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The Interrelationship between Money Supply, Inflation, Public Expenditure and Economic Growth

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Abstract

This study examines the association between money supply, inflation, government expenditure, and economic growth in Pakistan from 1972 to 2015. ARDL Bounds Testing approach for co-integration and ECM Technique were applied to study the long and short run relationship among the above mentioned variables. Granger Causality Test was applied to find out the direction of causality. The results find a long run association between Economic Growth, Government Expenditure, and Inflation. The results of ECM show the short run relationship among the above mentioned variables; however speed of adjustment is slow which slightly less than 20% is. Granger Causality test reveals that "causality runs from Inflation to Economic Growth" while causality between Inflation and Government Expenditure. Inflation and Money supply is bidirectional. It is concluded that both monetary and fiscal policies have an impact on economic growth.

Keywords: ARDL, Cointegration, Government Expenditure, Granger Causality, Growth, Inflation, Money Supply

Introduction

A high inflation was witnessed in the 1970s with oil embargo after Arab Israel war in 1973. Meanwhile Bretton woods System of fixed exchange rate was collapsed and floating exchange rate regime was adopted. The capital control was dismantled and financial sector was deregulated. These developments deterred the government role to counter the cyclical fluctuations. This relegated to lessen the importance of fiscal policy and monetary policy emerged as a tool for targeting inflation. This shift from fiscal policy to monetary policy was on the following considerations (Mallik, G., & Chowdhury, A. (2002)):-

i. Economic growth is hampered with the crowding out of private investment due to government fiscal deficit.
ii. Government fiscal deficit contributes to inflation beyond the output level at natural rate of unemployment.
iii. Decision making is affected with high rates of inflation which adversely affects growth.
iv. Monetary Policy is effective tool for targeting inflation

The theory of money is based on two premises viz. quantity theory of money and natural rate of unemployment (Georgantopoulos & Tsamis (2012)). Monetarists argue that change in money supply affects output in the short run and price level in the long run respectively. Therefore by targeting the money supply the objectives of monetary policy can easily be met. Money supply is controlled by monetary authority; hence prices are directly proportion to supply of money while

other things such as velocity of money and output remain constant. Similarly any increase in money supply which affects the output above the level of natural rate of unemployment will be a cause of inflation. It is considered that instead of pursuing the target of full employment the goal of regulating the growth of money supply should be given more importance. On the contrary while using the fiscal policy to achieve the macroeconomic targets like full employment, increase in output, either the government expenditure is increased or more taxes are imposed or a mixture of the two is adopted. The government expenditure is financed by borrowing from lender institutions such as IMF, World Bank, Asian Development Bank or from the Central Bank. This seriously hampers the economic growth. The borrowing from central bank enhances the money supply which causes the inflation and raises uncertainty in the economy (Landau (1985)). However it was also observed that in case the lower economic growth is due to factors other than inflation then the economy is relegated to printing more money to meet the inevitable expenditure leading to higher inflation (Barro (1995, 1997)). It is widely considered that "causality" runs from inflation to economic growth.

The economists still argue whether government expenditure boosts economic growth (Albatel (2000)), or monetary policy will be an effective tool for controlling inflation, enabling financial stability causing higher economic growth (Chaudhry (2012), Attari & Javed (2013), Barro (2013))

Study Objectives

i. To study the long run association amongst Money Supply, Inflation, Government Expenditure and Economic Growth

ii. To study the short run association amongst Money Supply, Inflation, Government Expenditure and Economic Growth with Error Correction Mechanism.

iii. To examine the causal relationship amongst Money Supply, Inflation, Government Expenditure and Economic Growth.

Significance of the Study

A number of studies on the relationship between Monetary Policy, Inflation and Economic Growth **(**Chaudhry et al. (2012), Inflation, Economic Growth and Government Expenditure (Attari & Javed (2013)), Inflation and economic growth (Hussain & Malik (2011)), Money, Inflation, and Growth (Qayyum (2006)), Money Supply (M2) and GDP (Ihsan (2013)) have been carried out for Pakistan economy. However the present study fills the gap by analyzing the interrelationship between money supply, inflation, government expenditure and economic growth in Pakistan.

The current study will provide an insight to the Policy Makers to identify the important economic variable(s) to be addressed to put the economy on an even keel of economic growth.

