Interrelationship Among Inflation And Saving: Empirical Evidence From The Emerging Economy Of Pakistan

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ABSTRACT:

The main target of most countries is to achieve economic growth with the increasing saving amount and with a lower inflation rate. The interrelationship in inflation, saving, and economic development in Pakistan is the main target of this research from the period 1983 to 2020. For the estimation of data, the time series econometric model was used in this study. The non-linear Autoregressive distribution lags (NARDL) were applied in the estimation process. The interrelationship among the variables enables us to understand through the long and short-run model. Gross national saving has positive and important impact while inflation is having a negative but substantial impact on the economic growth in the long term. Economic growth and CPI is a optimistic and substantial result on the gross domestic saving. Economic growth represented a optimistic but inconsequential effect on the CPI while gross domestic saving had a positive and important impact on CPI. The short-run result showed that gross domestic saving was a positive but insignificant influence on economic growth whereas inflation was a adverse but significant impact on economic growth. The economic growth and CPI had a significant and positive impact on the gross domestic saving. Economic growth was a positive but positive but insignificant influence on inflation while gross domestic saving was a negative but substantial effect on inflation rate. Based on the research it is recommended to the policymakers to raise savings in the economy government should promote economic growth in the country. By controlling the money supply inflation rate will be lower and should attempt to keep inflation in the single digits.

Keywords: Gross Domestic Saving, Inflation, Economic Growth, Pakistan economy, Non-linear Autoregressive Distributed Lag Model

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1 Introduction

The present chapter includes the background and the basic deification of the study, the problem's description, the purpose of the study, basic objectives of the research, and the significance of the study. It can be help full to review the chapter what should be defined in this chapter all are included. The link between saving, inflation, and economic development is the most significant flashpoint for the assessment of economic performance.

International experience shows that combining domestic investment and saving can generate employed and dependency ratios. The demand increased due to an increase in the population that is considering in Pakistan. The economy of Pakistan's pressure increased due to the inefficient legal system and people used illegal ways like hoarding and smuggling and to increase the production cost rises the prices of gas, oil becomes the reason for inflation (Shahbaz, 2013).

The connection between inflation and growth is influenced by the state of the economy in Pakistan. The growth can be improved without an increase in inflation, it cannot create a problem because inflation is always related to the increased prices unpredictability, which can create insecurity for the future productivity of the stock plan. By exports comparatively and loaning assessment inflation also effect on economy's balance of payment. As inflation increases it indicates an increase in the saving (Ilyas *et al.,* 2014).

There is an unintended association between inflation and growth that can be misinformed to recognize the relationship between inflation and growth because economic growth is influenced by the investment and investment influenced by inflation. Inflation affects economic growth through increased money flow in the economy because the relationship of inflation and different elements of economic can also be occurred by the existence of these variables (Hussain & Malik 2011). According to classical economists, the investment increased due to an increase in saving because economic growth and interest rate determination remain pending, also believed that for asset formation presence of saving is an essential and satisfactory condition. Even concluded the relationship of saving and economic growth is observable (Najarzadeh, Reed & Tasan, 2014).

The country's monetary and fiscal policy, Import price, more output, and more capitalization in the long run and short run all these factors affect inflation positively and negatively. For the economic growth of the country, every government tries to stable all these factors but sometimes the government cannot be stable all these factors that cause the higher inflation rate so multiple problems are increased such as unemployment, less economic growth, Corruption, high inflation. In some cases the recession started in the country no one found a job then unemployment and inflation go upward. Developing countries such as Pakistan, Afghanistan, and India faced this type of problem (Khan & Naushad, 2020).

Objectives of Research:

The few objectives are as under:

- To analyze the interrelationship among inflation, saving, and the economic development of Pakistan

- To estimate the threshold level of inflation in Pakistan

- Policy suggestions taking into account the statistical importance of the forecast result about inflation and growth of the economy and its effect on the economy of Pakistan.

2 Literature Review

The literature reviews are mentioned below:

Saving and Economic Growth: Empirical Evidence

The link between saving and economic growth was discussed in this section. The different researchers used different variables, periods, and different techniques were applied that may be useful for this study.

Mousavi and Monjazeb (2014) explained the effect of saving in the twelve developing countries on the rate of growth of real GDP per head. The yearly panel data had been collected from the World Bank from period of 1965-2010. The Autoregressive test, Heteroscedasticity test were applied for the variables of GDP, Private and Public Domestic Capital formation or Investment, Total Private and Public Consumption, Government Purchases, Net Export (NX), National Saving (NS), Gross Domestic Savings as a Percentage of Gross Domestic Product, LGDNS is one year Lagged Gross Domestic Saving as a Ratio of GDP, GROWTH is the Growth Rate real per-capita GDP. The result showed that the developing world and developed economies are different from each other. In the developing countries on the saving, the efficiency rate and the growth rate of real GDP per capita is lower than the developing countries.

Economics, Chaudhry, and Rahman (2017) described the real gross domestic product (GDP) and real gross domestic saving (GDS) and their long-run relationship for Morocco (1965-2007) and Tunisia (1961-2007). The time-series data was obtained from World Bank Development Reports. The log of real GDP and real GDS are variables that were used for the analysis. For the evaluation, the Auto Regressive Dickey-Fuller test, Vector Autoregressive Model (VAR), and Granger Causality were utilized. According to the data, Morocco's savings and GDP have a long-term relationship, whereas Tunisia's savings and GDP have no long-term relationship. This study also resulted that in Morocco exist bidirectional causality had been used for the link between economic growth and saving while unidirectional Granger causality among real GDP and real GDS and run as of saving to economic growth.

Inflation and Economic Growth: Imperial Evidence

Fakhri and Hasanli (2011) explained the relationship among inflation and economic growth and their threshold impact on the economy. In the Azerbaijani economy, the relation among economic development and inflation is non-linear. The time-series data had been taken from the Statistical Bulletins of State Statistical Committee or Central Bank of Azerbaijani from the period of 2000-2009. The Stationarity test and Threshold level estimation model were applied for the variables of rate of growth of real GDP (RGDP), Consumer Price Index, Inflation (INF), and rate of growth of Real Gross Fixed Capital Formation (GFCFG) in the estimation process. The result showed that it will be helpful to keep the inflation blew the threshold level of 13 for the monetary decision-maker, to avoid the economic growth from the negative effect also showed that negative effect on the GDP if inflation below the threshold level 13 but it has a positive effect happening on GDP under the threshold level.

