 3 provides that $R^2$ value is 0.94 which indicated that independents variable such as $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$ are predicting 94% Dependent Variable as $GDP_t$. F value is worked out as 4.1 (P<0.05) revealing overall significant relationships between dependent and

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independent variables in estimated model, which tells us overall combined effects and overall fitness of the Model.

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**Table 4. Bound Test for estimating long run relationships among variables (*$GDP_t$, $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$*)**

ARDL Bounds Test
Sample: 1991-92 to 2021-22
Included observations after adjustments: 29
HO: No long-run relationships

| Test Statistics | Value(s) | k |
|---|---|---|
| F-statistics | 3.363787 | 7 |
| Critical Bounds Value | | |
| Significance level | I0 Bound | I1 Bound |
| *10%* | *2.03* | *3.13* |
| *5%* | *2.32* | *3.5* |
| *2.5%* | *2.6* | *3.84* |
| *1%* | *2.96* | *4.26* |

Perusal of Table 4 provided probability value of F statistics as 3.36, which lies inbetween lower and upper limit of bound critical value, hence the model is inconclusive.

**Table 5. Error Correction Mechanism for estimating short run relationships among tested variables (*$GDP_t$, $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$*)**

**Part-A**
Response Variable: D(GDP)
Method: Least Squares
Sample: 1991-92 to 2021-22
Counted observations after adjustments: 30

| *Variable(s)* | *Co-efficient* | *Standard Error* | *t-Statistics* | *Probability* |
|---|---|---|---|---|
| *C* | *0.429161* | *0.431732* | *0.994045* | *0.3315* |
| *D(TE)* | *0.595252* | *0.598487* | *0.994595* | *0.3313* |
| *D(TR)* | *-0.495965* | *0.583002* | *-0.850709* | *0.4045* |
| *D(FD)* | *-0.668683* | *0.619443* | *-1.079490* | *0.2926* |
| *D(MS)* | *-0.068636* | *0.094111* | *-0.729310* | *0.4739* |
| *D(IR)* | *-0.327708* | *0.210737* | *-1.555059* | *0.1349* |
| *D(IFR)* | *0.017547* | *0.117049* | *0.149916* | *0.8823* |

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|---|---|---|---|---|
| *D(EXR)* | *-0.113504* | *0.059714* | *-1.900772* | *0.0711** |
| *ECT(-1)* | *-0.678600* | *0.248216* | *-2.733905* | *0.0124*** |

| | | | |
|---|---|---|---|
| $R^2$ | 0.687457 | Durbin-Watson Statistics | 1.578064 |
| Adjusted $R^2$ | 0.568392 | | |
| F-statistics | 5.773832 | | |
| Prob (F-statistics) | 0.000589 | | |

**Significant at 5%
*Significant at 10%

The estimated econometric equation for short run model to assess the impact of Total Expenditure, Total Revenue, Fiscal Deficit, Money Supply, Interest Rate, Inflation Rate and Exchange Rate on GDP Growth Rate of Pakistan in short run is presented as follows;

$$LGDP_t = \alpha_0 + 0.595252\ LTE_t - 0.495965\ LTR_t - 0.668683\ LFD_t - 0.068636\ LMS_t - 0.327708\ LIR_t + 0.017547\ LIFR_t - 0.113504\ LEXR_t - 0.678600\ ECT(-1) \text{----------iv}$$

Part-B: Long and Short Run adjustments

| Variable(s) | Model | | | |
|---|---|---|---|---|
| | Long run | p-value | Short run | p-value |
| $TE_t$ | 0.719528 | 0.3763 | 0.595252 | 0.3313 |
| $TR_t$ | -0.560281 | 0.4776 | - 0.495965 | 0.4045 |
| $FD_t$ | -0.737119 | 0.3922 | - 0.668683 | 0.2926 |
| $MS_t$ | -0.018961 | 0.8661 | - 0.068636 | 0.4739 |
| $IR_t$ | -0.451060 | 0.0098* | - 0.327708 | 0.1349 |
| $IFR_t$ | 0.070453 | 0.5365 | 0.017547 | 0.8823 |
| $EXR_t$ | -0.027212 | 0.1077*** | - 0.113504 | 0.0711* |
| *ECT(-1)* | n/a | n/a | -0.678600 | 0.0124** |

