

Inflation, Exchange Rate and Economic Growth A CASE STUDY of Pakistan: 1988-2018

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Abstract: This research article based to determine the relationship among the Inflation in prices, GDP growth and Exchange rate of Pakistan in last thirty years from 1988 to 2018. This analysis has been done in perception of the impact of inflation of prices and devaluation of currency on the economic growth of Pakistan. It has been analyzed by taking data during from 1988-2018. The procedures of econometric analysis like Stationarity of variables through Unit Root Test by Augmented Dickey Fuller (ADF) method; Short term and long term relationship through Autoregressive Distributed Lag(ARDL) method and Error Correction Method (ECM) test are used as a tools to find the relationships among the variables under investigation and to explain the results. It has been derived by using above stated methodologies on the data of specified period reveals a long term relationship among inflation and inflated exchange rate on economic growth. It is concluded that economic growth can be maintained by keeping stability in consumer price index and exchange rate. Further it has been proved that in a short run period inflated rate of price index does not affect growth rate but exchange rate yields negative impact on economic growth but it yields positive impact under controlled inflation and stable exchange rate.

Key words: Inflation Rate; Exchange rate; Growth Rate; Pakistan

Introduction

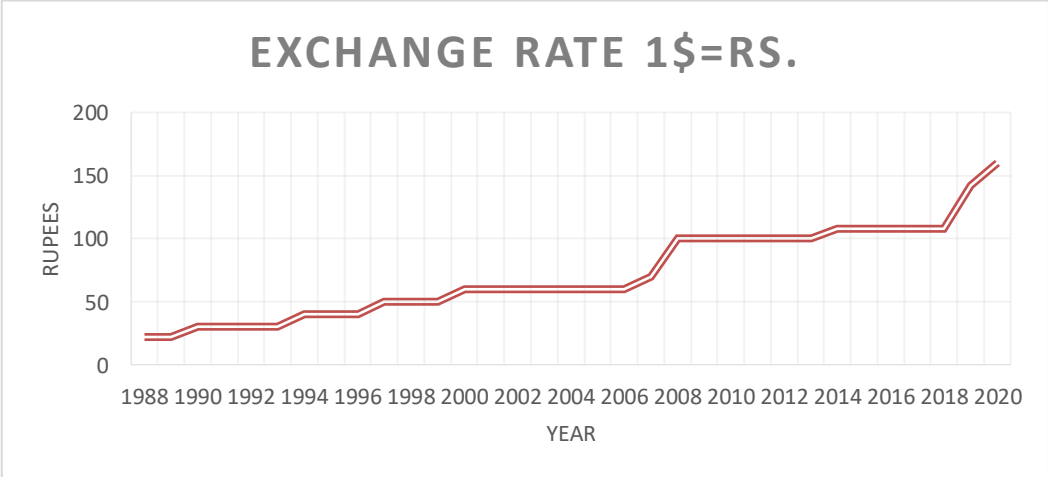
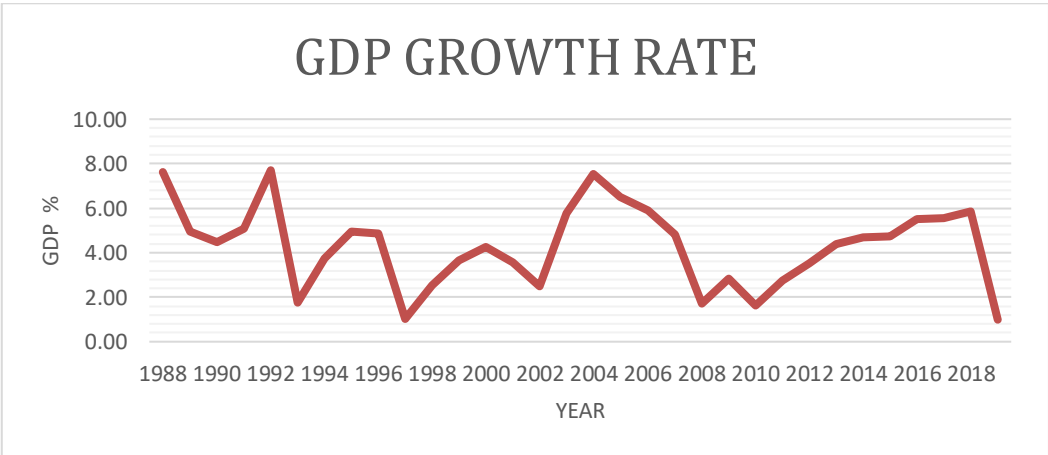
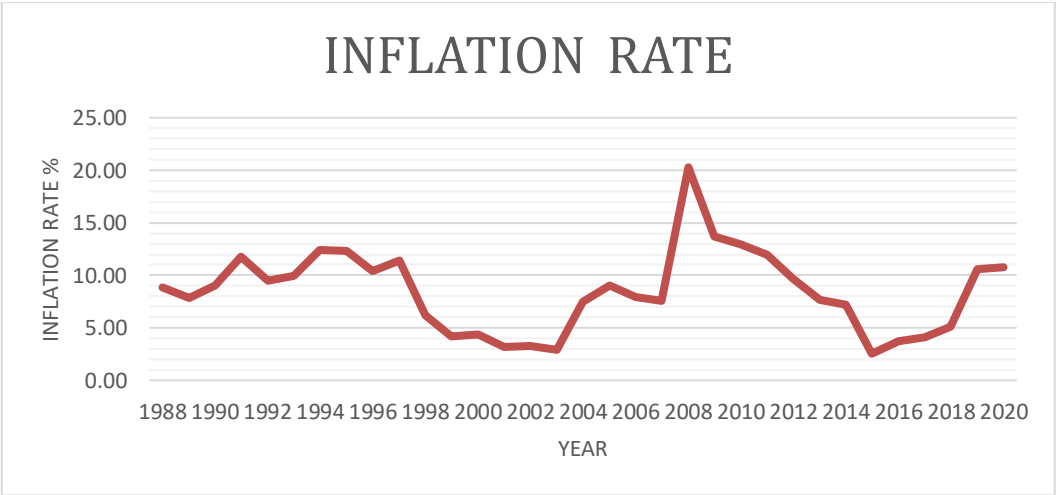
During the last thirty years from 1988 to 2018, the economic health of Pakistan remain sick and weak despite adopting different policies and strategies by elected governments. For the time being it prevail improved but in fact the people of Pakistan could not get relief even for a single year in last three decades. The primary concern of an individual in economic scenario is control prices of goods and services for getting their bread and butter comfortably. In this study it has also been observed that the size of economy is expanding gradually but having inflationary growth due to the devaluation of rupee because of heavy borrowings of government. The basic principal of economic policies is to promote high and consistent

