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Economic Growth, Inflation and Monetary Policy in Pakistan: Preliminary Empirical Estimates

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ARTICLE DETAILS	ABSTRACT
History: Accepted 22 April 2021 Available Online June 2021	<i>In economic policy, construction Inflation is a core variable to be considered that determines the economic activity. To make a suitable monetary policy, it is very essential to check the price level and later on, many other variables are considered to achieve the goal. This study aims to reveal the affiliation of inflation on the growth of economic activities in Pakistan. Time series data set for the period 1989-2020 was used to have the empirical estimates. Augmented Dickey Fuller Unit Root Test is employed to check the unit root of the time series and Auto Regressive Distributive Lag techniques are used for empirical estimates. The present research uses Inflation as a dependent variable and Gross Domestic Product, Interest Rate, Money Supply, and Exchange Rate as the explanatory variables of the study. The findings of this analysis reveal that there's an antagonistic relation between Inflation and GDP.</i>
Keywords: Inflation, Gross Domestic Product, Interest Rate, Money Supply, Exchange Rate, Monetary Policy	
JEL Classification: E31, E43, E51, F31, E63	

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1. Introduction

This study explores the link between monetary policy, inflation rate, and economic growth in Pakistan's economy for the long term and short term. There are two main functions of the monetary policy. One is to obtain constancy of prices and the second objective is economic growth in the country's economy. For achieving this objective an effective and solid monetary and fiscal system is necessary which strengthens the financial markets and banking and non-banking institutions. Economic development relay's on the adequate, functioning of these institutions which help the formation of capital in the economy and stabilize the price level and exchange rates.

For this research paper, Augmented Dickey Fuller test and Auto Regressive Distributive Lag Model are used. The period used for this research paper is 1989 to 2020. According to most of the Central Banks and Economists, low inflation and stable prices trigger the economic growth of a country on the higher side. Constancy in the prices of goods and services stabilizes the value of money and minimizes the recurring changes which strengthen the economic growth and eliminate the inequalities of income amongst the different classes of the society. A sound financial system enhances employment in the country which promotes economic growth. For this study, I used the variables Inflation, Gross Domestic Product, Interest Rate, Money Supply, and Exchange Rate. Pakistan is a developing country and also facing the problem of overpopulation. Overpopulation demands more and more resources which needs money and which increases inflation. Decreasing the interest rates by the central bank boosts the inflation in the country because the demand for money increased in the country and naturally supply of money also increased to meet the demand for money. Developed countries provide different financial aids to developing countries which also creates inflation in the country. In developing countries production of the agriculture sector is very low due to which there is an increasing trend in the price level of commodities which creates inflation in the economy. Levy of indirect taxes by the government is another reason for an increase in the price of goods in the country which creates inflation also.

2. Literature Review

Khalid (2005) estimated the relationship between Economic Growth, Inflation rate, and Monetary Policy in the case of Pakistan's economy. This study used variables that were CPI, Inflation Rate, Output Gap, Exchange Rate Depreciation, Budget Deficit, US inflation rate, and money supply to GDP ratio. In this study, CPI is used as a dependent variable and others as independent variables. This study used methods were ADF, Augmented Dickey Fuller Unit Root Test, and Granger Causality Test.

Noor and Chaudhry (2009) examined the relationship between economic management and the roots of inflation in Pakistan. This study used time series data which covered the period from 1972 to 2007. The study used variables that were inflation rate, real growth domestic product, budget deficit, interest rate, money supply, and inflation rate. This study used methods were ADF Augmented Dickey Fuller Unit Root Test and Johansen Co-integration test. This study exposed that there was a positive association between import price and inflation rate.

Ayyoaub Chaudhry and Farooq (2011) examined the effect of inflation on economic growth in the case of Pakistan. This study used time series data which covered the period from 1972 to 2010. This study used variables that were the gross domestic product, CPI inflation, Trade Openness, investment growth rate, labor force and population growth. This study used methods were OLS (Ordinary Least Square) and DW (Durbin Watson Test). The result of this study showed that there was a negative relationship between inflation and economic growth.