Since all tested variables are stationary at I(1) and error term at I(0), it means cointgration and long run relationship exists. Perusal of Table 5 (A) indicated the short run significant relationship in respect of Exchange Rate ($EXR_t$), but insignificant relationships between tested variable ($TE_t$, $TR_t$, $FD_t$ $MS_t$, $IR_t$, $IFR_t$) and the value of Co-integrating equation is negative (-0.678600) and significant ($P<0.01$) provides speed of adjustment as 68% per unit time indicating that there is convergence from short run dynamics towards long run equilibrium. Since the error correction term is 0.68, this means that the 68 percent of the error will be corrected in the next period in converging to the long

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run relationship. Perusal of Table 5 (B) provides long run and short run adjustments towards long run equilibrium.

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Table 6. Variance Inflation Factors for checking the presence of Multicollinearity for variables ($GDP_t$, $TE_t$, $TR_t$, $FD_t$ $MS_t$, $IR_t$, $IFR_t$ $EXR_t$)

**Part-A**

Variance Inflation Factors
Sample: 1991-92 to 2021-22
Counted observations after adjustments: 30

| *Variable(s)* | *Co-efficient Variance* | *Uncentered VIF* | *Centered VIF* |
|---|---|---|---|
| *C* | *0.186392* | *1.999462* | *NA* |
| *D(TE)* | *0.358186* | *13.23424* | *12.38548* |
| *D(TR)* | *0.339891* | *5.499480* | *5.283592* |
| *D(FD)* | *0.383710* | *8.200685* | *8.052093* |
| *D(MS)* | *0.008857* | *1.476000* | *1.465017* |
| *D(IR)* | *0.044410* | *3.056857* | *3.051437* |
| *D(IFR)* | *0.013700* | *1.666747* | *1.666746* |
| *D(EXR)* | *0.003566* | *2.240483* | *1.418134* |
| *ECT(-1)* | *0.061611* | *2.346391* | *2.342670* |

Variance Inflation Factors (VIF) ≥ 10 indicate existence of severe Multicollinearity in the Model.

Perusal of Table 6 (A) indicated that Centered VIF values of all tested variables ($TR_t$, $FD_t$ $MS_t$, $IR_t$, $IFR_t$, $EXR_t$) except ($TE_t$) are less than 10 suggesting to remove Total Expenditure ($TE_t$) being high collinear variable from the model.

**Part-B**

Variance Inflation Factors
Sample: 1991-92 to 2021-22
Counted observations after adjustments: 31

| *Variable(s)* | *Co-efficient Variance* | *Uncentered VIF* | *Centered VIF* |
|---|---|---|---|
| *TR* | *0.100632* | *203.6535* | *3.632740* |
| *FD* | *0.048357* | *17.83091* | *1.455694* |
| *MS* | *0.012261* | *24.46765* | *1.525727* |
| *IR* | *0.024930* | *35.95275* | *3.498809* |
| *IFR* | *0.012503* | *10.73967* | *1.924428* |

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| | | | |
|---|---|---|---|
| *EXR* | *0.000249* | *16.99216* | *3.526935* |
| *C* | *26.30730* | *255.3611* | *NA* |

Hence after removal of high collinear variable (i.e $TE_t$,) from the model, Centered VIF values of all tested variables ($TE_t, TR_t, FD_t\ MS_t, IR_t, IFR_t, EXR_t$) as shown in Table 6 (B) revealing non existence of severe Multicollinearity in the Model.

