DETERMINANTS OF INFLATION IN CASE OF PAKISTAN

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ABSTRACT

Inflation is not only rise in price level but it's also much complex phenomenon. Bit inflation exist in a natural and it's like greasing element that bring change in commerce and economy. Economy is badly effected due to the high inflation. Major determinants of economy must be explored in order to control inflation. Recent study aims to put some light on determinants of economic growth particularly in Pakistan using the time series data over the period of 1980-2016.Auto regressive Distributed Lag technique is followed for the empirical analysis. Empirical findings show the long and short run effect of each individual variable on inflation. Empirical results reveal that electricity production from oil resource and Agriculture prices has a positive and significant relationship with inflation while Broad money and real effective exchange rate has a significant but negative relationship with inflation. Results in short run reflect that real effective exchange rate and Govt. expenditure has a positive and significant impact on inflation.

Keywords: inflation, agriculture price, unemployment
JEL Codes: E31, E24

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I. INTRODUCTION

Continuous increase or rise in the general price level in an economy is called inflation. Inflation is the procedure in which value of money decreasing and the price is increasing. In Pakistan, inflation is a primary problem which effect the overall social and economic implication. For the business and economics perspective inflation directly affect or relates to government expenditure, tax revenue, fiscal deficit, interest rate, gross domestic product, money supply, import price and export supply. Because of higher inflation society faced many problems. More money requires to people to fulfill their daily transaction and more money has to carry because of losing the value of money. Due to rise in price level of consumption increases and rate of saving decreases. Low level of saving and deposit growth may cause the inflationary environment in a recent time. Traditionally Pakistan has a low inflation so it cannot bear the inflation in a double digit. In the previous year Pakistan facing the double digit inflation which is intolerable then the several measures of different policy combination is make by government like control budget deficit by the suitable monetary and fiscal policies, enhance the agriculture production, encourage investment to stimulate output to keep the inflation below the double digit and the suitable level. Inflation is very high in the year of 2010-2011 for t h world. Macroeconomic stability become very difficult due the threat of inflation. Point of ponder is that spike inflation comes from food that is harmful for poverty situation. According to ADB 10% increase in food inflation is worse poverty by 2.7%. There are two sources of inflation, inflation may be come from rise in aggregate demand or fall in supply. These sources affect the economy badly. If inflation come from demand then it considers as demand pull inflation. Gross domestic product, government expenditure, money supply and different other factors cause demand pull inflation. Increase in the price level cause the cost push inflation. Rising tax, fiscal budget, higher imports, increase wages and many other factors cause the cost push inflation. Recent study finds out the both sides of inflation (supply and demand side). The study is arranged as follow. Rather than introduction in section one, right after some empirical work are go through in second section, data span and composition of variables are discussed in third section, discuss the methodology in the fourth section, results are discussed in the fifth section and finally the conclusion is draw. On hypothetical grounds, literature refers two noteworthy arguments clarifying the factors of inflation. To start with "Demand pull inflation" expressing inflation as a result of high accumulated demand in goods market. And the other argument is cost push inflation which is cause due to fall in accumulated supply. Recent study give focus on the main determinant of inflation or the factor that effect directly or indirectly affect the inflation particularly in Pakistan and show the relation in short and long run.