Chaudhry, Qamber, and Farooq (2012) investigated three variables among inflation, financial policy, and economic development relationship in long term in Pakistan. The data collected from the Various Issue of World Bank and International Financial Statistical. The time-series data had been taken from the period of 1972-2010. For the variables, Johnson co-integration and Granger causality were employed, as well as Ordinary Least Square (OLS) and Augmented Dickey-Fuller (ADF) for Real Gross Domestic Product (RGDP), Money and Quasi Money as a Ratio of GDP (MGDP), Domestic Credit to the private sector as Percentage of GDP (CREDIT), Call Money rate (Proxy for Interest Rate) (CMR), Consumer Price Index (CPIR), Real Exchange Rate (REXR), Budget Deficit as a Percentage of GDP (BDEF). The result showed that the impact of variation in inflation in real gross domestic product and monetary policy variables in the economy.

Shahbaz (2013) the relation amongst price rises, economic growth, and terrorism, taking the data throughout 1971-2017. The source was the economic Survey of Pakistan (various issues). The variables that were used for the process of estimation are Inflation, economic growth, and terrorism. The ARDL and VECM Granger Causality approached are used among the variables inflation terrorism and GDP. The result described that the association between inflation and economic growth, inflation and terrorism was positively pairwise. Economic growth had effectively related to terrorism and had inversely related to inflation.

Inflation and saving: Imperial Evidence

This section explained the relationship between inflation and saving. These variables are included in the study that tells us their relationship in the long term and short-run and their impact on each other.

Emara and Kasa (2020) explained the consequence of inflation on saving that takes non-linear consequences. The time-series data had been used from the period of 1970-2012 from the source of RBI'S Handbook of Statistics on Indian Economy (HSIE) and the World Bank Indicator (WDI). For the variables, the linear and non-linear models were utilized for Gross Domestic Savings Rate (GDS), Per-Capita income (Y), Growth Rate of per-capita Income (GY), Inflation,

Age Dependency Ratio (ADR), Financial Development (FI), Real interest rate (RIR), Public Saving Rate (NSG), Private Saving Rate (NSP) and the share of Agriculture in GDP (SAGY). The result showed that the saving rate diminishes due to the inflation rate and the existness of the non-linear affiliation in non-linear saving model would be rejected and find that inflation is harmful to savings.

Adaramola and Dada (2020) explained the Nigerian economy's effect of inflation on growth. This research indicates that the negative consequences of inflation and the exchange on economic growth. The data had been collected from the period of 1980-2020 from the Statistical Bulletin in Nigeria. The autoregressive distributed lag had been applied on the variables of the inflation rate, exchange rate, interest rate, real gross domestic product (GDP), degree of economic openness; government consumption expenditure, and money supply were used in the estimation process. The result showed that in the macroeconomic variables the inflation is one variable that affects the economic growth and the interest rate, gross domestic product and government consumption expenditure there exists a unidirectional association..

Saving, Inflation, and Economic Growth: Imperial Evidence

In this section, all of the variables are included which are used in this study. The different researcher checks their inter-relationship with different variables, a different technique, and different periods that showed the impact on the economy. This will be very useful in this study.

Chaturvedi, Dholakia, and Kumar (2008) estimated the relationship between South Asia and the South East between the economic growth, saving, and inflation in a simultaneous equation. The panel data had been taken from the period of 1989-2003 for the variables per-capita Real GDP Rate of growth, Log per-capita Real GDP, Log per-capita Real GDP lag, Openness Ratio, Money Supply Growth Rate, Nominal Exchange Rate Growth Rate, Adult Literacy Rate, Real Interest Rate, Saving Rate, and Inflation Rate. The data was collected from Penn World Table, Asian Development Bank (UNICEF), and World Bank Statistics. The Two-Stage Least Square 2SLS techniques were applied. The result showed that inflation affects economic growth highly significantly negatively but saving it has a positive effect. There is no effect on the growth through inflation, but it concludes past values.

Ilyas *et a.,l* (2014) explained the impact of saving inflation and economic development in Pakistan. They have utilised data from a time sequence during the years from 1973 to 2010. 2SLS and OLS technique are used for the process of estimation. The data was collected from World Development Index (WDI) and International Financial Statistics (IFS) approaches are used to analyze the affiliation between the variables GDP, Saving unemployment rate, indirect tax, depreciation rate, total debt servicing, real interest rate, inflation rate, log of indirect taxes, dependency ratio, foreign direct investment, and total investment. This study resulted that for developing the saving in a country economic growth, dependency ratio and foreign direct investment remained valuable on the other hand depreciation was risky for the saving. The connection between inflation and economic growth was not statistically significant.

3 Data Type And Source

This study applied the Time Series Yearly data had been taken 39 years of data from the period 1983-2020 from Pakistan. The secondary data had been collected from two different sources such as the Pakistan Hand Book of Statistics and the World Development Index (WDI). The different variables that are used in the estimation process such as economic growth that are dependent variables and inflation and saving are independent. The investment and money supply are independent variables that are used as explanatory variables. In the investigation, Non-linear Autoregressive Distributed Lag (NARDL) was applied.

Empirical Methodology

$$GDP_t = \beta_0 - \beta_1 INF_t + \beta_2 GDS_t + \beta_3 INV_t - \beta_4 M2_t + \varepsilon_t \rightarrow equation\ 1$$

$$INF_t = \beta_0 - \beta_1 GDP_t - \beta_2 GDS_t - \beta_3 INV_t - \beta_4 M2_t + \varepsilon_t \rightarrow equation\ 2$$

$$GDS_t = \beta_0 + \beta_1 GDP_t - \beta_2 INF_t + \beta_3 INV_t + \beta_4 M2_t + \varepsilon_t \rightarrow equation\ 3$$

Where

GDP= Gross Domestic Product

INF= Inflation Rate

GDS= Gross Domestic Product

INV= investment

M2= Money Supply

RESULT AND DISCUSSION

The factual statistic explores the data that are provided such as the average, median, minimum value, maximum value, Standard Deviation, Skewness, and Kurtosis. The table shows the value of the variables that are taken in this mode such as GDPG, WCPI, GDS, M2, and INV

Table 1: Descriptive Estimation

	GDP	GDS	WCPI	M2	INV
Mean	4.9355	11.4482	7.7525	47.8704	513914.7
Median	4.8465	11.0476	7.4446	47.1502	193446.0