Table 7. Heteroskedasticity Test for tested variables ($GDP_t$, $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$)

*Heteroskedasticity Test:*

| | | | |
|---|---|---|---|
| | | *Probability.* | |
| *F-statistics* | *1.592173* | *F(12,17)* | *0.1852* |
| | | *Prob. Chi-* | |
| *Obs*R²* | *15.87495* | *Square(12)* | *0.1970* |
| | | *Prob. Chi-* | |
| *Scaled explained SS* | *4.125937* | *Square(12)* | *0.9811* |

Ho: No Heteroskedasticity
HI: Heteroskedacticity

Perusal of Table 7 indicated that probability values of F-Statistics and Chi-square are greater than 5% level of significance; hence Null Hypothesis is accepted revealing presence of homoskedasticity (no heteroskedasticity) in the model.

Table 8. Lagrange Multiplier (LM) Test for checking Serial Correlation/ Autocorrelation among variables ($GDP_t$, $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$)

*Serial Correlation LM Test:*

| | | | |
|---|---|---|---|
| *F-statistics* | *0.477138* | *Probability. F(2,15)* | *0.6297* |
| *Obs*R²* | *1.794396* | *Prob. Chi-Square(2)* | *0.4077* |

HO: No serial correlation exist between variables
HI: Serial correlation exist between variables

Since the probability values of all tested variables (i.e $TE_t$, $TR_t$, $FD_t$, $MS_t$, $IR_t$, $IFR_t$, $EXR_t$) are greater than 5% significance level (P>0.05) as shown in Table 8, hence HO is accepted, which revealed that model is free from serial correlation/ autocorrelation and does not need to be treated.

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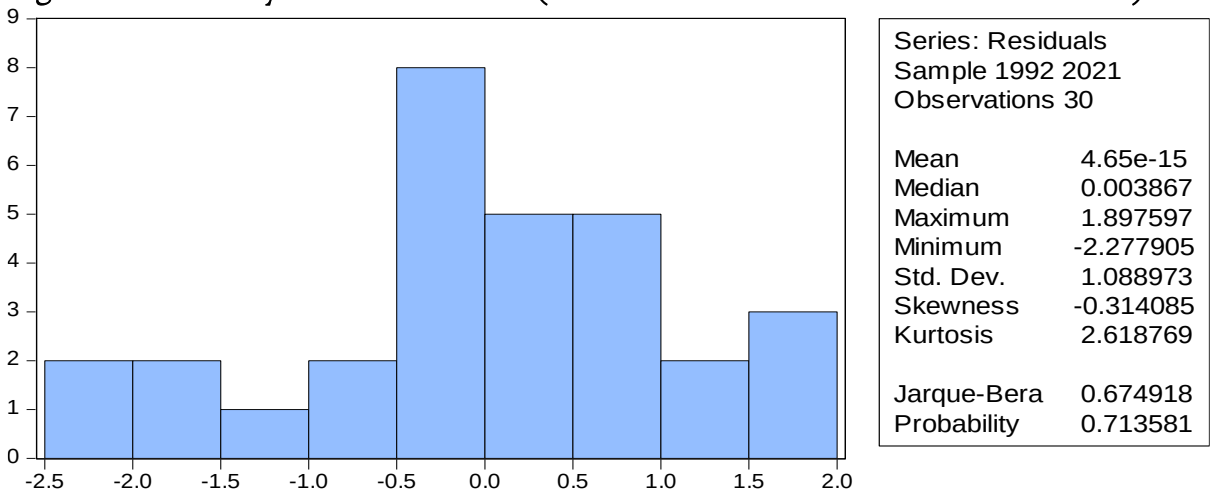
Figure 1. Normality Test for variables (*GDP$_t$, TE$_t$, TR$_t$, FD$_t$ MS$_t$, IR$_t$, IFR$_t$ EXR$_t$*)




HO: Sample data drawn from normally distributed

HI: No sample data drawn from normally distributed

Since the probability value of Normality Test (0.71) is greater than 5% level of significance (P>0.05) depicted in Figure 1, hence null hypothesis is accepted, confirming that sample data has been drawn from normal distributed. Hence relationships among tested variables are normal in the model.