Chaudhry, Qamber and Farooq (2012) studied the monetary policy, inflation and economic growth in Pakistan. This study used time series data which covered the period 1972 to 2010. This study used variables that were Real Gross Domestic Product, money and Quasi money as a percentage of GDP, Call money rate, CPI, Real Exchange Rate and budget deficit as a percentage of GDP. This study used methods were Augmented Dickey Fuller Unit Root Test, Error Correction method, Granger Casualty Test and Johnson Co-integration test. This study showed that the call money rate has a positive impact on GDP.

Javed et al. (2012) examined the inflation and uncertainty of inflation in Pakistan. This study used monthly data which covered the period from 1957:1 – 2007:12. This study used the model was ARMA – GARCH. This study used method was Granger Casualty Test. This study showed that there was a positive relationship between inflation and inflation uncertainty.

Chughtai, Malik and Aftab (2015) estimated the effect of main economic variables on the economic growth of Pakistan. This study used secondary data which covered the period from 1081 to 2013. This study used variables that were Gross Domestic Product, Exchange Rate and Inflation. This study used methods were Regression Analysis and ANOVA Test. In this study, Gross Domestic Product was used as a dependent variable and Exchange Rate, Interest Rate, and Inflation were used as independent variables. The observation of this study showed that the Inflation Rate and Interest Rate hurt economic growth. This study revealed that Exchange Rate has a positive effect on economic growth.

Chaudhry et al. (2015) estimated the monetary policy and inflation pressure in Pakistan, this study used variables were Inflation, Money Supply, Gross Domestic Product and Interest Rate. This study used time series data which covered the period from 1973 to 2013. This study used methods were Augmented Dickey Fuller Test, Unit Root Test, Auto Regressive Distributive Lag Model and Error Correction Method. The result of this study showed that the money supply was a dominant reason for inflation.

Mahmood, Waheed and Khalid (2017) estimated the effect of monetary policy on the economic growth of Pakistan. This study used time series data which covered the period from 1983 to 2013. This research employed methods were Augmented Dicky Fuller Unit Root Test and Johnson Co-integration Test. This study used variables that were GDP, money supply, inflation, interest rate, unemployment, government expenditure and exchange rate. The result of this research showed that there was a positive relationship between money supply, government expenditure and inflation rate. This study exposed that there was a negative association between GDP and interest rate.

Malik et al. (2020) estimated the effect of monetary policy on the economic growth of Pakistan. This study used time series data which covered the period from 1973 to 2014. This study used variables that were gross domestic product, money supply official exchange rate, inflation and interest rate. This study used methods were ADF (Augmented Dicky Fuller Test), Unit Root Test and ARDL (Auto Regressive Distributive Lag Model). This study exposed that exchange rate and money supply have a positive effect on economic growth.

3. Data and Methodology

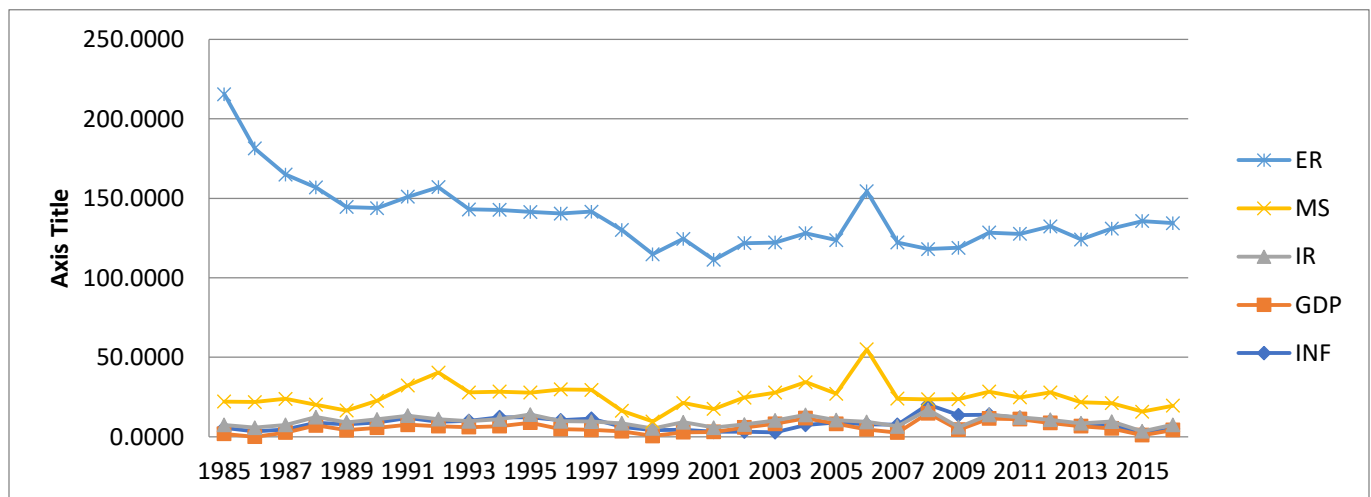
The objective of this analysis is to analyze the relation of INF (dependent variable) with other independent variables i.e. GDP, IR, MS and ER. The period used for this study is 1989 to 2020. Data is collected from World Development Indicator.