Maximum	10.2157	17.6116	20.2861	58.8676	2431664.
Minimum	1.01439	5.78259	2.5293	38.5947	2581.000
Std. Dev.	2.08125	3.97805	3.7991	6.4029	708302.5
Skewness	0.15335	0.18397	0.9788	0.2459	1.6774
Kurtosis	2.70019	1.57626	4.2116	1.8572	4.6448
Jarque-Bera	0.29892	3.51393	8.6142	2.5152	22.6872
Probability	0.86117	0.17256	0.0134	0.2843	0.0000
Sum	192.4853	446.4815	302.34	1866.949	200426
Sum Sq. Dev.	164.6012	601.3469	548.4703	1557.907	1.91E+13

Source: Authors' calculations

The table showed that in Pakistan the real GDP stood on average of 4.9 percent. The real GDP is increased from 1.0143 percent and goes to the maximum level of 10.2157 percent. The value of skewness and Kurtosis is 0.1533 and 2.7001. The value 2.7001 showed that the GDP is normally distributed. The gross domestic saving average is 11.4482. the GDS increased from the value of 5.7825 and go to the maximum level at the point of 17.6116. The value of Skewness and kurtosis is 0.1839 and 1.5762. The value of Skewness, Kurtosis, and Jarque-Bera has demonstrated that the GDS is not normally distributed. The Consumer Price index average value is 7.7525. The value increased from 2.5293 and go to the maximum level at the point of 20.2861 percent. The value of Skewness and Kurtosis is 0.9788 and 4.2116. The value of skewness, Kurtosis, and v showed that CPI is not normally distributed. The average value of money supply (M2) is 47.8704. The money supply increased from the value of 38.59470 and reached the maximum value of 58.86769 percent. The 0.2459 percent and 1.8572 percent value of skewness and kurtosis respectively that showed that the money supply is normally distributed and the average value of the investment is 513914.7 that is increas3d from the 708302.5 percent and goes to the maximum level at 2581.000 percent. The value of skewness and kurtosis 1.6774 and 4.6448 showed that is not normally distributed.

Table 2: Augmented Dickey-Fuller Test

	AT LEVEL		AT 1st DIFFERENCE	
Variables	Intercept	intercept & trend	intercept & trend Rank	

GGDP	-3.8954	-3.7541	-7.7730	-7.8070
GCF	-1.5057	-2.6228	-6.2019	-6.1290
STCPI	-2.5016	-2.6404	-6.5160	-6.4607
NS	-5.0795	-5.0141	-6.8220	6.7197
GOVT-EX	-7.5579	-7.4684	-7.2315	-7.1543

Note: "*" shows a 1 % level of significance for the variable. Source: Authors' calculations based on software, E-Views

"Augmented Dickey-Fuller" was introduced for the unit-roots test by Dickey and Fuller. The test investigates the average of series over time and constant variance. Before running the co-integration the stationarity must be tested for the variables such as Gross Domestic Product (GDP), Gross Domestic Saving (GDS), Inflation (INF), Investment (INV), and Money Supply (M2). The differenced variables to perform stationarity tests on the different variables are the next step. The different variables stationarity test result is showed by the table. The table result showed that the variable GDP is stationary at the level and first difference on both. GDS stationer at fist difference similarly money supply (M2) also stationer on the first difference. The investment is stationer at the level of first difference and WCPI stationer level and fist difference.

Table 3: Correlation matrix

Covariance Correlation	GDP	GDS	WCPI	M2	INV
GDP	1.0000	-0.2937	-0.0179	-0.0629	-0.3480
GDS	-0.2937	1.0000	0.0905	-0.3777	0.0153
WCPI	-0.0179	0.0905	1.0000	0.0336	0.5351
M2	-0.0629	-0.3777	0.0336	1.0000	0.2432
INV	-0.3480	0.0153	0.5351	0.2432	1.0000

The strength of variable association depicts the correlation matrix. The GDP has a negative correlation with GDS, WCPI, M2, and INV. The variables GDS found that positively correlated

with WCPI and INV while negatively correlated with M2 and GDP. WCPI has a positive correlation with GDS, M2, and INV. Similarly, M2 is positively correlated with WCPI and INV and negative with GDS GDPG, and INV has a positive Correlation with GDS, WCPI, M2, and INV.

Table 4: NARDL Estimation

NARDL Estimation	
R-squared	0.424421
Adjusted R-squared	0.211244
Prob(F-statistic)	0.075459
Durbin-Watson stat	2.177694

Cointegrating Form

Table 5: Run   Short-

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDS_POS)	49.6843	0.0776	640.2618	0.0000
D(GDS_NEG)	0.3384	0.2753	1.2290	0.2326
D(GDS_NEG(-1))	-0.3609	0.3044	-1.1857	0.2490
D(WCPI_POS)	-0.7275	0.1517	-4.7936	0.0001
D(WCPI_NEG)	-0.1717	0.1895	-0.9064	0.3750
D(WCPI_NEG(-1))	-0.5055	0.1504	-3.3600	0.0030
D(M2)	-0.8583	0.0912	-9.4106	0.0000
D(INV)	-0.1886	0.0000	-30942.9975	0.0000
CointEq(-1)	-1.3130	0.1704	-7.7039	0.0000

Cointeq = GDPG - (37.8388*GDS_POS + 0.5284*GDS_NEG - 0.6131*WCPI_POS + 16.3287*WCPI_NEG -2.8067*M2 -0.7049*INV + 11.9265)

Estimation of NARDL for GDP

The coint-Eq shows are significant and less than negative which displays that here is a long-run connection between the variables. The GDS has a optimistic effect on GDP. The CPI takes a significant negative impact, in the short term. In the short run estimation, some variables are significant and some variables are insignificant because the change duration in the short run is small therefore variation exists among the variables, the long run results explore the clear result. The result of the long run is accurate and significant.