Table 9. Granger Causality Test for variables (*GDP$_t$, TE$_t$, TR$_t$, FD$_t$ MS$_t$, IR$_t$, IFR$_t$ EXR$_t$*)

Pairwise Granger Causality Tests
Sample: 1991-92 to 2021-22
Lags: 2

| *HO:* | *Obs* | *F-Statistics* | *Probability* |
|---|---|---|---|
| *TE not Grander Causing GDP* | *29* | *1.16993* | *0.3275* |
| *GDP not Grander Causing TE* | | *3.06134* | *0.0654** |
| *TR not Grander Causing GDP* | *29* | *1.14354* | *0.3354* |
| *GDP not Grander Causing TR* | | *4.29071* | *0.0255*** |
| *FD not Grander Causing GDP* | *29* | *5.33893* | *0.0121*** |
| *GDP not Grander Causing FD* | | *0.30556* | *0.7395* |
| *MS not Grander Causing GDP* | *29* | *6.02389* | *0.0076**** |
| *GDP not Grander Causing MS* | | *4.49912* | *0.0219*** |
| *IR not Grander Causing GDP* | *29* | *0.70687* | *0.5032* |
| *GDP not Grander Causing IR* | | *6.16148* | *0.0069**** |

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| | | | |
|---|---|---|---|
| *IFR not Grander Causing GDP* | *29* | *0.81073* | *0.4563* |
| *GDP not Grander Causing IFR* | | *1.96284* | *0.1624* |
| *EXR not Grander Causing GDP* | *29* | *0.24010* | *0.7884* |
| *GDP not Grander Causing EXR* | | *3.14729* | *0.0611** |
| *TR not Grander Causing TE* | *29* | *1.07356* | *0.3576* |
| *TE not Grander Causing TR* | | *0.13815* | *0.8717* |
| *FD not Grander Causing TE* | *29* | *0.45696* | *0.6386* |
| *TE not Grander Causing FD* | | *0.10315* | *0.9024* |
| *MS not Grander Causing TE* | *29* | *0.26529* | *0.7692* |
| *TE not Grander Causing MS* | | *0.33046* | *0.7218* |
| *IR not Grander Causing TE* | *29* | *4.63551* | *0.0198*** |
| *TE not Grander Causing IR* | | *3.44330* | *0.0485*** |
| *IFR not Grander Causing TE* | *29* | *0.46580* | *0.6332* |
| *TE not Grander Causing IFR* | | *0.43738* | *0.6508* |
| *EXR not Grander Causing TE* | *29* | *2.75307* | *0.0839** |
| *TE not Grander Causing EXR* | | *0.21408* | *0.8088* |
| *FD not Grander Causing TR* | *29* | *0.11204* | *0.8945* |
| *TR not Grander Causing FD* | | *0.21158* | *0.8108* |
| *MS not Grander Causing TR* | *29* | *0.95850* | *0.3977* |
| *TR not Grander Causing MS* | | *0.34979* | *0.7084* |
| *IR not Grander Causing TR* | *29* | *1.68094* | *0.2074* |
| *TR not Grander Causing IR* | | *4.70694* | *0.0189*** |
| *IFR not Grander Causing TR* | *29* | *0.74469* | *0.4855* |
| *TR not Grander Causing IFR* | | *1.08645* | *0.3534* |
| *EXR not Grander Causing TR* | *29* | *5.88248* | *0.0083**** |
| *TR not Grander Causing EXR* | | *2.41353* | *0.1109* |
| *MS not Grander Causing FD* | *29* | *0.05411* | *0.9474* |
| *FD not Grander Causing MS* | | *0.64673* | *0.5326* |