Table 1: Description of Variables

Variables	Description of Variables	Unit of Measure	Expected Sign	Source
INF	Inflation	Percentage		WDI
GDP	Gross Domestic Product	Percentage	Negative	WDI
IR	Interest Rate	Percentage	Negative	WDI
MS	Money Supply	Percentage	Positive	WDI
ER	Exchange Rate	Percentage	Positive	WDI

Source: Data collected from World Development Indicator.

The above table shows the explanation of variables chosen for this research paper. The resources and measuring units are also mentioned in the table. The data collected from the world development indicator. The expected sign shows the relationship of INF with other variables. There's an antagonistic relation between INF and GDP and also a negative relationship between INF and IR. This research exhibits that there's a positive relation between INF and MS and also a positive relationship between INF and ER. The data collected in percentage.

**Figure 1: Trend of Independent and dependent Variables**

3.1 Description of Variables

We selected different variables proper for the model after a thorough study of different articles and studies of recent as well as previous scholars. We explain in this section the dependent and independent variables which are appropriate to this model. In this model, INF is used as the dependent variable and Gross Domestic Product (GDP), Interest Rate (IR), Money Supply (MS), and Exchange Rate (ER) as independent variables.

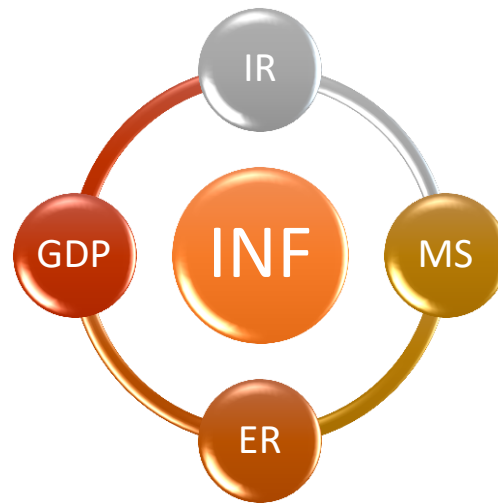


Figure 2: Variables

3.1.1 Inflation Rate

In this paper (INF) inflation rate is used as the dependent variable. Inflation is a procedure in which the level of the price goes up. With raising the price level the value of currency decrease. These circumstances are not appropriate for the economy because inflation reduces the purchasing power of customers. In inflation value of money gets lesser and lesser. To measure inflation indicator used consumer price index. The people wanted to make more money for consumption. Prices of goods and services increase, so firms pay out more wages in this way income raises.

Most important drivers of current inflation

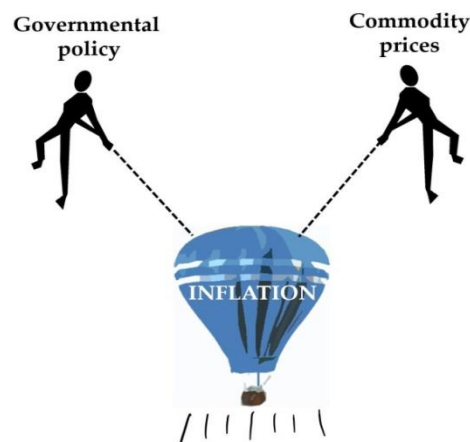


Figure 3: Inflation

Prices of commodities and policies of government increase inflation in the country. The price of goods increases inflation rises in the country. Taxes also a cause of inflation, sometimes government imposes taxes so prices increase which leads to increase inflation. The government also spends on unproductive expenditure for example on the military, so that government policies also increase inflation.