Table 6: Long-Run Estimation of NARDL for GDP

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDS_POS	37.8387	4.9351	7.6671	0.0000
GDS_NEG	0.5284	0.2490	2.1216	0.0459
WCPI_POS	-0.6130	0.1206	-5.0823	0.0000
WCPI_NEG	16.3286	2.0889	7.8167	0.0000
M2	-2.8066	0.4002	-7.0118	0.0000
INV	-0.7049	0.0914	-7.703984	0.0000
C	11.9264	3.4756	3.431409	0.0025

Source: Authors' Estimations

Here is a positive relation among the Gross Domestic Product and Economic development. A one percent increase in Gross Domestic Saving means a 37.8387 percent increase in GDP. While one percent decreases in negative Gross Domestic Saving leads to a 0.5284 percent decrease, this shows a positive and substantial affiliation with GDP that is true according to the theory of saving. In the case study of Pakistan here is a long-term association among saving and economic growth, here are different cases in the lower-income and higher-income countries there is found mixed relationships. In the lower-income countries, the rate of economic growth to saving rate causality moves and causality moves in the higher income countries from economic growth to saving but in the countries of upper- middle income, there is bidirectional causality exist (Reddy,

Rajasekhar & Gopalakrishnan, 2019). One percent rise in positive CPI centrals to a -0.6130 decrease independent variable GDP, while negative CPI decrease in one percent leads to a 16.3286 percent surge in GDP that is true according to the theory of inflation. According to the economic theory, the link among the rate of inflation and economic growth is negative in numerous studies the different researchers explained that relationship. On the supply of money, the government control effectively becomes to decreases the rate of inflation and then the economy will go to the growth (Babatunde and Shuaibu 2011).

In many studies, there has been a positive correlation amongst economic growth and investment, and there is a negative relationship between them such as a one percent increase in independent variable -0.7049 decreases in GDP that showed the negative but significant relationship between them. Nowadays the economy may slow down due to an increase in investment. The dynamic short-run investment may be a positive effect but in the long term, there exists a negative relationship and suggested that the imports are dependent on developing countries that are becoming the reason for the unsustain level of economic growth and investment (Murtala, Nwaoha & Olagoke, 2013). One percent increase in the independent variable money supply then -2.8066 decreases in the dependent variable GDP. In many studies, there exists a positive association between GDP and money supply. But in some studies there is a negative relationship such as the by the FOMC money supply is slowed when GDP exceeds the target while the money supply speed up when lowering the target of GDP (Tin, 2017).

Table 7: Co-integration Analysis (Bound test)

Equation	F-statistics	Upper-bound value	Results
GDP, WCPI, GDS, M2, INV	5.542110	*3.23*	Co-integration exists

Source: Author's Estimations

The long-run co-integration may be existing between variables, according to Granger (1987) and Engle on data series. Pesaran et al. (2001) suggest f-statistics can determine the long-run co-integration. Above table illustrates the value of the f-statistic is 5.5421 that is greater than the value of the upper limit that is 3.23; this outcome indicates that here is a long-run affiliation.

Table 8: Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.8936	Prob. F(2,19)	0.4257
Obs*R-squared	3.0954	Prob. Chi-Square(2)	0.2127

Table 9: Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.8030	Prob. F(14,21)	0.6578
Obs*R-squared	12.553	Prob. Chi-Square(14)	0.5620
Scaled explained SS	3.6306	Prob. Chi-Square(14)	0.9973

The serial correlation of the null hypothesis (Brush God fray LM test) in the rejection failed that is the reason of with the test statistic p-values greater than the significant level [0.89>0.05]. The serial correlation is applied to the testing of the Brush LM test was used, since the statistic test Durbin Watson which is traditional unlike is inapplicable when as a repressor the dependent variable appears. The limitation of the DW test the LM test avoids. The result showed that there are no problems with the serial correlation and Heteroscedasticity in the model. Because value of the probability of Obs*R-Squared is greater the 5% that is the level of significance of heteroscedasticity is [0.6>0.05].

Stability Analysis

Through the stability analysis, the estimation relationship shows that the stability exists or not in the long run. The diagram shows the result below
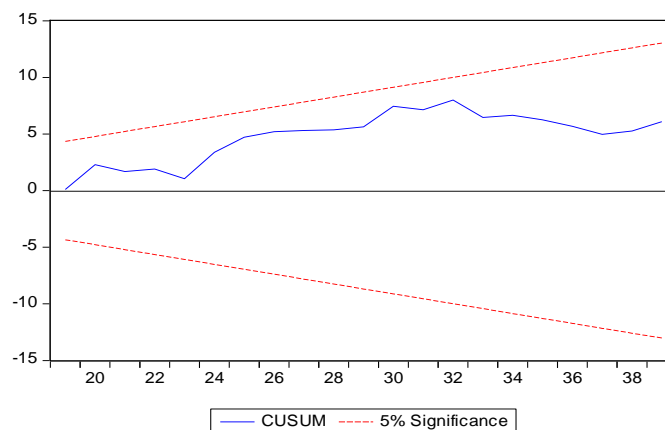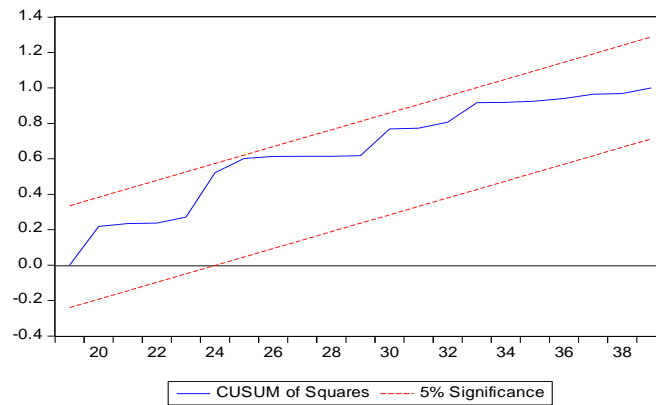