growth while keeping inflation at low level, according to popular belief. Although inflation is viewed in the long run as a monetary phenomenon, the SBP bank utilizes monetary tool to fulfil the second goal to decrease inflation. Inflation can be focused by adjusting the respective increase in wages, prices and interest rates in short and medium pace. However, it is presumed that inflation is beneficial to the economy if it is controlled with low rate since it promote growth in businesses and thus low rate in inflation helps to boost economic activity. Pakistan has a long history of macroeconomic imbalances of foreign and domestic loans, huge budgetary and current account shortfalls, severely low foreign exchange deposits, higher inflation, higher nominal interest rates and sluggish economic development. The present budget shortfall is around 6% of GDP. The average economic growth over the last 40 years has been around 4%. Over time, these economic imbalances led to rising inflation and unemployment. Exchange rate of rupee against US\$ has depreciated drastically. Exchange Rate in Pakistan has rapidly increased during the thirty years study period. Despite the fact that the government was in IMF stabilization program and could not be controlled the devaluation. The politically maneuvered exchange rate need to be controlled but there seem to be no control in the Monetary Policy.

Table 1: Inflation Rate, Exchange Rate and Growth Rate Pakistan 1988 to 2018

YEAR	Exchange Rate \$1=Rs.	GDP GROWTH RATE %	INFLATION RATE %
1988	22	7.63	8.84
1989	22	4.96	7.84
1990	30	4.46	9.05
1991	30	5.06	11.79
1992	30	7.71	9.51
1993	30	1.76	9.97
1994	40	3.74	12.37
1995	40	4.96	12.34
1996	40	4.85	10.37
1997	50	1.01	11.38
1998	50	2.55	6.23
1999	50	3.66	4.14
2000	60	4.26	4.37
2001	60	3.55	3.15
2002	60	2.51	3.29
2003	60	5.78	2.91
2004	60	7.55	7.44
2005	60	6.52	9.06
2006	60	5.90	7.92
2007	70	4.83	7.60
2008	100	1.70	20.29
2009	100	2.83	13.65
2010	100	1.61	12.94
2011	100	2.75	11.92
2012	100	3.51	9.68
2013	100	4.40	7.69
2014	108	4.67	7.19

2015	108	4.73	2.53
2016	108	5.53	3.77
2017	108	5.55	4.09
2018	108	5.84	5.08



In the light of above data shown in table 1 with its graphical representation shown above reveals that inflation rate, exchange rate and growth rate are correlated in this time series data. Both inflation and exchange rate put positive or negative impact on growth rate. If growth rate increases, obviously inflation rate remain in single digit as well as stable exchange rate. When there is low growth in the economy due to higher inflation rate and expensive \$ price, government need funds to finance the expenditures from borrowed funds because of low collection of tax revenues. Consequent upon inadequate collection of tax revenue the government always looking for national or international donor agencies like IMF for getting loans to run the machinery of state. This practice of getting loans commonly executed on the basis of acceptance of demands of donor agencies. The most common conditions are to lift subsidies on commodities and devaluation of currency. These conditions promotes inflate prices in the country. The past studies on this topic reveals a vital negative effect of such national or international borrowings economic growth. According to Landau, 1985 the crucial factor of increasing prices of commodities and services is the increasing of circulation of money through printing of currency notes by central bank. Increasing interest rate to motivate the general public to increase savings rather than spending causes reduction of investment. Further the imposition of indirect taxes creates not only increase of cost of business but also promotes curiosity in the public which lead reduction in output as well as in growth.

The objective of this study is to analyze the influence of the variations of inflation rate and exchange rate on the growth rate in Pakistan. For this objective the relationship among inflation rate, exchange rate and growth rate would be empirically analyzed by taking time series data of last three decades from 1988 to 2018 to conclude the results.

This research paper is spread among four following sections:-

- a) Section 2 for Literature Reviews.
- b) Section 3 for Methodology and Data collection.
- c) Section 4 for Data analysis.
- d) Section 5 for Conclusions.
- e) Section 6 for Recommendations.

2. LITERATURE REVIEW

During literature review it is found researchers cited below strongly support the inverse relationship between inflation rate and growth rate. In their study it is mutually agreed upon that the growth rate is negatively affected if the inflation level become beyond its threshold (De Gregorio, 1992; Fischer, 1993; Barro, 1995; Thornton, 1996; Atesoglu, 1998; Bruno & Easterly, 1998; Ericsson, Irons & Tryon, 2001; Guerrero, 2006).

Monetary policy plays a vital role on the behavior of inflation rate and growth rate. Best policy for central bank is to focus on targeting the inflation. It is also being noted that exchange rate system should be flexible because high valued currencies are not only inflationary but also become the obstacle in the way of economic growth, Sulaiman, (2010).

The influence of government budgetary policy on domestic growth is significant and the existence of co-integration relationship among Government expenditures, inflation rate, growth rate and circulation of money stock. But the influence variables like volatile exchange rate and higher inflation rate on growth of economy is negative, Khosravi and Karimi, (2010).

In small and open economy exchange rate channel is also a crucial one. The monetary tightening causes the nominal exchange rate to increase. Due to nominal strictness prices remain constant in small time period and in the result we see the appreciation in real exchange rate (Mishkin, 1996).

Any rise in the currency rate by keeping other things as constant will lead to an appreciation. In the consequence of appreciation not just the import costs including import of middle merchandise and materials will diminished however this will end in the misfortune of intensity for exporters and import-contending firms. Improvement in the term of trade due to currency appreciation, will involve only in growth of real income, but on the other side output and employment will decrease due to competitiveness effects (McLennan, *et al.*, 1998).