3.1.2 Gross Domestic Product

Gross Domestic Product (GDP) is defined as the overall market value of all final goods and services produced within ranges of an entity in a given time usually a calendar year. GDP is the complete market worth of production which is created within the limits of the country by

consumption of both domestic and overseas factors created. GDP growth rate is calculated as the variation in the proportion of the number of goods and services produced within the limits of a state within a year.



Figure 4: Gross Domestic Product

3.1.3 Interest Rate

In this paper interest rate is used as the independent variable. There's an inverse relationship between interest rate and inflation rate. Interest rate is the very essential determinant of the economy. All factors and segments depend on it. The interest rate hurts the inflation rate. When the central bank decreases interest rate money supply increase, consumption and investment also increase in this way prices of goods increase.

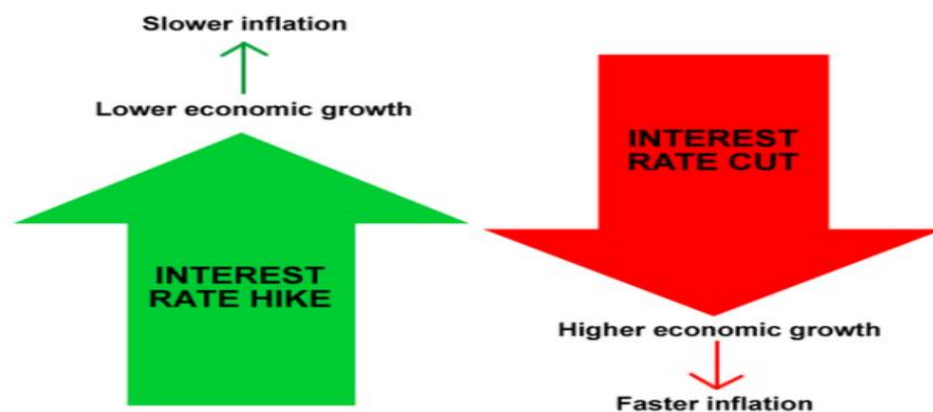


Figure 5: Interest Rate

This diagram shows that when the rate of interest increase the growth of the economy reduces and inflation also slows because the money supply decrease. On the other hand when the rate of interest decreases the economic growth rises and inflation increase because the supply of

money increase.

3.1.4 Money Supply

The money supply is the entire quantity of money that circulates in the country. This circulation includes currency, printed notes, deposits in bank accounts, and all other liquid assets. When the central bank decreases the interest rate the supply of money increased in the economy. When the rate of interest increased money supply decreased. When the money supply is increased, the prices of goods consumption and investment increased too. This shows money supply is the main cause of inflation.



Figure 6: Money Supply

3.1.5 Exchange Rate

In this paper, the Rate of Exchange is used as the independent variable. There's a positive relationship between inflation and the rate of Exchange. The rate of Exchange is the value of the foreign currency in terms of the domestic currency. When the rate of Exchange increases imports also increase and exports decrease.

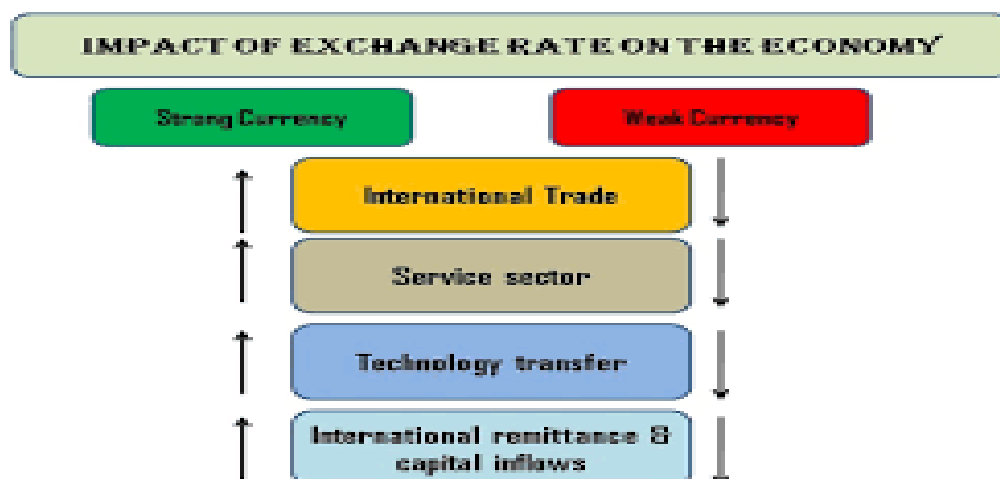


Figure 7: Exchange Rate

The above diagram shows that low value currency leads to a deficit in trade stability, technology relocation decrease, and reduction in international payments & capital inflow and also repair sectors. On the other way, strong currency leads to a boost in worldwide trade, service sector, equipment transport and foreign aid & flow of capital.