Organization of the Study

The study has been divided into five sections. The first section is that of Introduction which the present one is. The second section presents the review of existing Literature. The section 3 gives the detail of Methodology and Data issues. Next section discusses the empirical results. Section 5 contains the results of this study. Section 6 gives some recommendation for policy makers

Literature Review

A number of efforts are already has been done to the topic of this study. A brief review of these studies is given here. Barro (2013) discussed the association of inflation and economic growth for 100 countries used the data from 1960 to 1990. He concluded that while other characteristics held constant the Regression results reveal that a 10 percent increase in inflation per year leads to 0.2 percent to 0.3 percent decrease in the growth of per capita GDP per year and a 0.4 percent to 0.6 percent decline in investment to GDP ratio. He further concluded that a persistent 10 % increase in

inflation will cause the decline in economic growth by 4-7% over a period of 30 years which justifies a target of price stability. He argued that causation runs negatively from high persistent inflation to lower real GDP Growth and investment to GDP ratio. Guerrero (2006) also concluded that the effect of persistent inflation on long term economic growth is statistically significant and negative. Mallik & Chowdhury (2002) investigated the association between inflation and national income in the countries which targeted a zero or low inflation such as Spain, Canada, New Zealand, Sweden, Australia, Finland and UK. They found a positive relationship between inflation and economic growth in the long run. They also observed a positive long run relationship between Government Expenditure and Economic Growth. Vinayagathasan (2013) investigated the impact of inflation on economic growth for 32 Asian economies for the period 1980 to 2009. The study found a threshold of 5.43% inflation rate, below of which inflation rate does not hurt economic growth but beyond the threshold rate, inflation has a negative impact on economic growth. The study also concluded that investment ratios and level of openness have a positive impact on the economic growth. Ruge-Murcia (1999) developed a model where budget deficit and money supply are endogenous variables while Government Expenditure is determined exogenously. The study concluded that steady state inflation and money growth rates are associated with the government spending. Jha & Dang (2012) studied the association between inflation variability and economic growth for 31 developed and 182 developing countries respectively and using data from 1961 to 2009. The study concluded that for developing countries when inflation increase beyond 10% then inflation variability has negative effect on economic growth while no such evidence was found for developed countries. Eggoh & Khan (2014) concluded that there is nonlinear relationship between inflation and economic growth and maximum level of inflation beyond which inflation adversely affects economic growth, declines with the increase in level of income. They further concluded that nonlinearity between inflation and economic growth alters over time and across countries depending on the factors such as degree of trade openness, capital accumulation, financial development, and government size. The analysis also indicated that level of optimal inflation depends on income level of countries. Optimal level of inflation was high for low-income countries. Manamperi (2014) examined the short term and long term relationship between inflation and economic growth for BRICS (Brazil, Russia, India, China, South Africa) countries. The data for the last three decades from 1980 to 2012 was used in the analysis. The study observed a long run positive association between inflation and economic growth for India but the same was not observed for the other sample countries. However negative short run association was observed for Brazil, Russia, China and South Africa while the opposite is observed for India. Devarajan et al. (1996) carried out a study of 43 developing countries for 20 years period from 1970 to 1990 and concluded that change in composition of government expenditure also contribute to steady state economic growth as compared to level of government expenditure. They concluded that current expenditure leads to more economic growth as compared to capital expenditure. They observed that capital expenditure is negatively related to per capita economic growth and excess of capital expenditure becomes unproductive. Attari & Javed (2013) carried out a study for Pakistan covering a period from 1980 to 2010. They concluded that there is long run relationship between inflation rate, economic growth and government expenditure. However there is no short run relationship between inflation rate and economic growth but there is short run relationship between government expenditure and economic growth. The unidirectional causality runs from inflation rate to economic growth and from economic growth to government expenditure. They disaggregated the government expenditure between current expenditure and development expenditure. The study concluded that there is strong negative relationship between inflation and economic growth beyond the threshold inflation rate. However, otherwise there is positive relationship between government expenditure and economic growth. The

influence of development expenditure on economic growth is significant as compared to that of current expenditure. Albatel (2000) carried out a study to explore the association between government expenditure and economic growth in Saudi Arabia from 1964 to 1995. He argued that pubic expenditure positively contributes towards growth and development. He suggested that government should invest in infrastructure development. It was also concluded that composition of government expenditure is more important than the level of government expenditure. Georgantopoulos & Tsamis (2012) studied the interrelationship between Money Supply, Prices, Government Expenditure and Economic Growth for Cyprus. The period of study was from 1980 to 2009. Results revealed that Government spending promotes economic growth. However deficit financing generates inflationary pressure and there is negative relationship between inflation and economic growth. It was suggested that Government should curtail current expenditure to contain aggregate demand and should promote development expenditure to enhance aggregate supply.

Data and Methodology

The data used in the study is for the period from 1972 to 2015. The data has been obtained from WDI (World Development Indicators), Pakistan Economic Surveys of different years and a publication of State Bank of Pakistan titled "Handbook of Statistics on Pakistan Economy 2010" (Now the latest one is of 2015). Data for Development Expenditure has been obtained from Pakistan Economic Surveys and aforementioned publication of State Bank of Pakistan. The data for all other variables such as Real GDP per Capita (R_GDP_PC), Broad Money (M2), Inflation (consumer prices (annual %)) have been obtained from WDI. The Total Government Expenditure is a sum of Government Current Expenditure and Government (Federal) Development Expenditure. The Nominal Variables are in Current Local Currency (LCU) i.e. PKR (Pakistan Rupee), while Real Variables are in Constant Local Currency (LCU) i.e. PKR. The Nominal Variables have been converted to Real Variables to eliminate the impact of change in prices, by applying the appropriate deflators at the constant prices of 2005-06. ARDL Bounds Testing Approach for cointegration was applied to study the long run relationship amongst the variables. ECM was applied to estimate the short run relationships associated with Long run relationships, along with Error Correction Term. Granger Causality Test was applied to determine the direction of causality amongst the variables.