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| | | | |
|---|---|---|---|
| *IR not Grander Causing FD* | *29* | *2.31736* | *0.1202* |
| *FD not Grander Causing IR* | | *1.93893* | *0.1657* |
| *IFR not Grander Causing FD* | *29* | *1.46936* | *0.2500* |
| *FD not Grander Causing IFR* | | *2.72126* | *0.0861** |
| *EXR not Grander Causing FD* | *29* | *0.11775* | *0.8894* |
| *FD not Grander Causing EXR* | | *3.38808* | *0.0506** |
| *IR not Grander Causing MS* | *29* | *4.03722* | *0.0308*** |
| *MS not Grander Causing IR* | | *1.64815* | *0.2134* |
| *IFR not Grander Causing MS* | *29* | *0.26671* | *0.7681* |
| *MS not Grander Causing IFR* | | *1.77797* | *0.1905* |
| *EXR not Grander Causing MS* | *29* | *0.77104* | *0.4737* |
| *MS not Grander Causing EXR* | | *2.92854* | *0.0728** |
| *IFR not Grander Causing IR* | *29* | *0.93188* | *0.4076* |
| *IR not Grander Causing IFR* | | *2.09181* | *0.1454* |
| *EXR not Grander Causing IR* | *29* | *1.20393* | *0.3175* |
| *IR not Grander Causing EXR* | | *3.93875* | *0.0332*** |
| *EXR not Grander Causing IFR* | *29* | *0.05984* | *0.9421* |
| *IFR not Grander Causing EXR* | | *0.65417* | *0.5289* |

***Significant at 1%
**Significant at 5%
*Significant at 10%

Perusal of Table 9 revealed bi-directional causal relationship between Money Supply and GDp and between Interest Rate and Total Expenditure. Uni-directional causal relationship exists between GDP and Total Expenditure (P<0.10), between GDP and Total revenue (P<0.05), between Fiscal Deficit and GDP (P<0.05), between GDP and Interest Rate (P<0.01), between GDP and Exchange Rate (P<0.10), between Exchange Rate and Total Expenditure (P<0.10), between Total Revenue and Interest Rate (P<0.05), between Exchange Rate and Total Revenue (P<0.01), between Fiscal Deficit and Inflation Rate (P<0.10), between Fiscal Deficit and Exchange Rate (P<0.10), Interest Rate and Money Supply (P<0.05), between Money Supply and Exchange Rate (P<0.10), between Interest Rate and Exchange Rate (P<0.05), indicating long-term relationship in the cointegration test. No causality is present among rest of other combinations in the model. .