3.2 Model Specification

The ARDL equation estimates the relationship between inflation, monetary policy and economic growth:

$$INF = \beta_0 + \beta_1 GDP + \beta_2 IR + \beta_3 MS + \beta_4 ER + \mu_i$$

μ = Distributed term

β_0 = Intercepted term

$\beta_1, \beta_2, \beta_3, \beta_4$ = Slope Coefficient

3.2.1 The ARDL Model

The Model was prepared to verify the effect of relation amid inflation, monetary policy and GDP growth in Pakistan. In this model INF is used as a regressed variable and GDP, IR, MS and ER are used as independent variables. The equation of the ARDL Model is as under:

$$\begin{aligned} \Delta INF = & \alpha_0 + \alpha_1 \sum_{i=0}^{k1} (INF)_{t-1} + \alpha_2 \sum_{i=0}^{k2} (GDP)_{t-1} + \alpha_3 \sum_{i=0}^{k3} (IR)_{t-1} + \alpha_4 \sum_{i=0}^{k4} (MS)_{t-1} \\ & + \alpha_5 \sum_{i=0}^{k5} (ER)_{t-1} + P1(INF) + P2(GDP) + P3(IR) + P4(MS) + P5(ER) + \mu \end{aligned}$$

INF = Rate of Inflation

GDP = Gross Domestic Product

IR = Rate of Interest

MS = Money Supply

ER = Exchange Rate

I used 5 variables in the above cited equation for this research paper. The INF is a dependent variable whereas GDP, IR, MS and ER are being used as independent variables. The result shows a negative relationship between INF and GDP. It is revealed from this research that when GDP increases the inflation decreases. There is a negative relation between INF and IR. There is a positive relation between INF & MS and INF & ER.

To estimate the relationship between the variables following analysis was done:

Table 1: Descriptive Analysis

	INF	GDP	IR	MS	ER
Mean	8.2841	-2.4678	3.8224	15.6148	113.0960
Median	7.8826	-2.7639	4.3011	15.4096	110.1521
Maximum	20.2861	5.3300	6.2637	45.5320	193.2350
Minimum	2.5395	-9.2043	1.0628	4.3142	93.7168
Std. Dev	3.9841	2.9358	1.5255	7.3732	20.9799
Skewness	0.7110	0.5616	-0.2155	2.0965	2.1266
Kurtosis	3.7298	4.1779	1.5888	9.8494	8.2099
Jarque-Bera	3.4066	3.5326	2.9030	85.9961	60.3116
Probability	0.1820	0.1709	0.2342	0.0000	0.0000

Source: Data Collected from E-views 9.5 student version

The maximum, generally used measure of an average is the mean. In this table mean of INF is 8.2841 and mean of GDP is -2.4678 and IR, MS and ER values of mean 3.8224, 15.6148 and 113.0960 correspondingly. The value of the maximum of variables INF, GDP, IR, MS and ER is 20.2861, 5.3300, 6.2637, 45.5320 and 193.2350 correspondingly. The median value of INF is 7.8826. The median is the middle two values of the data. The value of the median GDP is -2.7639. In this paper standard deviation is used in this study to prove the fluctuations in the data. In this table value of the standard deviation of GDP is 2.9358 which shows the low level of oscillations. In this table value of the standard deviation of INF is 3.9841 and the IR value is 1.5255 and While the standard deviation of MS is 7.3732. In this we use skewness. There are two types of distribution symmetrical distribution and skewed distribution. The distribution is negatively skewed or has a long left tail. If the value of skewness is less than zero, it is called symmetrical distribution. The distribution is positively skewed and has a long right tail; if the units of skewness are greater than zero. In this research paper values of INF, GDP and IR are 0.71104, 0.5616, -0.2155 negatively skewed. In this paper value of skewness of MS and ER 2.0965 and 2.1266 is positively skewed.