The relationship among inflation rate, exchange rate and growth rate may be unrelated, positive and negative which will be proved in following section.

1. DATA COLLECTION AND METHODOLOGY

The relationship can be found through Multiple Regression analysis methodology. The Reviews 10 software is used to get analysis. The secondary time series data from 1988 to 2018 is used in analysis which has been collected from official source sand from World Bank data base. Economic growth is taken as dependent variable. Inflation and exchange rate are used as independent variables for the time series data.

Econometric model is given below:

$$GR = f(\beta_0 + \beta_1 \text{InfRate} + \beta_2 \text{ERate} + \epsilon_t)$$

Where

GR	=	Growth Rate
Inf Rate	=	Inflation Rate
E Rate	=	Exchange Rate
ϵ_t	=	Error Term (Stochastic)

Where, β_0 , β_1 , β_2 are the coefficients of regressors.

The Autoregressive Distributed Lag (ARDL) is an ordinary least square (OLS) based model which is appropriate for mixed order of stationarity. For mixed order of integration an ARDL model is applied. A number of lags of past period of each variable are taken to explore the significance between dependent and independent variables (Pesaran and Shin, 1999; Pesaran,

Shin and Smith, 2001). This methodology for empirically analysis is used to find the relationship between dependent and independent variables by using following steps:-

- To verify the relationship among the variables by constructing Covariance Matrix;
- To check the stationarity of each variable by using ADF test
- To apply ARDL model to measure the short run relationship with significance of joint probabilities through Wald test.
- To apply ARDL bound test to find long run relationship
- To check the stability in a long run ECM test is applied.

Time series annual data from 1988 to 2018 of each variable having 30 points are analyzed to estimate. The below stated model was applied to check the impact of exchange Rate and inflation rate on economic growth rate that is shown in following equation (1).

$$GR = f(\beta_0 + \beta_1 \text{InfRate} + \beta_2 \text{ERate} + \epsilon t) \dots \dots \dots (1)$$

2. ANALYSIS

Correlation matrix (Table 2) also validate the significance of the variables included in this model. Values of correlation matrix indicate that there is prominent positive and negative relationship among all variables. It reveals that Inflation and exchange rate have vital role in GDP growth rate.

TABLE-2 CORRELATION MATRIX

	GDP_GR	INFLATION_RATE	EXCHNAGE_RATE
GDP_GR	1.00	-0.35	-0.29
INFLATION_RATE	-0.35	1.00	-0.02
EXCHNAGE_RATE	-0.29	-0.02	1.00

To examine the stationarity a Unit Root Test is taken through Augmented Dickey-Fuller (ADF). If unit root is exist then it means that there is a trend in series and Null hypothesis is accepted. If unit root is not existed then it means that there is no trend and data is considered stationary lead to rejected Null hypothesis.

The ADF test consist of three steps to check stationarity of variables that is level I(0), first difference I(1) and second difference I(2). The Akaike info criterion (AIC) is used to choose lag differences. The test results had shown in Table 2:

INFLATION_RATE	0.128111	0.128425	0.997557	0.3317
INFLATION_RATE(-1)	0.102723	0.155748	0.659547	0.5179
INFLATION_RATE(-2)	-0.32528	0.125076	-2.600659	0.0181
EXCHNAGE_RATE	-0.146555	0.046935	-3.1225	0.0059
EXCHNAGE_RATE(-1)	-0.001754	0.084983	-0.020637	0.9838
EXCHNAGE_RATE(-2)	0.136017	0.087723	1.550524	0.1384
EXCHNAGE_RATE(-3)	-0.065619	0.060711	-1.080845	0.294
EXCHNAGE_RATE(-4)	0.082601	0.045699	1.807495	0.0874
C	6.031511	1.425349	4.231603	0.0005
R-squared	0.648371	Mean dependent var		4.115575
Adjusted R-squared	0.472557	S.D. dependent var		1.852159
F-statis				
Tic	3.687813	Durbin-Watson stat		1.913638
Prob(F-statistic)	0.008879			

In view of above ARDL test results shown Table-3, lag1 of gdp growth rate, lag 2 of inflation rate and current period with lag 4 of exchange rate have negative influence on growth rate but only lag 2 of inflation rate and current period of exchange rate are significant having p value less than 5% otherwise all are insignificant due to not qualifying cut off value.. For taking Wald tests statistics of Inflation Rate and exchange rate, it is found that only Exchange Rate confirms its significance on growth rate in short run relationship otherwise inflation rate are not significant in Wald test statistics for joint probabilities shown in below mentioned Table4 and 5.