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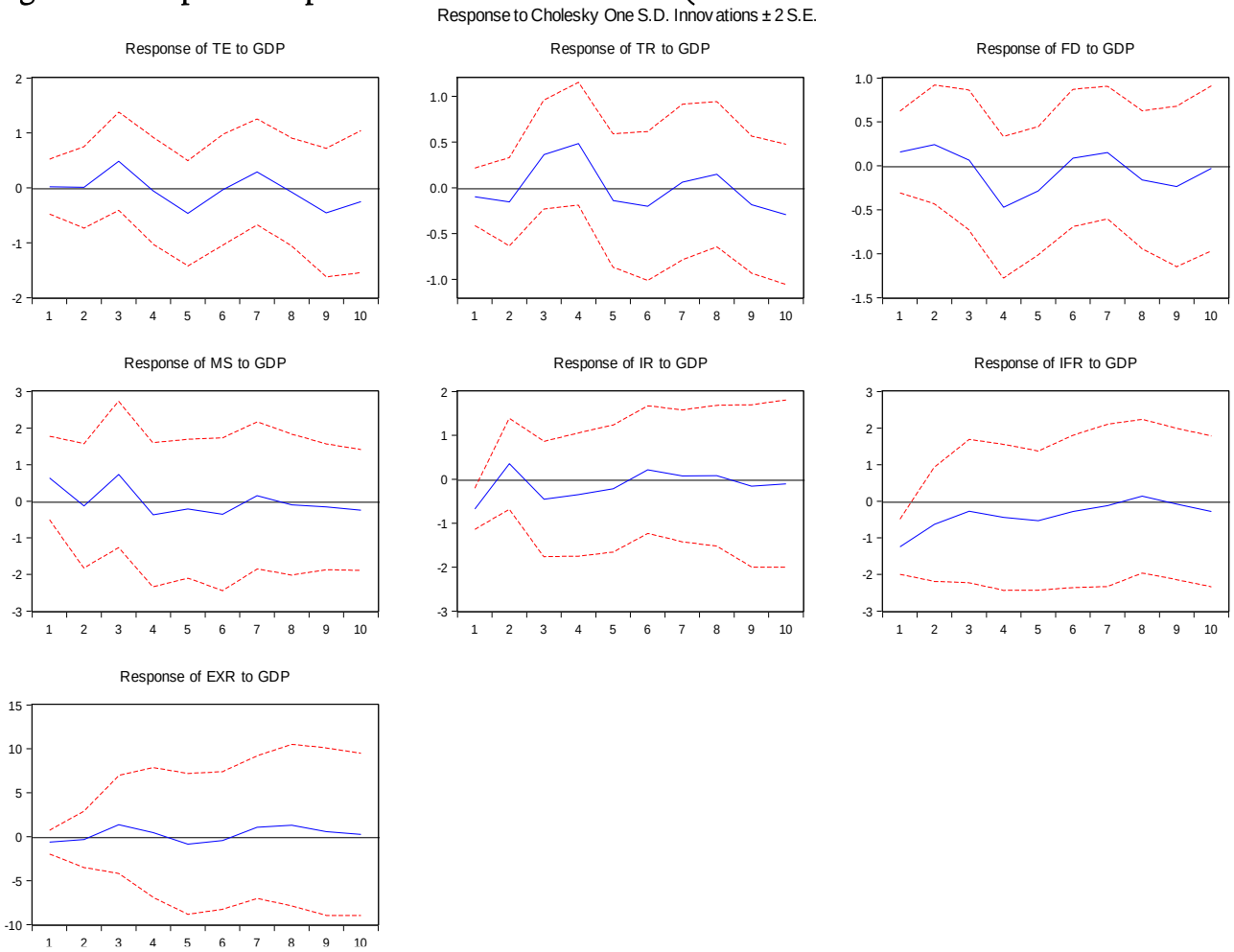
Figure 2. Impulse Response Function for variables (*GDP$_t$, TE$_t$, TR$_t$, FD$_t$ MS$_t$, IR$_t$, IFR$_t$ EXR$_t$*)




Perusal of Figure 2 depicted red and blue lines in all seven responses of Total Expenditure, Total Revenue, Fiscal Deficit, Money Supply, Interest Rate, Inflation Rate and Exchange Rate to GDP. Red lines referred to 95% confidence interval, whereas Blue line referred to Impulse Response Function.

In case of Response of Total Expenditure to GDP revealed that one standard deviation shock or impulse or innovation given to GDP resulted in stable state from 1$^{st}$ to 2$^{nd}$ period, then sharp increases from 2$^{nd}$ to 3$^{rd}$ period, then sharp declines from 3$^{rd}$ to 5$^{th}$ period becomes negative, then sharp increases from 5$^{th}$ to 7$^{th}$ period become positive, then sharp declines from 7$^{th}$ to 9$^{th}$ period becomes negative and thereafter gradual increases from 9$^{th}$ to 10$^{th}$ period.