Figure 1: Cusum

Figure:2 Cusum Square

Two graphs that are presented above, two parallel straight lines indicate that the 5% level of significance. If the two parallel straight lines remain inside of the graph of CUMSUM and CUSUM SQUARE the correct specification of the null hypothesis of the model and in other cases, the 5% significance level will reject the null hypotheses and the miss-specified regression equation. The CUSUM and CUSUM SQUARE plots are disclosed and within the line stay, so this showed that the model is stable and the equation had specified correctly. Moreover during the sample period instability in the structure are mod found in the model. So in Conclusion the CUSUM and CUSUM SQUARE chart showed that the model stability at 5% cannot reject the null hypotheses of the stability parameter.
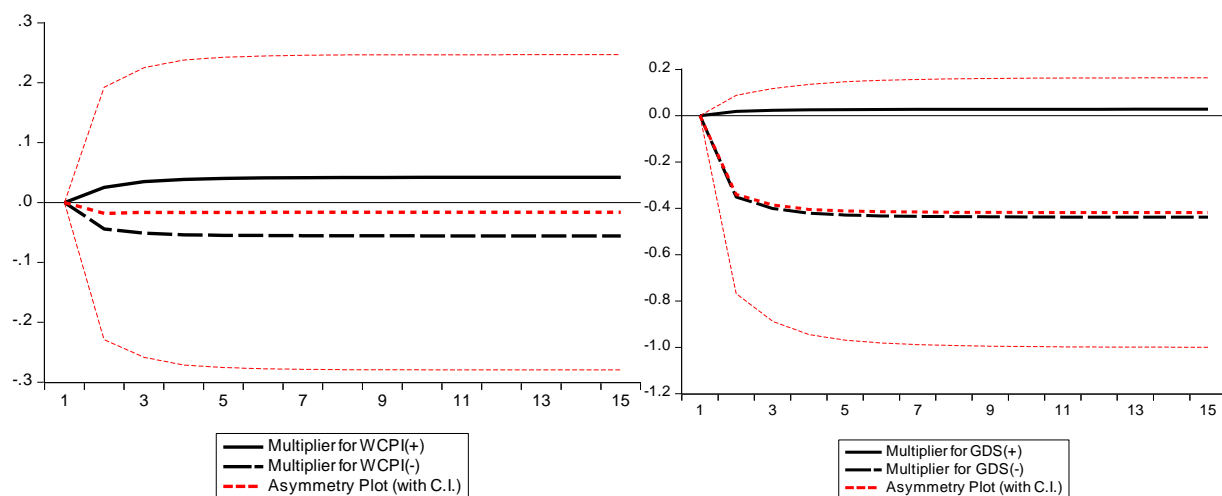

Figure 3: Dynamic Multiplier Graph

The asymmetry bends depict the linear combination of WCPI and GDS paths that emerge as a result of positive or negative shocks. At a certain predictive horizon, the asymmetry curves of

positive and negative WCPI and GDS asymmetrical reaction to positive and negative changes in these variables.

Table 9: NARDL Estimation of GD Model

NARDL Estimation	
R-squared	0.859251
Adjusted R-squared	0.799704
Prob(F-statistic)	0.000000
Durbin-Watson stat	2.286470

Table 10: Estimate short-run NARDL Model for GD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDS(-1))	0.2091	0.2151	0.9718	0.3433
D(GDS(-2))	0.6373	0.2083	3.0594	0.0065
D(GDPG_POS)	1.6515	0.4152	3.9772	0.0008
D(GDPG_NEG)	0.0000	0.2852	0.0000	1.0000
D(GDPG_NEG(-1))	0.0000	0.2950	0.0000	1.0000
D(M2)	-0.289027	0.137356	-2.1042	0.0489
D(M2(-1))	-0.417136	0.1559	-2.6745	0.0150
D(INV)	-0.8571	0.0000	-1110.6112	0.0000
D(WCPI_POS)	0.4034	0.1670	2.4142	0.0260
D(WCPI_POS(-1))	-0.6309	0.1458	-4.3274	0.0004
D(WCPI_NEG)	0.6309	0.2309	2.7315	0.0133
CointEq(-1)	-0.7568	0.1843	-4.1051	0.0006

Cointeq = GDS - (2.1823*GDPG_POS + 0.0000*GDPG_NEG + 0.5942*M2 +   0.8923*INV + 2.2510*WCPI_POS +

0.8337*WCPI_NEG + 0.8337)

The result showed that between the variables, here is a long-run affiliation. because value of CointEq is -1, indicating a long-term relationship exists. For the short term, a few variables are substantial and a few insignificant. But the Long run estimation clears the result because in the short run the period of change too small so there will be variation in the variables. In the table the D (GDS (-1)) while the negative and significant impact in D (GDS (-2)) and D(GDPG_POS) is a positive and substantial impact while D(GDPG_NEG) and D(GDPG_NEG(-1)) have a negative and insignificant impact over the short run. D (M2) takes a negative and substantial effect although D (M2 (-1)) in the short term, it has a optimistic and important impact. D (INV) had a negative and substantial impact in the short run. D (WCPI_POS) and D(WCPI_POS(-1)) has a positive and significant effect over the short term while D(WCPI_NEG) is having a negative and significant impact. The variation should be found between the variables because in the short term the period is too small.

Table 11: Estimate Long Run for GDS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPG_POS	2.1822	0.7491	2.9130	0.0089
GDPG_NEG	0.0000	0.5460	0.0000	1.0000
M2	0.5942	0.2684	2.2135	0.0393
INV	0.8923	0.2173	4.1051	0.0006
WCPI_POS	2.2510	0.5884	3.8253	0.0011
WCPI_NEG	0.8337	0.1911	4.3619	0.0003
C	0.8337	9.6484	0.0864	0.9320

In this table, the GDS is used as the dependent variable while WCPI, GDPG M2, and investment are being used as the independent variable. And the outcome indicated that there has been a positive link between Gross Domestic Product and GDP. In GDPG one percent increase in independent variable GDP POS. 2.1822 percent increases in the dependent variable that showed the positive and significant relationship between them while in GDPG NEG one percent rise in the independent variable 0.0000 percent decrease in the dependent variable that shows the positive relationship between them. The researcher research that there is a positive affiliation is that the role of domestic saving leads to economic growth the initiate long-run equilibrium connection between financial development and saving (Jangili, 2011)) and Gross domestic savings and economic growth have a positive link. (Adebayo, 2020).

There has been a positive association is between gross domestic saving and money supply as shown in the table one percent rise in the independent variable leads to a 0.5942 percent rise in the dependent variable. There are many studies on this relationship such as the rise in gross domestic saving leads to increase in money supply there exist positive and significant relationship (Emmanuel, 2013) and to the stock development market in equally in the long and short term, saving and money supply have a positive impact in Pakistan (Ali & Nazar, 2017)). The effect of saving and investment is positive as shown in the table one percent escalation in an explanatory variable if mean 0.8923 percent rise in the dependent variable. According to other research that the long-run relationship exists amongst saving and investment, the Nigeria government gives special attention to the dynamic interaction among gross domestic saving and investment for the growth of the Omoregie, Ikpesu & Okpe, 2018) and in other studies there found causality between investment and saving that shows there is a positive and significant relationship among them (Budha 2012).

This study investigates whether there is a link between the CPI (inflation) proxy and gross domestic savings as shown in percent increase in the independent variables leads to 2.2510 percent rise in dependent variable, while one percent decrease in an independent variable means a 0.8337 percent decline in the reliant on the variable that showed that the is positive relationship exists between saving and consumer price index (CPI). In general, there is a positive association between the two but in some studies there exists a negative affiliation such as inflation and saving relationship is largely mirage statistically. The inflation rate measured income and saving as higher the inflation higher the fraction in the payments that are not income on a financial asset but the value of the asset is decrease and they want to maintain their wealth therefore the measurement of GDP and GDS is different as the inflation rate increased as saving increased (Dash & Kumar, 2018).