II. LITERATURE REVIEW

Ellahi (2017) conducts the study to examine the determinants of inflation through specified data to find impact of each variable on inflation. The study reflects that the stability of exchange rate reduces inflation in long run and inflation is product of supply side factors of the economy. Ahmad et al., (2014) explores the long run and short run dynamics of inflation in Pakistan through particular data by Johansen Co-integration Technique to find the relationship between inflation and selected variables. The analysis reveals the significant factors of inflation and shows that output gap of fiscal policy is highly significant. Haider et al., (2014) illustrates the determinants of energy inflation prevailing in Pakistan as a critical component of any economy. The study evaluates the role of different factors related to determinants of energy inflation and the behavior of monetary and fiscal authorities as pro-cyclic towards energy supply. Shahid (2006) presented the study to evaluate the responsiveness of monetary policy actions upon high inflation. The study resulted that the monetary police effects the inflation with an interval before positioning on its peak. Yamach and Saatci (2016) conducts the study for economic factors that effects the consumer prices in Turkey to find the relationship between consumer price inflation and interest rate in short run and long run. Resulted as the impact of capacity utilization is higher on consumer inflation than on output gap. Abdullah and Kalim (2012) shows the long run relationships among food price inflation and its determinants for a specific data by Johannsen co-integration technique. The result shows several factors influence food prices of demand and supply side which backs the monetary phenomenon. Ghumro and Memon (2015) explores the core sources of inflation in Pakistan's economy for a period through autoregressive distributive lag model. The findings illustrate the occurrence of cointegration among variables plays a significant role in examining inflation. Bashir et al., (2011) investigated the relationship between macroeconomic variables and demand side and supply side of determinants of economic and econometric inflation in Pakistan. The results reveal that selected factors tend to decrease in long run and in short run factors are adjusted towards long run. Bashir et al., (2016) observed the demand and supply determinants affecting inflation for a specific period in Pakistan. The outcomes show that demand side is affected significantly and inflation can be overcome by controlling certain factors by government.

Chaudhry and Farooq (2011) re-examines the relationship of inflation and its growth in the economy of Pakistan at certain levels with focus on its impact on GDP growth. The study reflects that the feasible level of inflation reduces

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growth of GDP. Ahmed et al., (2013) observed the relationship of long run and short run dynamics of inflation in the economy of Pakistan. Resulted that money supply, expenditure, imports and GDP have positive influence in case of Pakistan excluding the effect of exports. Islam et al., (2017) observed the inflation caused by several factors in the case of Malaysia and relationship between dependent and independent variables. Results shows three main factors influencing inflation in Malaysia. Manju (2014) conducted examination on inflation dynamics in India and its influence during last eight years. Study indicates the negative impact of industrial production on inflation in long run and positive effect of money supply. The study conducted the study to examine the relationship of sources of inflation with economy of Pakistan to analyze long run period. The results show the presence of positive correlation between inflation and exchange rate. Kandil and Morsy (2009) studies the dynamics of inflation in gulf cooperation council (GCC) to examine the domestic and external factors of inflation. Resulted as factors of domestic inflation is more relevant among foreign factors and there is limited flexibility towards exchange rate. Lim and Papi (1997) conducted this study to examine the determinants of inflation in Turkey for price determination of multi-sector macroeconomic model. Outcomes shows prime role of monetary variables in inflationary process in the case of Turkey.

Gillman et al. (2002), this data base on the Organization for Economic Cooperation and Development (OECD) and Asia-Pacific Economic Cooperation (APEC) countries, the medium and high inflation which has a positive effect on growth in the OECD countries, and has a low-level effect on APEC countries. The world economy is not facing a prompt growth rate that effect the expected inflation can be observed due to shocks. A reduce in inflation rate can produce higher growth rate if there are no shocks. Similarly, Alexander (1997) used a panel of OECD countries show a negative impact of inflation on growth rate of per capita GDP. Bruno and Easterly (1996) conduct the study that no indication of any relationship between inflation and growth at annual inflation rates of less than 40 percent. This result shows that the negative, smaller and medium relationship among high inflation and growth. Countries recover back toward their pre crises growth rate as a result of high inflation crises which has no long-lasting damage to growth. Ghosh and Phillips (1998) result shows that low inflation rates (less than 2-3 per cent) and growth are positively correlated but negatively correlated at high level of inflation. Similarly, the Nell in (2000) shows that inflation may be beneficial in the single-digit zone, but in double-digit zone inflation impose to slower growth.