There are three types of kurtosis:

- i) If $2 > 3$ it means that the curve is highly peaked it is called leptokurtic.
- ii) If $2=3$ in this way curve has normally peaked, it is called mesokurtic.
- iii) If $2 < 3$ then the curve has flat topped, it is called platykurtic.

3.3 Time Series Analysis

In this research (ADF) Augmented Dickey Fuller examined to examine the data stationarity, if data is non-stationarity the forecasting cannot be possible.

3.4 Augmented Dickey Fuller Test

In this research data collected from WDI and SBP. In this analysis time series data taken the period from 1989-2020 to examine the variables stationary ADF (Unit Root Test) applied.

Table 2: Augmented Dickey Fuller Test Result

Variables	At level		At first Difference		Results
	Intercept	Intercept and Trend	Intercept	Intercept and Trend	
INF	-2.507108	-2.406702	-6.849603*	-6.932898*	I(1)
GDP	-2.295329	-2.329832	-5.213837*	-5.120329*	I(1)
IR	-2.488576	-3.485068	-6.931851*	-6.838833*	I(1)
MS	-4.300477	-4.221950	-6.035472*	-5.928365*	I(1)
ER	-8.302695*	-5.672215*	-5.749140*	-5.784779*	I(0)

Source: The *, **, *** shows significance at 1%, 10% and 15% respectively.

The table is organized with the help of Eviews Software 9.5 to prove the variables preferred for this research are stationary or not. To check the stationary level ADF (Augmented Dickey Fuller) is examined. The Stationarity level of variables is verified too and the time series data used in this paper. The INF assimilates at level or 1st difference at 1% level of significance. The GDP integrate at 1st difference and its ADF value is -5.2138 at a 1% level of significance. The IR assimilates at 1st difference and its ADF value is -6.9318 at a 1% level of significance. The Ms integrates at level or 1st difference and 1% level of significance. The ER integrates at 1st difference and level, at 1 percent significance level The table 2 shows that dependent variable INF and other Independent variables GDP, IR, MS, ER.

Table 3: Results of Bound Test for Co- integration

Equation	F- Statistic	Upper Bond	Result
INF,GDP,IR,MS,ER	3.764562	3.29	Cointegration subsists

Source: Data collected from E-views 9.5

In table 3 bound tests are applied. The F-statistics value is 3.764562 which is higher than the upper bound (I1) value that is 3.29. The F-Statistic value is bigger than the upper Bound (Io) value. In this way, we deject null preposition which shows in the absence of co-integration, and accept the alternative hypothesis.

Table 4: Short Run Estimates of Model

Variables	Coefficient	Standard Error	T-Statistics	Probability
D(INF)	-0.31963	0.2008	-1.5910	0.1725
D(GDP(-3))	-1.0934	0.4643	-2.3549	0.0652
D(IR(-3))	0.0769	0.0585	1.3139	0.2459
D(MS(-3))	-0.7854	0.0965	-2.2474	0.0745
D(ER(-3))	-0.7854	0.1958	-4.0104	0.0102
Cointeq = INF-(-0.5367*GDP-3.1077*IR+0.4509*MS+0.2980*ER-20.3131)				
R squared	0.9330	Adjusted R Square	0.6383	
AIC	4.5429	SBC	5.6372	
HQC	4.8775	Durbin -Watson stat	2.9093	
F Statistics	3.1661	Prob of F Statistics	0.1019	

Source: Data collected from E-views 9.5

The preceding table demonstrates the short run approximation of variables with cointeq equation. The calculated value of 'R-Squared' and 'Adjusted R-Squared' are 0.9330 and 0.6383 correspondingly. The Durbin-Watson is 2.9093 which means there is no autocorrelation between dependent and independent variables.