Table 12: Co-integration Analysis (Bound test)

Equation	F-statistics	Upper-bound value	Results
GDS, WCPI, GDPG, M2, INV	4.6041	*3.23*	Co-integration exists

Source: Author's Estimations

The bound test, according to Granger and Engle, investigates the existence of long and short-run estimation. It is determined by the f-statistics value and the upper limit value. Unless the f-statistics value is above the upper limit, there is no long-term affiliation..

The table shows that the f-statistics value is 4.6041 that is higher than the value of the upper bound test that is 3.23 demonstrates the presence of a long-term relationship..

Table 13: Serial Correlation LM Test:

| F-statistic | 2.3516 | Prob. F(2,17) | 0.1254 |
| Obs*R-squared | 7.8014 | Prob. Chi-Square(2) | 0.0202 |

If the probability of the f-statistics is greater than 0.05% that showed that there is not found the problem of serial correlation. If there is a p-value that is smaller than the significant level and then serial correlation exists within the model. Table for the result showed that the p-value is larger than the significance 5% which shows there is not found the problem of serial correlation and the model is substantial.

Table 14: Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.5041	Prob. F(16,19)	0.9142
Obs*R-squared	10.7290	Prob. Chi-Square(16)	0.8259
Scaled explained SS	4.05505	Prob. Chi-Square(16)	0.9988

The issue of heteroscedasticity will present in the model condition that the probability value is smaller than the significance level at 5% if the result will adverse there is not finding the problem of heteroscedasticity. The table result exhibited that the probability of f-statistics is larger than the 5% that showed that there is not found the problem of heteroscedasticity. Similarly, the value of Obs*R-squared and Scaled explained SS is greater than the significant level so the model is not finding the heteroscedasticity problem.
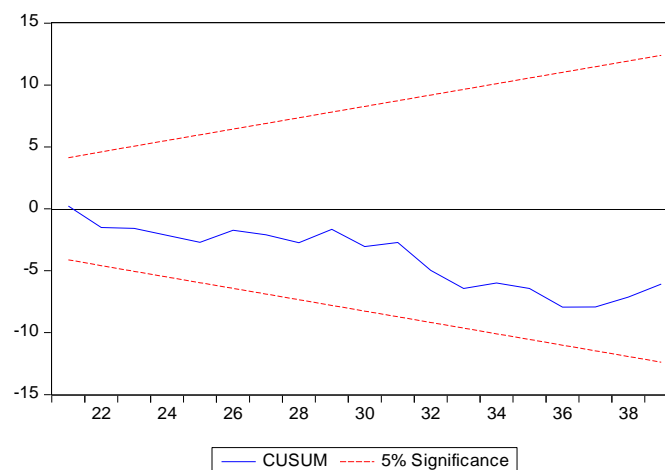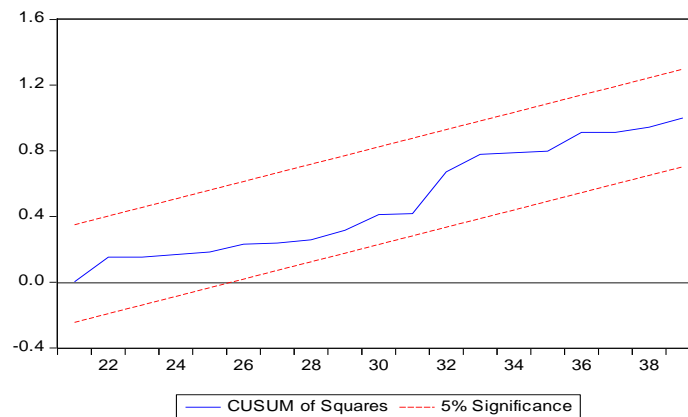

Figure 4: Stability Test

Figure 5: Cusum Square

Over the Cusum and Cusum square, we check the steadiness of model. If both remain in the boundaries at the critical lines then the estimated model is stable and significantly specified. If it remains outside the boundaries then the model is not significant. The diagram of Cusum and Cusum square demonstrates that the blue line within the two parallel lines which shows the level of significance and the model is correctly specified.
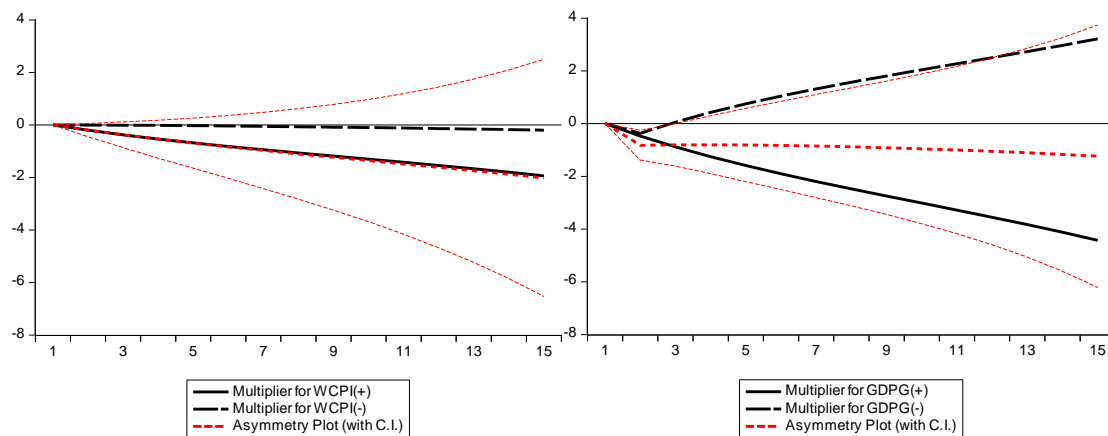

Figure 6: Dynamic Multiplier Graph of GD model

We followed Shin et al directions to make the dynamic multiplier graph. Inflation has fluctuated in both positive and negative ways. The asymmetry bends depict the linear combination of WCPI and GDPG paths that emerge as a result of positive or negative shocks. At a certain predictive horizon, the asymmetry curves of positive and negative WCPI and GDPG's asymmetrical reaction to positive and negative changes in these variables.