In case of Response of Total Revenue to GDP revealed that one standard deviation shock or impulse or innovation given to GDP resulted in gradual decline from 1$^{st}$ to 2$^{nd}$ period become negative, then sharp increases from 2$^{nd}$ to 3$^{rd}$ period, then gradual increases from 3$^{rd}$ to 4$^{th}$ period, then sharp declines from 4$^{th}$ to 5$^{th}$ period becomes negative, then gradual declines from 5$^{th}$ to 6$^{th}$ period, then sharp

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increases from 6th to 7th period becomes positive, then gradual increases from 7th to 8th period, then gradual declines from 8th to 9th period and thereafter gradual declines from 9th to 10th period.

In case of Response of Fiscal Deficit to GDP revealed that one standard deviation shock or impulse or innovation given to GDP resulted in gradual increase of Fiscal Deficit from 1st to 2nd period, then gradual decreases from 2nd to 3rd period, then sharp declines from 3rd to 4th period becomes negative, then gradual increases from 4th to 5th period, then sharp increases from 5th to 6th period becomes positive, then gradual increases from 6th to 7th period, then gradual declines from 7th to 8th period becomes negative, then gradual declines from 8th to 9th period and thereafter sharp increases from 9th to 10th period.

In case of Response of Money Supply to GDP revealed that one standard deviation shock or impulse or innovation given to GDP resulted in sharp decline from 1st to 2nd period, then sharp increases from 2nd to 3rd period, then sharp declines from 3rd to 4th period becomes negative, then gradual increases from 4th to 5th period, then gradual declines from 5th to 6th period, then sharp increases from 6th to 7th period becomes positive, thereafter gradual declines from 7th to 10th period becomes negative.

In case of Response of Interest Rate to GDP revealed that one standard deviation shock or impulse or innovation given to GDP resulted in sharp increase from 1st to 2nd period becomes positive, then sharp declines from 2nd to 3rd period becomes negative, then gradual increases from 3rd to 5th period, sharp increases from 5th to 6th period becomes positive, then gradual declines from 6th to 7th period, thereafter in stable from 7th to 10th period.

In case of Response of Inflation Rate to GDP revealed that one standard deviation shock or impulse or innovation given to GDP resulted in gradual increase from 1st to 3rd period in negative state, then gradual declines from 3rd to 5th period, then gradual increases from 5th to 8th period becomes positive and thereafter gradual declines from 8th to 10th period.

In case of Response of Exchange Rate to GDP revealed that one standard deviation shock or impulse or innovation given to GDP resulted in stable from 1st to 2nd period in negative state, then gradual increases from 2nd to 3rd period becomes positive, then gradual declines from 3rd to 5th period becomes negative, then gradual increases from 5th to 7th period becomes positive, then in stable from 7th to 8th period and thereafter gradual declines from 9th to 10th period.

Since Impulse Response Function indicated direction and magnitude of casual relationships among tested variables, hence in all seven responses, negative as well as positive responses existed, so shock to GDP noticed symmetric impact of Total expenditure, Total Revenue, Fiscal Deficit, Money Supply, Interest Rate, Inflation Rate and Exchange Rate in Pakistan in short as well as in long run.

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Table 10. Wald Test for Tested Variables ($GDP_t$, $TE_t$, $TR_t$, $FD_t$ $MS_t$, $IR_t$, $IFR_t$ $EXR_t$)

Wald Test:

| *Test Statistics* | *Value(s)* | *df* | *Prob.* |
|---|---|---|---|
| *F-statistics* | *2.578633* | *(7, 23)* | *0.0406*** |
| *Chi-square* | *18.05043* | *7* | *0.0117*** |

*HO:*
*C(1)=0,C(2)=0,C(3)=0,C(4)=0,C(5)=0,C(6)=0,C(7)=0*
*HO Summary:*

| *Normalized Restriction (= 0)* | *Value(s)* | *Standard Error* |
|---|---|---|
| *C(1)* | *0.719528* | *0.797548* |
| *C(2)* | *-0.560281* | *0.776027* |
| *C(3)* | *-0.737119* | *0.845358* |
| *C(4)* | *-0.018961* | *0.111243* |
| *C(5)* | *-0.451060* | *0.160163* |
| *C(6)* | *0.070453* | *0.112277* |
| *C(7)* | *-0.027212* | *0.016255* |