Mubarik (2005) investigate the study a verging point of inflation in case of Pakistan economy. Use a sample of 27 years from 1973 to 2000. The result shows that the level of inflation in Pakistan economy at rate of 9 percent though using a threshold modeling. A level of inflation below 9 percent may be favorable for Pakistan. Robustness test confirm the results of 9 percent for threshold analysis due to sensitivity analysis. Hussain (2005) conduct the study of threshold level of inflation for Pakistan economy using time series data set from 1973 to 2005 the inflation would be a disincentive to economic growth at the level of inflation within the range of 4 to 6 as a threshold beyond. Khan and Senhadji (2001) examine the effects of inflation on growth separately for industrial and developing countries. The data is taken from 140 countries from both groups, the method which is used is non-linear least squares (NLLS) and conditional least squares. The results show that inflation utilizes a negative effect on growth that the existence of a threshold beyond. The thresholds at 1-3 percent level of inflation for developing countries and 11-12 percent inflation levels for industrialized countries have been found. Malik and Chowdhury (2001) conduct a study of long-run positive relationship between GDP growth rate and inflation for four South Asian countries. Using co-integration and error correction models. According co-inaccording the Structuralists' view, the results also suggest that moderate inflation is helpful to growth and faster economic growth feeds back into inflation. The authors recommend moderate inflation for growth of the economies of Bangladesh, India, Pakistan and Sri Lanka.

Barro (1995) examines the issue and finds a significant negative relationship between inflation and economic growth, considering variables like fertility rate, education, etc constant. The study contains a large sample data of more than 100 economies for the period 1960 to 1990 and to assess the effects of inflation on growth, a system of regression equations is used, in which many other determinants of growth are held constant. This framework is based on an expanded view of the neoclassical growth model as stated by Barro and Sala-i-Martin (1995). The study indicates that there exists a statistically significant negative relationship between inflation and economic growth. More specifically, an increase in the average annual inflation by 10 percentage points per year lowers the real GDP growth by 0.2 to 0.3 percentage points per year. Sarel (1996) conduct the study of non-linear effects of inflation on economic growth and finds a significant structural break which occurs at annual average 8 percent inflation rate, the function relates economic growth to inflation. This result show that below that structural break, inflation has positive effect on growth but it has negative effect on growth after 8 percent inflation rate. Using OLS technique these results have been found after gathering annual information of 87 countries for the period 1970-1990. Khan and Qasim (1996) investigate the key determinants of inflation in Pakistan. Using the annual data for the period 1971-1995. The result shows that

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disaggregate inflation into food and non-food inflation and role of money supply in accelerating inflation in Pakistan. In which include other factors causing inflation, are currency devaluation, sport price of wheat, import price and price of electricity, value addition in agriculture sector.

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Ahmed and Lal (2013) observed the relationship of long run and short run dynamics of inflation in the economy of Pakistan. Resulted that money supply, expenditure, imports and GDP have positive influence in case of Pakistan excluding the effect of exports. Islam et al., (2017) observed the inflation caused by several factors in the case of Malaysia and relationship between dependent and independent variables. Results shows three main factors influencing inflation in Malaysia. Nair (2014) conducted examination on inflation dynamics in India and its influence during last eight years. Study indicates the negative impact of industrial production on inflation in long run and positive effect of money supply. The study to examine the relationship of sources of inflation with economy of Pakistan to analyze long run period. The results show the presence of positive correlation between inflation and exchange rate. Kandil and Morsy (2009) studies the dynamics of inflation in gulf cooperation council (GCC) to examine the domestic and external factors of inflation. Resulted as factors of domestic inflation is more relevant among foreign factors and there is limited flexibility towards exchange rate. Malla (1997) also conducted the study for OECD countries and some Asian countries separately and found that there is negative and significant relationship between inflation and growth for OECD while insignificant for developing countries of Asia. The result shows that cross-country analysis has some problems regarding adjustment in country sample and time period. So, the relationship between inflation and growth is inconclusive. Motley (1998) using data from cross section of countries for the period 1960-1990, examined the effect of inflation on real growth in a Solow growth model and found that reduction in inflation would increase the growth rate of real GDP. Non-linear effects of inflation on economic growth have also been tested (see for example Burdekin *et al*, 2000 and Gillman & Kejak, 2000b). Inflation rate causes growth rate of the economy negatively but at lesser rates.