Table 15: NARDL Estimation of Inflation Model

NARDL Estimation of Inflation Model

R-squared	0.944004
Adjusted R-squared	0.895474
Prob(F-statistic)	0.000000
Durbin-Watson stat	2.418768

Table 16: Estimate short-run Model for INF (Inflation)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPG)	0.3231	0.2922	1.1059	0.2789
D(GDS_POS)	-0.3766	0.1755	-2.1453	0.0414
D(GDS_NEG)	0.2316	0.4176	0.5547	0.5838
D(INV_POS)	-0.3402	0.0000	-5768.1978	0.0000
D(INV_NEG)	0.4063	0.0000	41999.2339	0.0000
D(M2)	0.4666	0.1578	2.9555	0.0066
CointEq(-1)	-0.7531	0.1181	-6.3741	0.0000

Cointeq = WCPI - (0.4291*GDPG -0.5001*GDS_POS +
1.3717*GDS_NEG + 1.9095*INV_POS + 0.5396*INV_NEG +
1.2356*M2 +   1.4365)

The result showed that D(GDPG) have a positive plus substantial influence on inflation in the short term that is one percent surge in the GDP 0.3231 percent increase in the inflation while in D(GDS_POS) one percent increase leads -0.3766 percent decrease in the inflation that has negative but significant impact on inflation and one percent decrease in D(GDS_NEG) leads to 0.231682 percent decrease in inflation in the short term that shows a adverse and inconsequential influence on inflation in short run. One percent increase or decrease in D (INV_POS) and D (INV_NEG) leads to -0.3402 and 0.4063 percent decrease inflation that has a negative and significant consequence on inflation in the short run. the one-percent rise in the Money Supply leads to a 0.4666 percent rise in the inflation rate that is having a positive and substantial impact on inflation in the short run. Moreover in the model, the CointEq was correctly signed and significant that was significant at 5 % and negative as expected. The coefficient value -0.7531

explores that rate of inflation-adjusted by 7.53179 percent between equilibrium level of the long run and current level.

Table 17: Estimate Long Runs for CPI (Inflation)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPG	0.4291	0.3905	1.0987	0.2819
GDS_POS	-0.5001	0.2613	-1.9132	0.0668
GDS_NEG	1.3717	0.4500	3.0481	0.0052
INV_POS	1.9094	0.2995	6.3742	0.0000
INV_NEG	0.5395	0.0846	6.3742	0.0000
M2	1.2356	0.2818	4.3833	0.0002
C	1.4365	8.3433	0.1721	0.8646

The table demonstrates that a 1% upsurge in GDP results in a 0.4291 percent rise in the dependent variable, indicating a positive but minor impact on inflation. Inflation and economic growth have a negative bond in many types of research, but this research found that there is a negative relationship between them such as in the long run the inconsequential association found among inflation and economic growth (Faten 2020), In previous studies, the CPI and GDP always grew in reaction to the asset purchase shock, and the asset purchase impact on the GDP and CPI was always similar (Weale and Wieladek 2016). Similarly, there is a negative relation amongst Gross Domestic Saving and Inflation, as seen in table one percent increase in the independent variable GDS -2.3286 percent drop in the dependent variables, here is a negative link among Gross Domestic Saving and Inflation. whereas a 1% reduction in the independent variable GDS then 21.6903 percent increase in the dependent variable that shows the negative but significant relationship between them. There is a negative relationship found among inflation and saving when in12 months higher the rate of inflation and the saving is positive when the prices are stable (Premik and Stanisławska 2017).

Investment and inflation have a positive association, according to the data given in the above table, with a rise of 1% in the independent variable leading to a 1.9094 percent increase in the variables that are dependent, and one percent decrease in the independent variable leading to a 0.5395 percent reduction in the dependent variable. The investment adversely affects the inflation such as the rate of inflation above the thresh hold level then investment and the inflation rate is negative but when the inflation below the threshold level then the relationship of inflation and investment is positive (Iqbal and Nawaz 2009). One percent rise in independent variables

will result in a 1.2356 percent rise in the dependent variable that shows the positive relationship between them. In many studies, there were found positive and negative relationships between them. According to some researchers, there is a substantial and positive influence on money supply and the inflation rate (AL-Mutairi, Al-Abduljader & Naser, 2020).

Table 18: Co-integration Analysis (Bound test)

Equation	F-statistics	Upper-bound value	Results
WCPI, GDS, GDPG, M2, INV	3.8191	*3.23*	Co-integration exists

 Source: Author's Estimations

The presence of long and short run estimation is demonstrated by bound test. The existence is determined by the f-statistics value and the upper bound value. Long-run relationship exists unless the f-statistics value is larger than the upper bound test. The tables result illustrate that the f-statistic 3.8191 value that is more than the upper limit bound value of 3.23 that shows a long-term affiliation exist in concerning variables.

Table 19: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.3076	Prob. F(2,24)	0.7381
Obs*R-squared	0.9247	Prob. Chi-Square(2)	0.6298

The Breusch-Godfrey Serial Correlation LM Test is designed to ascertain whether or not here exists a serial correlation issue. There is no problem with serial correlation in the model if the p-value is more than the significant level of 5%; however, if the p-value is less than the significance level, there is a problem with serial correlation in model. The table illustrates that the p-value is greater than significance level that shows there is not found the problem of serial correlation.

Table 20: Heteroscedasticity Test

F-statistic	0.5404	Prob. F(10,26)	0.8454
Obs*R-squared	6.3675	Prob. Chi-Square(10)	0.7835
Scaled explained SS 1.9225		Prob. Chi-Square(10)	0.9969

A higher p-value indicates that there is not found the problem of heteroscedasticity. If the value falls below the 5% level of significance, there exists the problem of heteroscedasticity. The table