Table 4
Wald Test: Inflation Rate

Test Statistic	Value	Df	Probability
F-statistic	2.676674	(3, 18)	0.0781
Chi-square	8.030023	3	0.0454

Null Hypothesis: C(2)=C(3)=C(4)=0

Table 5
Wald Test: Exchange Rate

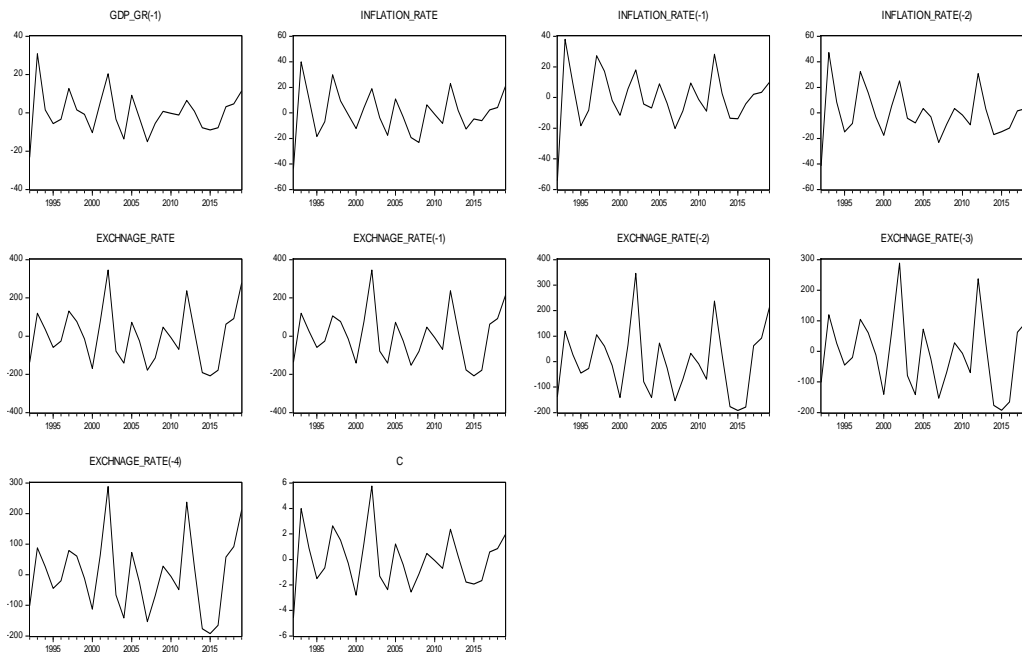
Test Statistic	Value	Df	Probability
F-statistic	3.318808	(5, 18)	0.0268
Chi-square	16.59404	5	0.0053

Null Hypothesis: C(5)=C(6)=C(7)=C(8)=C(9)=0

In the short run model, ARDL explains the macroeconomic theory that Exchange Rate has a causal effect on GDP in a short run relationship but IMF Repayments has not any causal effect on GDP in a short run relationship as shown below in equation (2) and Figure-1:-

$$GDP_GR = -0.022*GDP_GR(-1) + 0.12*INFLATION_RATE + 0.10*INFLATION_RATE(-1) - 0.32*INFLATION_RATE(-2) - 0.14*EXCHNAGE_RATE - 0.0017*EXCHNAGE_RATE(-1) + 0.13*EXCHNAGE_RATE(-2) - 0.06*EXCHNAGE_RATE(-3) + 0.08*EXCHNAGE_RATE(-4) + 6.03.....(2)$$