Faria and Carneiro (2001) investigate the relationship between inflation and output for the economy of Brazil where permanent inflationary shock has been observed for the last many years. They use a bivariate vector auto-regression composed of output growth and the change in inflation in order to test the hypothesis that inflation has long run impact on output. They also use the data for the same period 1980-95 to estimate the short run relationship between inflation and real output. Their findings verify Sidrauski's superneutrality of money which can be defined as inflation has no real effect on output and productivity in the long-run. Their results suggest that inflation has real effects on output in the short run. Hussain (2005) finds no definite threshold level of inflation for Pakistan and just suggests that 4-6 percent range of inflation is tolerable for economy of Pakistan. This study shows similar results with Singh (2003) which recommends 4-7 percent range of inflation for India. The researcher contradicts with Mubarik (2005) as 9

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percent threshold level for Pakistan appears to be on the very high side. Follow the methodology used by Khan and Senhadji (2001) and Singh (2003) and advises the central bank authorities to keep the inflation low and stable, irrespective of any threshold level. Khan and Schimmelpfenning (2006) investigate a simple inflation model taking data of economy of Pakistan for the period January 1998 to June 2005 and find that monetary factors determine inflation in Pakistan. The result shows that long run relationship between the CPI and private sector credit and their results show that there may be no trade-off between inflation and growth in the short run but it certainly exists in the medium and long run. Estimated results suggest 5 percent inflation target for sustained economic growth and macroeconomic stability for the economy. Kemal (2006) conduct the study an increase in money supply over the long-run becomes the source of inflation and thus verifies the quantity theory of money .The results drawn by Khan and Schimmelpfenning (2006) have also been verified in the sense that the long run excess money supply is the main responsible for inflation in Pakistan.

Munir et al. (2009) analyze the non linear relationship between inflation level and economic growth rate for the period 1970-2005 in the economy of Malaysia. Using annual data and applying new endogenous threshold autoregressive (TAR) models proposed by Hansen (2000), the result shows that inflation threshold value existing for Malaysia and verify the view that the relationship between inflation rate and economic growth is nonlinear. The estimated threshold regression model suggests 3.89 percent as the structural break point of inflation above which inflation significantly hurts growth rate of real GDP. In addition, below the threshold level, there is statistically significant positive relationship between inflation rate and growth. Gokal and Hanif (2004) conduct the different economic theories to develop consensus on the inflation and growth relationship for the economy of Fiji. The results show that a weak negative correlation exists between inflation and growth, while the change in output gap bears significant bearing. The causality between the two variables ran one-way from GDP growth to inflation. Sweidan (2004) examines the relationship between inflation and economic growth for economy of Jordan and finds a structural break point at 2 percent level of inflation. Another issue which is covered by the study is to check the effect of inflation uncertainty on the growth and developments in the economy. The result implies that the effects of inflation on growth are stronger as compared to the effects of inflation uncertainty and variability. Ghosh and Phillips (1998), conduct the study starting from lower inflation rates; a rapid disinflation is associated with fall in GDP growth. They employ a large panel data set, covering IMF member countries for the period 1960–96. Shows two important nonlinearities in the inflation growth relationship. At very low inflation rates (around 2–3 percent a year, or lower), inflation and growth are positively correlated. Otherwise, inflation and growth are negatively correlated, but the relationship is convex, so that the decline in growth associated with an increase from 10 percent to 20 percent inflation is much larger than that associated with moving from 40 percent to 50 percent inflation. Caporin, and Maria (2002) selected 19 countries as a sample and empirically investigated the growth-inflation relationship in a regression which is based upon pooling strategy. Countries were grouped while keeping in view average level of inflation. The result shows that regression coefficient of inflation varies with average inflation because of the fact that different countries experienced different level of inflation. Hence it could be concluded that average level of inflation may be a cause of improvement in explanatory power of the regression. Fischer (1993) results shows that inflation reduces growth by reducing investment and productivity growth. Conduct low inflation and small fiscal deficits are not necessary for high growth even over long periods; likewise, high inflation is not consistent with sustained economic growth. Ghosh and Phillips (1998), using large panel dataset, covering IMF member countries over 1960 to 1996, found that at very low inflation rates (less than 2-3 per cent) inflation and growth are positively correlated. However, they are negatively correlated at high level of inflation. Nell (2000) examines the issue whether inflation is always harmful to growth or not? Considering the South African Economy's data for the period 1960-1999 and dividing it into four episodes, using Vector Auto Regressive (VAR) technique, his empirical results suggest that inflation within the single-digit zone may beneficial to growth, while inflation in the double digit zone appears to impose costs in terms of slower growth. Rousseau and Wachtel (2002) conduct the study that4 impact of inflation rate on growth of financial markets. Used a sample of 84 countries as a cross-section in a time series of time period from 1960 to 1965. By using the technique relating to series of rolling panel found that there existS a threshold of inflation rate within the range of 13 percent to 25 percent, which affects finance-growth association. The finance has been ceased to enhance economic growth as the inflation crossed the verging point of inflation.