Table 5: Long Run Estimates of Model

Variables	Coefficient	Standard Error	T-Statistics	Probability
GDP	-0.5367	1.0068	-0.5330	0.6168
IR	-3.1076	1.4359	-2.1642	0.0827
MS	0.4509	0.5434	0.8298	0.4444
ER	0.2979	0.2319	1.2844	0.2553
C	-20.3130	24.8370	-0.8178	0.4506

Source: Data collected from E-views 9.5

This table shows the long run estimates of the model. In the table, the value of the coefficient of GDP is -0.5367 and it is negative. The value of the coefficient of IR is -3.1076. This shows that there's an antagonistic relation between GDP and INF. The findings show the probability value of MS, ER, 0.4509 and 0.2979 respectively.

Table 6: Diagnostic Test for Model

Name of Test	F-Statistics	Probability
Breusch-Godfrey Co- relation LM Test	2.6451	0.2177
Hetroskedasticity Test	0.3933	0.9417

Source: Data collected from E-views 9.5

In the above table, the Breusch-Godfrey Co-relation LM Test applied the value of F-statistic is 0.6451 and probability is 0.2177. In this table, the Heteroskedasticity test applied value of F-statistics is 0.3933 and probability is 0.9417.

4. Test to Check the Stability of Economy

In this model, tests are applied to check the stability of the economy. For this objective, Cumulative Sum of Recursive Residual (CUSUM) and Cumulative Sum of Recursive Residuals of Squares (CUSUM SQ) techniques are employed. The plotted diagram shows that line amid the critical region at a 5 % significance level. When tests are applied blue line should be between two red lines. It shows that economy is stable.

4.1 Model Stability

To verify the model stability (CUSUM) and (CUSUM SQ) are applied and check the results. In this study INF, GDP, IR, MS, and ER variables were used. The economy is stable if in the diagram Blue strip should be amid the two red stripes. In these diagrams blue strip amid the two red strips which display economy is stable.