Restrictions are termed as linear in coefficients.
**Significant at 5%

HO: The value of independent variable is zero (0)

HI= The value of independent variable is not equal to zero (0)

Since the results of Wald Test in Table 10 indicated the probability values at F-test and Chi-Square values are less than 5% significance level revealing significant impact of Total Expenditure, Total Revenue, Fiscal Deficit, Money Supply, Interest Rate, Inflation Rate and Exchange Rate on GDP growth rate of Pakistan Economy over period of time 1991-92 to 2022-22.

The current study is associated with previous studies conducted by Dickey & Fuller (1981); Hassan & Ahmed (1991); Mallik and Chowdhury (2001); Khwaja (2007); NJIMANTED (2009); Ismal (2011); Kakar (2011); Genc (2011); Hussain & Ejaz (2022); Hussain *et al.* (2022); Collaku *et al.* (2023); Soharwardia (2022); Yurdadog (2022); Hussain *et al.* (2023); Madurapperuma (2023);

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Nasir & Morgan (2023); Osamor *et al.* (2023); Sharabidze (2023); Tang *et al.* (2023) & Zaerpour (2023).

## CONCLUSION

Various econometric test, techniques and approaches were employed to assess the effectiveness of Total Expenditure, Total Revenue and Fiscal Deficit in context of Fiscal Policy Dynamics on one hand and Money Supply, Interest Rate, Inflation Rate and Exchange Rate in context of Monetary Policy Dynamics on another in relationships with GDP growth rate of Pakistan over a period of time 1991-92 to 2021-22. Results revealed positive and significant effects of Total Expenditure, Total Revenue and Fiscal Deficit Fiscal Deficit as proxies of Fiscal Policy Dynamics and Money Supply, Interest Rate, Inflation Rate and Exchange Rate as proxies of Monetary Policy Dynamics towards GDP economic growth rate of Pakistan's economy over a period of time 1991-92 to 2021-22.

## POLICY IMPLICATIONS

The study presented the policy implications in terms of causes and effects of Total Expenditure, Total Revenue and Fiscal Deficit Fiscal Deficit as proxies of Fiscal Policy Dynamics and Money Supply, Interest Rate, Inflation Rate and Exchange rate as proxies of Monetary Policy Dynamics are as;

1. There is dire need to reduce the burden of fiscal deficits by boosting exports through good fiscal managerial strategy, providing employment and investment opportunities, generating capital accumulation so necessary to alleviate poverty and accelerate economic growth of Pakistan's economy on the one hand and also to reduce uncertainties in macroeconomic policies, emphasizing transparency and effective financial management, especially in monetary policy decisions concerning money supply, interest rate, inflation rate, exchange rate and related liquidity matters in Pakistan.
2. It is recommended that government may use monetary policy as an effective instrument for economic stability in short run and long run.
3. The findings underscored the relevance of monetary policy in shaping macroeconomic performance, suggesting interventions in fiscal policies, financial market development, and interest rate liberalization for enhanced effectiveness.
4. It was also evident that monetary policy was less effective as compared to fiscal policy in effecting Economic growth of GDP in the long run. So the research concluded that Coordination of fiscal and monetary policy may leads to sustainable economic growth otherwise it can lead to downturn of economic performance.
5. The findings suggested that minimizing interest rate differentials could be a strategic approach to fostering long-term growth in Pakistan's capital market.

6. The study suggests that high money supply and increased interest rates contribute to rising inflation, subsequently causing an increase in exchange rate volatility.
7. The research findings also provided that major issue of expansionary fiscal reduction was due to politically motivated unproductive activities on the part of Government machinery, which restrained economic growth and development in Pakistan.

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