III. THE MODEL
On the empirical and theoretical basis of literature model is establish. After recall the literature current study form a relationship model containing both supply side variables as well as demand side variables. Ali (2011), Ali (2015), Ali (2018), Ali and Bibi (2017), Ali and Ahmad (2014), Ali and Audi (2016), Ali and Audi (2018), Ali and Rehman (2015), Ali and Naeem (2017), Ali and Zulfiqar (2018), Ali et al., (2016), Arshad and Ali (2016), Ashraf and Ali

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(2018) Haider and Ali (2015), Sajid and Ali (2018), Ali and Senturk (2019), Kassem et al, (2019) and Ali and Bibi (2020). Functional form can be written as:

lnCPI=lnBM+lnEC+lnAGRP+lnGE+REER (1)

CPI=Consumer price index [2010=100]

BM=Broad money [% of GDP]

EC=Electricity production from oil source

AGRP= Agriculture price use as a proxy of food production index

GE=Gov.t Expenditure as of Gross National Expenditure [% of GDP]

REER= Real effective exchange rate

Source of data through which all variables collected are WDI. Time span for data is 1980-2016. Sample data is large enough to conclude the theoretical and empirical evidence.

IV. THE RESULTS

Table 1, shows the standard deviation, median and mean. All variables find to be normally distributed because Jerque bera is insignificant. Table 3 reported the absence of multicollineraty because all values among independent variables are less than 10. After the results reported by variance inflation factor, ADF technique addresses the unit root problem. The outcomes reveal in tables 4 shows that except one variable which is agriculture price, all variables are non-stationery at level. At first difference all variables found to be stationery. So, the data has mixed order of integrations. Literature suggested that in case of mixed order of integration the long run relationship between variables can be find by ADRL approach.

Table 1: Descriptive statistics

	LNBM	LNCPI	LNEC	LNAGRIP	LNGE	LNREER
Mean	3.825887	3.587480	3.115022	4.354567	4.662730	4.801991
Median	3.821156	3.679089	3.391489	4.437816	4.667636	4.733121
Maximum	4.075292	5.015646	3.681211	4.827593	4.721982	5.434360
Minimum	3.653115	2.209769	0.103087	3.675034	4.594780	4.540987
Std. Dev.	0.122274	0.866070	0.726916	0.362872	0.036356	0.266298
Skewness	0.290901	0.094878	-2.343457	-0.341686	-0.132437	1.182272
Kurtosis	2.022363	1.834589	9.571500	1.860144	2.021978	3.114159
Jarque-Bera	1.995326	2.149375	100.4423	2.722997	1.582806	8.639648
Probability	0.368740	0.341404	0.000000	0.256276	0.453208	0.103302
Sum	141.5578	132.7367	115.2558	161.1190	172.5210	177.6737
Sum Sq. Dev.	0.538234	27.00275	19.02267	4.740348	0.047585	2.552930
Observations	37	37	37	37	37	37