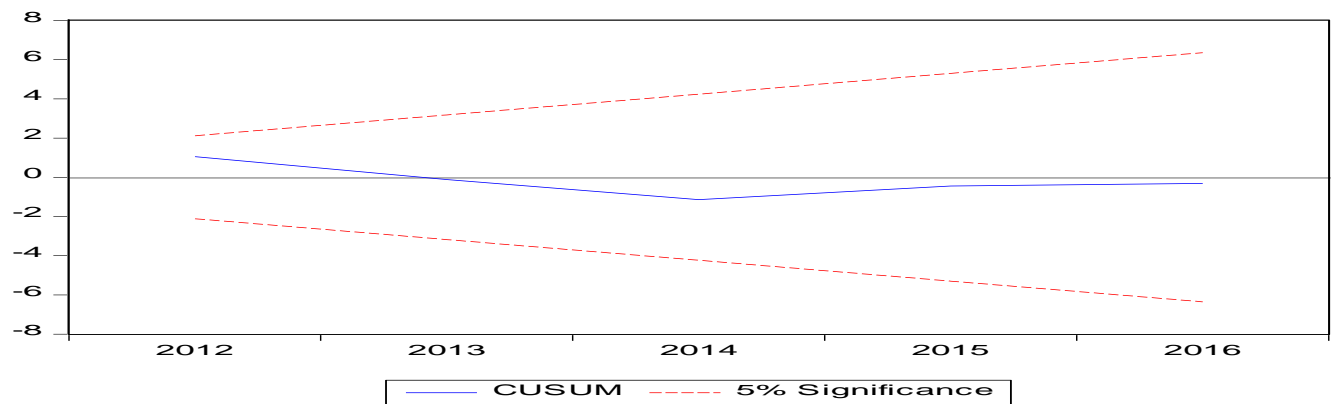


Figure 8: Cumulative Sum of Recursive Residuals plot

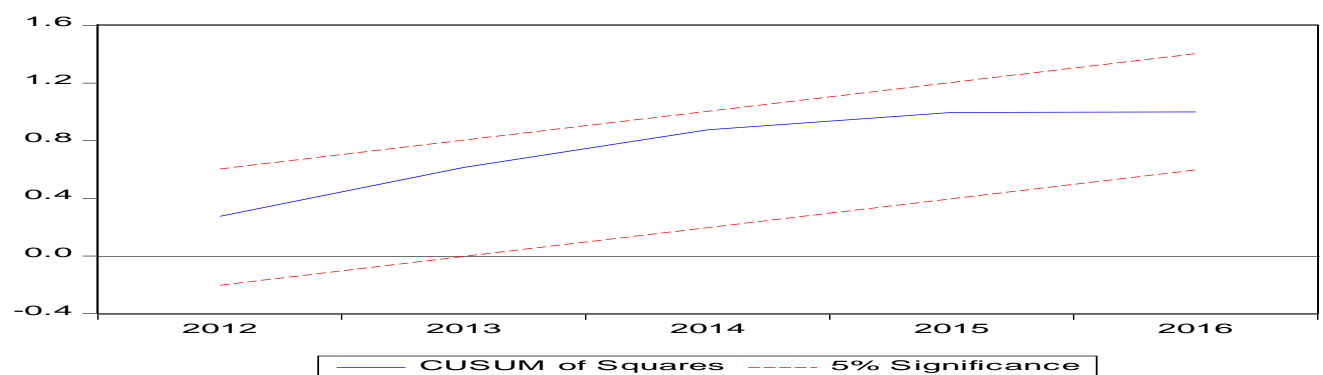


Figure 9: Cumulative Sum of Square Recursive Residuals plot

In this research, we explain the tables. In the first table, we explain the table of descriptive analysis in which Mean, Median, Minimum, Skewness, and Standard deviation are shown. In the second table, variables are expected to sign and the unit of measure is shown. In the third table, ADF is employed to examine the stationarity of the data and its results. In the fourth table Bound test was

applied. In the fourth table short run table explain. In the fifth table long run table explain. In this chapter CUSUM and CUSUM, squares diagram explain.

5. Conclusion and Policy Implications

The main conclusion of this analysis is to find out the connection between inflation, monetary policy, and economic growth. This research paper uses the time phase from 1989 to 2020. The article uses variables (INF) as the dependent variable and independent variables (GDP), (IR), (MS), and exchange rate. The paper use the (ADF) unit root test and (ARDL) test. There's an affirmative relation between Inflation, Gross Domestic Product, and Rate of interest. There is an inverse relationship between inflation and money supply and also a negative between inflation and exchange rate. In short higher inflation resulted in lower GDP and on the second side low inflation caused higher GDP.

- Government should improve the tax structure to control inflation.
- Government must control the supply of money through an efficient monetary strategy.
- Reduced unproductive expenditure to decrease inflation.
- Government should increase family planning programs to decrease the population in the country.
- A price solidity plan was introduced to maintain the price stable.
- Government should improve the agriculture segment and industrial region to control inflation.

References

- Ayyoub, M., Chaudhry, I. S., & Farooq, F. (2011). Does Inflation Affect Economic Growth? The case of Pakistan. *Pakistan Journal of Social Sciences (PJSS)*, 31(1).
- Malik, M. Y., Latif, K., Khan, Z., Butt, H. D., Hussain, M., & Nadeem, M. A. (2020). Symmetric and asymmetric impact of oil price, FDI and economic growth on carbon emission in Pakistan: Evidence from ARDL and non-linear ARDL approach. *Science of the Total Environment*, 726, 138421.
- Chughtai, M. W., Malik, M. W., & Aftab, R. (2015). Impact of Major Economic Variables on Economic Growth of Pakistan. *Acta Universitatis Danubius: Oeconomica*, 11(2).
- Chaudhry, I. S., Ismail, R., Farooq, F., & Murtaza, G. (2015). Monetary policy and its inflationary pressure in Pakistan. *Pakistan Economic and Social Review*, 251-268.
- Chaudhry, I. S., Qamber, Y., & Farooq, F. (2012). Monetary policy, inflation and economic growth in Pakistan: Exploring the co-integration and causality relationships. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, 6(2), 332-347.
- Javed, S. A., Khan, S. A., Haider, A., & Shaheen, F. (2012). Inflation and inflation uncertainty nexus: empirical evidence from Pakistan. *International Journal of Economics and Financial Issues*, 2(3), 348.
- Khalid, A. M. (2005). Economic growth, inflation, and monetary policy in Pakistan: Preliminary empirical estimates. *The Pakistan Development Review*, 961-974.
- Mahmood, H., Waheed, A., & Khalid, S. (2017). The impact of monetary strategies on economic growth: an empirical analysis for Pakistan. *Asian Journal of Empirical Research*, 7(10), 260-268.
- Noor, A., & Chaudhary, M. A. (2009). Economic Management and Roots of Inflation in Pakistan. *Economic Management*, 5, 17-34.