FIGURE-1



Growth rate itself with its lag 1 is negatively correlated but also having influence with a coefficient of 0.02. Inflation rate is positively correlated at current period and its lag 1 on dependent variable i.e. growth rate with a coefficient of 0.12 and 0.10 respectively but negatively correlated with lag 2 having 0.32 which is quite influencing on growth rate means growth rate and inflation rate are behaved inversely. On the other hand Exchange rate has of also negative impact on growth rate at current period, its lag 1 and lag 3 having coefficient 0.14, 0.0017 and 0.06 respectively. But lag 2 and lag 4 of exchange rate are positively related with growth rate and having coefficients 0.13 and

0.08 respectively. It reveals that the exchange rate is more negatively influencing on growth rate in current period but getting stability in exchange rate promotes growth in consecutive time.

For testing the co-integration of this model in a long run bound test were taken place which results are shown below states that at F-statistics of Bound test is 9.84 which is quite upper than lower and upper bound at 5% significant level that is 3.79 and 4.85 respectively, so null hypothesis can be rejected which implies that growth rate is cointegrated in a long run relationship with Inflation rate and Exchange Rate in a long run. Inflation rate with its lag 1 and exchange rate with current period and lag 1 confirms its significance by critical value $p < 5\%$ in a long run relationship as shown below table:-

Table-6.

DV: D(GDP_GR)
 Selected Model: ARDL(1, 2, 4)
 Sample: 1988 2020
 Conditional ECR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.031511	1.425349	4.231603	0.0005
GDP_GR(-1)*	-1.022158	0.190397	-5.368555	0
INFLATION_RATE(-1)	-0.094446	0.092146	-1.024962	0.319
EXCHNAGE_RATE(-1)	0.004689	0.009703	0.483278	0.6347
D(INFLATION_RATE)	0.128111	0.128425	0.997557	0.3317
D(INFLATION_RATE(-1))	0.32528	0.125076	2.600659	0.0181
D(EXCHNAGE_RATE)	-0.146555	0.046935	-3.1225	0.0059
D(EXCHNAGE_RATE(-1))	-0.152998	0.067759	-2.257993	0.0366
D(EXCHNAGE_RATE(-2))	-0.016982	0.048647	-0.349074	0.7311
D(EXCHNAGE_RATE(-3))	-0.082601	0.045699	-1.807495	0.0874

Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION_RATE	-0.092398	0.090793	-1.017688	0.3223
EXCHNAGE_RATE	0.004588	0.009494	0.483222	0.6348

$$EC = GDP_GR - (-0.0924*INFLATION_RATE + 0.0046*EXCHNAGE_RATE)$$

Null Hypothesis: No levels relationship

F-Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	9.846093	10%	3.17	4.14
K	2	5%	3.79	4.85
		2.50%	4.41	5.52
		1%	5.15	6.36
Actual Sample Size	28	Finite Sample: n=35		
		10%	3.393	4.41
		5%	4.183	5.333
		Finite Sample: n=30		
		10%	3.437	4.47
		5%	4.267	5.473
		1%	6.183	7.873

To examine the significance of coefficients of this model in a long run ECM test was run which shows that Coefficients of Conintegration equation is negative which is good sign and its evidences long run reversion to equilibrium having speed of 100.02% as well as confirms its significant level $p < 5\%$ below that is 0 with adjusted R2 73% with qualifying free from autocorrelation by Durbin Watson 1.911 shown below in Table-7.

Table 7

ARDL Error Correction Regression
 DV: D(GDP_GR)
 ARDL(1, 2, 4)
 ECM Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.031511	1.035284	5.825947	0
D(INFLATION_RATE)	0.128111	0.110771	1.156543	0.2626
D(INFLATION_RATE(-1))	0.32528	0.115472	2.816968	0.0114
D(EXCHNAGE_RATE)	-0.146555	0.042249	-3.468832	0.0027
D(EXCHNAGE_RATE(-1))	-0.152998	0.0619	-2.471687	0.0237
D(EXCHNAGE_RATE(-2))	-0.016982	0.041736	-0.406877	0.6889
D(EXCHNAGE_RATE(-3))	-0.082601	0.040158	-2.056879	0.0545