illustrates that the p-value is higher than the significance level that shows there is not exist the problem of heteroscedasticity and the model is stable.
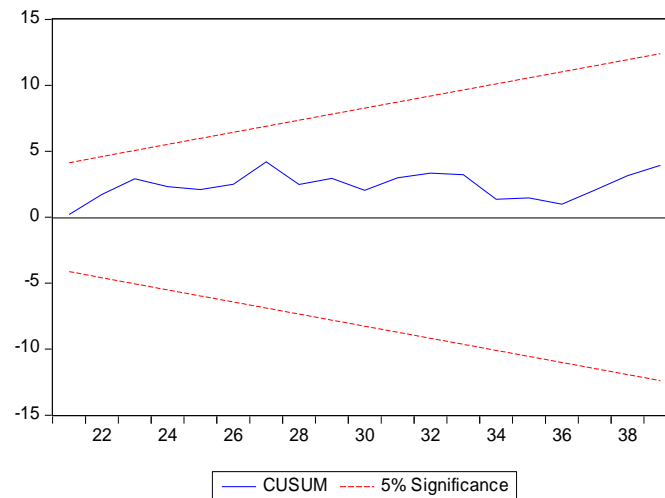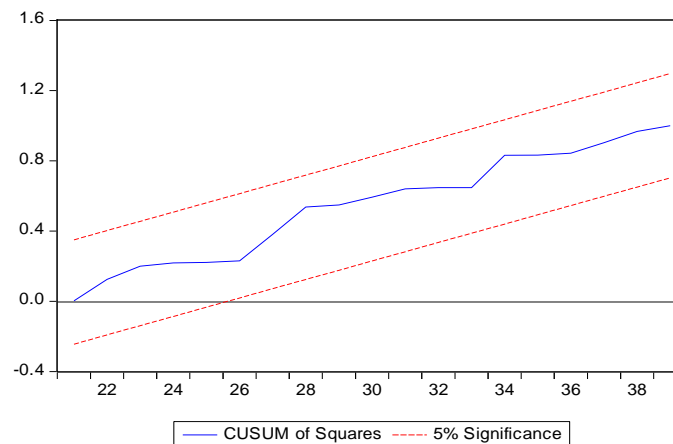

Figure 7: Stability Test

Figure 8: Cusum Square

In the above two graphs, Cusum and Cusum square we have tested that shows that two parallel straight lines show the level of significance at 5%. If the Cusum and Cusum square plot remains insides the two parallel lines then the model is significant and correctly specified but if it remains insight that shows that the model is insignificant and not correctly specified. The above graph Cusum and Cusum square remain insight the two parallel lines that show the model is the significance and correctly specified.
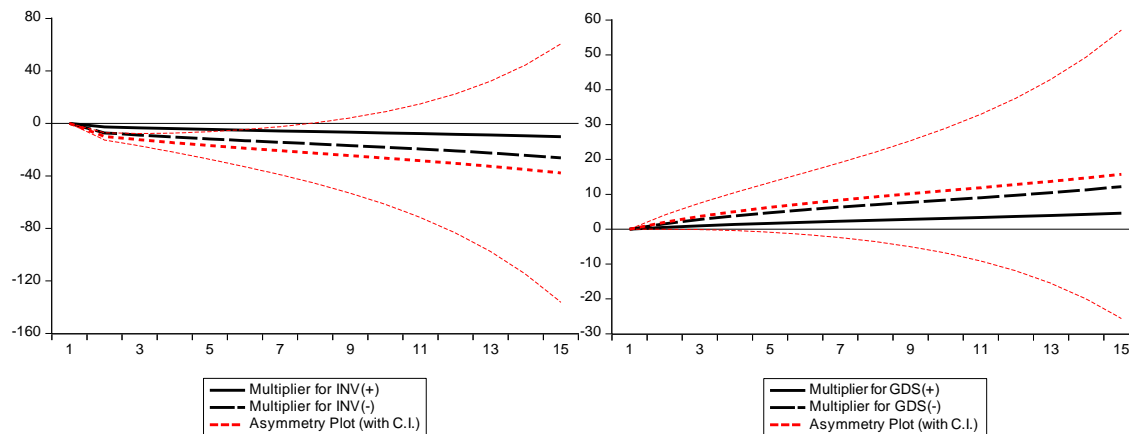
Figure 9: Dynamic Multiplier of CPI Model

We formed the dynamic multiplier graph by following Shin et al instructions. Inflation has had both positive and negative variations. The asymmetry bends show the linear combination of pathways in INV, and CPI that occur from positive or negative shocks. The asymmetry curves of positive and negative INV and CPI at a certain predictive horizon can provide information on GDPG's unequal response to positive/negative changes in these variables.

4 Conclusion

The inter-relationship of inflation, saving and economic development is the key objective of this research. On the way to estimate long and short run, the Non-linear Autoregressive Distribution Lag (NARDL) model was applied. Before applying the NARDL model the variables which are used throughout this study are tested the properties of the time sequence, using the ADF test the unit root test was used. The result has demonstrated that entire the variables are stationary at the significance level. The co-integration result indicated that in the model has a long-run relations between two variables. Through stability and stationarity test demonstrated in this model there are no issues with serial correlation or heteroscedasticity. were found in this study and the distribution of the residual is abnormal. This study found that gross domestic savings have an impact on economic growth that is both positive and significant over the long term. While the consumer price index has an adverse and considerable impact on the economy in long run. Explanatory variables money supply and investment have an adverse effect but substantial on economic growth. When GDS is dependent, GDP and CPI are have a positive and substantial impact on GDS, while explanatory variables like money supply and investment have a positive and significant impact in the long run. When inflation is used as the dependent variable then GDP has a positive but insignificant impact on inflation while the gross domestic saving has a negative but significant impact in the long run. The explanatory variables investment and money supply has a substantial and positive impact on inflation. rate in the long run. There are many empirical and theoretical studies found that explore the positive relationship between saving and the negative effect of inflation. This study also confirms that there is a positive and substantial

effect of saving and a negative effect of inflation on the economic growth. This demonstrates that in the contribution of economic growth saving plays a significant role in the economy of Pakistan.

Many studies demonstrate that investment has a significant and positive influence on the economy but this study shows that the investment hurts the economy, as shown in the result one percent increase in investment -0.7049 percent decrease independent variable that shows the negative impact on the GDP similarly the money supply has a a favourable consequence on the economic growth but herein study, the result displayed there is negative impact as shown in the lone run result one percent increase in the money supply -2.8066 percent decrease in the economic growth but the significant impact on the dependent variable. According to the research paper, the growth of real GDP explaining the money supply have insignificant predictive power. The contractionary and expansionary between the choice the response of money supply have not been significant in the case of GDP growth rate (Hussain & Haque, 2017).

5 Policy Recommendation

Based on the finding the researcher would recommend the government and the policymakers should be responsible for the following actions that will help to increase the saving and economic growth and to reduce the inflation rate. In the current study, in Pakistan, gross domestic savings have a favorable and considerable long-term and short-term impact on economic growth. The influence of economic growth on inflation is negative.

➢ The government should promote long-term economic growth to increase gross domestic saving, government of Pakistan can increase tax and private businesses to encourage increasing the domestic saving.
➢ The government should control the money supply to control the inflation rate and should try to maintain inflation at a single-digit level.

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