Table 2: Correlation Matrix

Variables	LNAGRIP	LNBM	LNEC	LNGE	LNREER
LNAGRIP	1.000000	0.776464	0.758396	-0.452482	-0.851552
LNBM	0.776464	1.000000	0.465725	-0.027448	-0.517130
LNEC	0.758396	0.465725	1.000000	-0.472338	-0.754526
LNGE	-0.452482	-0.027448	-0.472338	1.000000	0.709204
LNREER	-0.851552	-0.517130	-0.754526	0.709204	1.000000

We followed the ARDL approach to estimate the long run relationship. Table 5 proves that there exists a long-term unique relation among inflation and its variables because level of significance at 5 percent, upper critical value found to lesser than F-statistic. Meaning that, there exist a cointegration and unique long-term relation among variables reported by table 4. Result of ARDL approach table shows the picture that the value of upper critical bound which is 4.3919 lesser than the value of F test which is 4.7503 at 5% level of significance. That confirm the existence of long-term integration among Inflation and its control variables like broad money, agriculture price, Gov.t expenditure, electricity production from oil price and real effective exchange rate. All diagnostics are found to be insignificant

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which confirmed the absence of heteroscedasticity and serial correlation problem. Functional form that is selected for ARDL model is accurately specified and error term distributed normally.

Table 3: Variance inflation factor:

VARIABLES	LNAGRIP	LNBM	LNEC	LNGE	LNREER
LNAGRIP					
LNBM	2.518234				
LNEC	2.353852	1.276976			
LNGE	1.25745	1.000754	1.287172		
LNREER	3.638227	1.365045	2.321853	2.011952	

Later on, Coefficients of inflation with its control variables has been estimated in case of long and short run. Table 6 presented the long and short-term results that, inflation and broad money, real effective exchange rate has a negative but a significant relationship with each other. Similarly, there exist a positive and significant relationship among inflation and Gov.t expenditure and electricity production in case of long run. It has been noticed that as if gov.t increase their expenditure than inflation also start rising. If 1% increase in electricity production and agriculture prices then inflation will increase by .079622 and 2.3349 %respectively. If 1% increase in broad money and real effective exchange rate then inflation will drop down by -.38241% and -.44913%. Similarly, in the short run Electricity production, and Agriculture price has significant and positive impact on inflation while broad money has a negative but significant relation with inflation.

Coefficient of ECM is negative and significant which give the evidence that 13.05% economic shock will be cover within the one year. After finding the long and short run behavior study plotted the CUSUM and CUSUM Square variance of error term and mean find to be stable.so problem related to structural break are existed.

Table 4: Unit root

Variables	At level T-Statistic	Probability value	Variables	First difference T-Statistic	Probability value
LNCPI	-0.00398	0.9519	LNCPI	-2.65729	0.0916
LNBM	-1.1953	0.6658	LNBM	-5.02406	0.0002
LNAGRP	-2.80276	0.0679	LNAGRP	-5.44798	0.0001
LNGE	-2.10632	0.2435	LNGE	-6.48521	0
LNREER	-2.14495	0.2292	LNREER	-4.65348	0.0007
LNEC	-2.57625	0.1074	LNEC	-5.51282	0.0001

Table 5: ARDL Bound Testing Approach

Significance Level	Critical Bound for F-Statistics		W-Statistic	
	Lower Critical Bound	Upper Critical Bound	Lower Critical Bound	Upper Critical Bound
5 percent	3.0647	4.3919	18.3884	26.3515
10 percent	2.5355	3.7211	15.2129	22.3266