CointEq(-1)*	-1.022158	0.178421	-5.728901	0
R-squared	0.736035	Mean dependent var	-0.145455	
Adjusted R-squared	0.643648	S.D. dependent var	2.137705	
F-statistic	7.966816	Durbin-Watson stat	1.913638	
Prob(F-statistic)	0.000117			

F-Bounds Test

Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.846093	10%	3.17	4.14
K	2	5%	3.79	4.85
		2.50%	4.41	5.52
		1%	5.15	6.36
t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.728901	10%	-2.57	-3.21
		5%	-2.86	-3.53
		2.50%	-3.13	-3.8
		1%	-3.43	-4.1

After examining the significance of coefficients of this model in a long run, Error Correction Method (ECM) reveals that Coefficient of Conintegration equation is negative. It is good sign and its evidences long run reversion to equilibrium having speed of 102% as well as significant at critical value of 5% below that is 0. Well explained data having R^2 is 73% with qualifying Durbin Watson 1.91 that is nearer 2 shows data is free from autocorrelation.

3. Conclusion

This research work is the effort for finding the influence of inflation and exchange rate on the economic growth of Pakistan on the basis of time series data from 1988-2018. It has been started by checking stationarity of regressor and explained variable by ADF test. Having mixed order of stationarity of time series data; an Autoregressive Distributed Lag Model (ARDL) method has been used to quantify the short and long run relationship of variables. The estimates reveals that increased prices of goods and services as well as higher exchange rate crucially influence economic growth. Inflation is essential for the growth but it should be in moderate range otherwise it becomes the path of declining of growth. On the other hand the expensive dollar is inversely proportional of growth due to expensive oil and other manufacturing raw material and lead to increase inflation. During the studied period it has been observed that dollar rate is moved from Rs.22 to Rs.180 in thirty years. It means that the Pakistan has not only imported goods but also imported inflation from the world because of expensive exchange rate. The model used for analysis is from free from heteroscedasticity and auto correlation.

For a developing country the industries are life line. Large quantity of raw material and machinery are needed for manufacturing units. It is all are depend on import simultaneously having lesser exports until to get stability in manufacturing and capturing foreign markets for selling of goods. In this connection the pressure of exchange rate continuously exist but it can be managed by sophisticated financial management in respect of imports and exports. Simply only essentials item are allowed to import until the burden of debts on government treasury get decline. In fact consistency in economic policy and sacrifices of nation in respect of inflation can lead growth in long term. If currency depreciates certainly imports are expensive but favorable for exports having low price of goods in terms of foreign currency which can capture the foreign market. If this way is consistent the deficit of trade balances can improve and at the end the gap in current account deficit become shrink. The stable exchange rate not only favorable for control inflation but also attractive for foreign investors. The capital flow in the country leads more opportunities of expansion of economy as well as increase in growth rate. No doubt to say that controlled inflation and stable exchange rate are crucial for economic growth and as important as oxygen for life.

Recommendations

Firstly, in the light of higher negatively rate of change in a form of coefficient of inflation compel to policy makers has to evaluate thoroughly the macro-economy policy. The very essential basic priority of authorities to design a road map to keep prices of commodities and services under control and its fruits of these actions must be reached at the door of common man. This can only be done through the steps taking at war footings such as to get money from progressive income holders and these funds may be transferred to the poor people in form of subsidized prices of basic commodities.

Secondly, an effective steps are required in respect of imports and exports to contract the gap of current account deficit which is the only solution to keep exchange rate stable. Consequently it leads to promote economic growth. For this; export industry is one of the important channel to get foreign currencies to keep foreign reserves at upper side and this is the only factor for stable exchange rate. So the export industries are motivated by decreasing their cost of business through exemptions in taxes as well as provide easy and flexible procedures for exporting goods. Simultaneously there must be a comprehensive and concrete polices are framed in respect of imports because the imports of luxury goods and services are the major factor to deplete the foreign reserves. For keeping foreign reserves at upper side only essential goods and raw material for manufacturing be allowed to import until the mountain of debts on Pakistan become smaller.

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