Table 6: Long Term and Short-term Dynamics

Estimated Long run Coefficients using the ARDL		Error Correction Representation Selected the ARDL	
Dependent variable: LCPI		Dependent Variable: ALCPI	
Variables	Coefficient[p-values]	Variables	Coefficient[pvalues]
lnBM	-.38241 [.052]	lnBM	-.04906[.538]
lnEC	.079622 [.039]	lnEC	.028786[.341]
LnAGRP	2.3349 [.000]	LnAGRP	.30471 [.166]
lnGE	5.6306 [.120]	lnGE	.73482 [.004]
lnREER	-.44913 [.004]	lnREER	.23575[.058]
C	-28.9348 [.009]	ECM	-.13051[.051]
Diagnostics for ECM Model			
R-Squared	.55917	Mean Dependent variables	.077941
Adjusted R-squared	.42856	S.D Dependent variables	.035483
S.E. of Regression	.026823	Akaike Information Criterion	75.3627
Sum Squared Residual	.019425	Schwarz Bayesian Criterion	68.2369
Log Likelihood	84.3627	Durbin-Watson Stat	1.7650
F-Statistic	5.7081	P.value[F-statistic]	[.001]

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

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Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
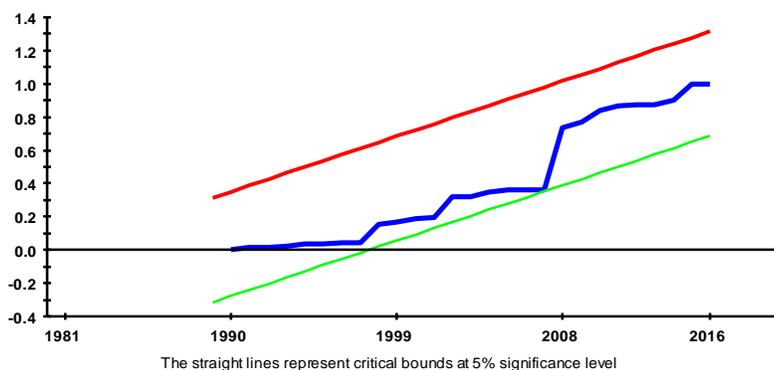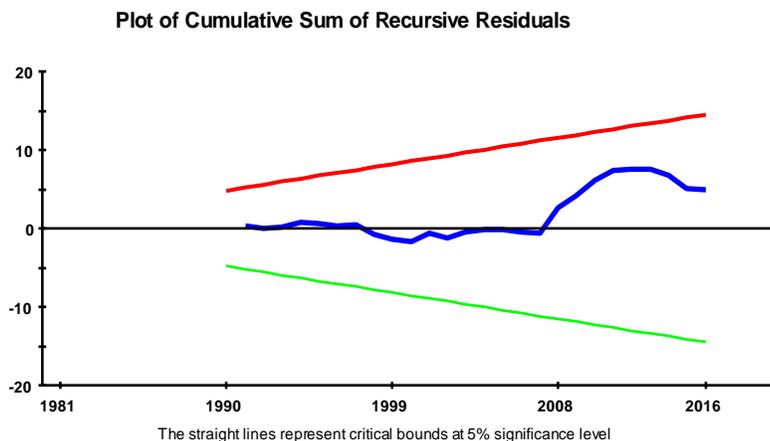
V. CONCLUSIONS

Recent study is conducted to seek determinant of inflation particularly in Pakistan. Using time series data from 1986-2017.Main finding suggested that electricity production from oil resources and gov.t expenditure promote the inflation to rise while decrease in broad money and real effective exchange rate will increase the inflation in the long run. . If 1% increase in electricity production and Agriculture prices then inflation will increase by .079622 and 2.3349% respectively. If 1% increase in broad money and real effective exchange rate then inflation will drop down by -.38241% and -.44913%. In order to short run Gov.t expenditure and real effective exchange rate help in increasing in increasing the inflation.

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