Results and Discussion

Summary Statistics

The summary statistics of the variables under study is given in Table 1.

Table 1 depicts the overall summary statistics and correlation amongst the variables. All the variables are normally distributed as indicated by Jarque-Bera statistic. There is positive correlation between Real GDP per capita and Real Government Expenditure and between Real GDP per capita and Broad Money (M2). However there is negative correlation between Real GDP per capita and inflation. There is positive correlation between Real Government Expenditure and Broad Money (M2). The correlation between Real Government expenditure and inflation is negative. There is also negative correlation between Broad Money (M2) and Inflation.

Table 1: Summary Statistics of the Variables

Statistics	Real GDP Per Capita (Natural Log)	Real Government Expenditure (Natural Log)	Money Supply M2 (Natural Log)	Inflation (Natural Log of Consumer Prices; Annual Percent)
	L_R_GDP_PC	L_GE	L_M2	L_P
Mean	10.56802	13.44047	13.37715	2.088117
Median	10.62390	13.48704	13.39904	2.090903
Maximum	10.99272	14.38817	16.49909	3.283278
Minimum	10.06093	12.40007	10.23042	0.931973
Std. Dev.	0.276942	0.480676	1.887711	0.545923
Skewness	-0.309658	-0.083015	0.015647	-0.054172
Kurtosis	1.949471	2.568255	1.847467	2.795765
Jarque-Bera	2.726468	0.392278	2.437073	0.097992
Probability	0.255832	0.821898	0.295663	0.952185
Sum	464.9928	591.3807	588.5944	91.87717
Sum Sq. Dev.	3.297961	9.935125	153.2285	12.81538
Observations	44	44	44	44
L_R_GDP_PC	1.000000			
L_GE	0.948542	1.000000		
L_M2	0.987275	0.932602	1.000000	
L_P	-0.182731	-0.136495	-0.190673	1.000000

i. **L_R_GDP_PC is the Natural Log of Real GDP per Capita**
ii. **L_GE is Natural Log of Real Government Expenditure**
iii. **L_M2 is Natural Log of Broad Money (M2)**
iv. **L_P is the Natural Log of Consumer Prices; Annual Percentage, (which represents inflation)**

Trends in the Data

Table 2. Data of Variables for Selected Years

Year	Real GDP per Capita (R_GDP_PC) (In Rs.)	Real Government Expenditure (GE) (In Million Rs.)	Inflation (Consumer Prices, Annual Percentage) (P)	Broad Money (M2) (In Million Rs.)
1972	23410.25	242818.28	5.18	27734.20
1980	28699.07	436068.02	11.94	97321.60
1990	38295.34	769297.82	9.05	334991.30
2000	43867.94	636465.09	4.37	1476676.00
2005	50458.50	737646.23	9.06	3182515.00
2006	52491.31	1096516.00	7.92	4631578.00
2007	53910.98	1129093.44	7.60	5439249.00
2008	53709.01	1144588.22	20.29	5794143.80
2009	54094.23	1196798.62	13.65	6814495.82
2010	53824.64	1230398.46	13.88	7807082.73

Year	Real GDP per Capita (R_GDP_PC) (In Rs.)	Real Government Expenditure (GE) (In Million Rs.)	Inflation (Consumer Prices, Annual Percentage) (P)	Broad Money (M2) (In Million Rs.)
2011	54149.37	1226336.82	11.92	8790979.84
2012	54872.22	1389955.79	9.68	10306617.18
2013	56067.45	1620428.57	7.69	11676558.56
2014	57501.80	1640965.46	7.19	13028161.16
2015	59439.80	1772971.43	2.54	14637380.71

Source: WDI, State Bank Publication, Economic Surveys of different years

The GDP per capita has increased from 23410.25 in 1972 to Rs. 59439.80 in 2015. It had an upward rising trend throughout the study period. Real Government Expenditure increased from Rs. 242818.28 Million in 1972 to Rs. 769297.82 Million in 1990. It decreased to Rs. 636465.09 in 2000. However it had a rising trend from 2005 onwards. Inflation had a mixed trend of rise and fall during the study period. It was at the highest level of 20.29% in 2008 while it was at the minimum level of 2.54% during 2015 due to external factor such as oil prices. Money Supply (M2) increased from Rs.27734.20 Million in 1972 to Rs. 14637380.71 Million in 2015. It had a rising trend throughout the study period.

Trends in the data for variables involved are represented in the following Figures

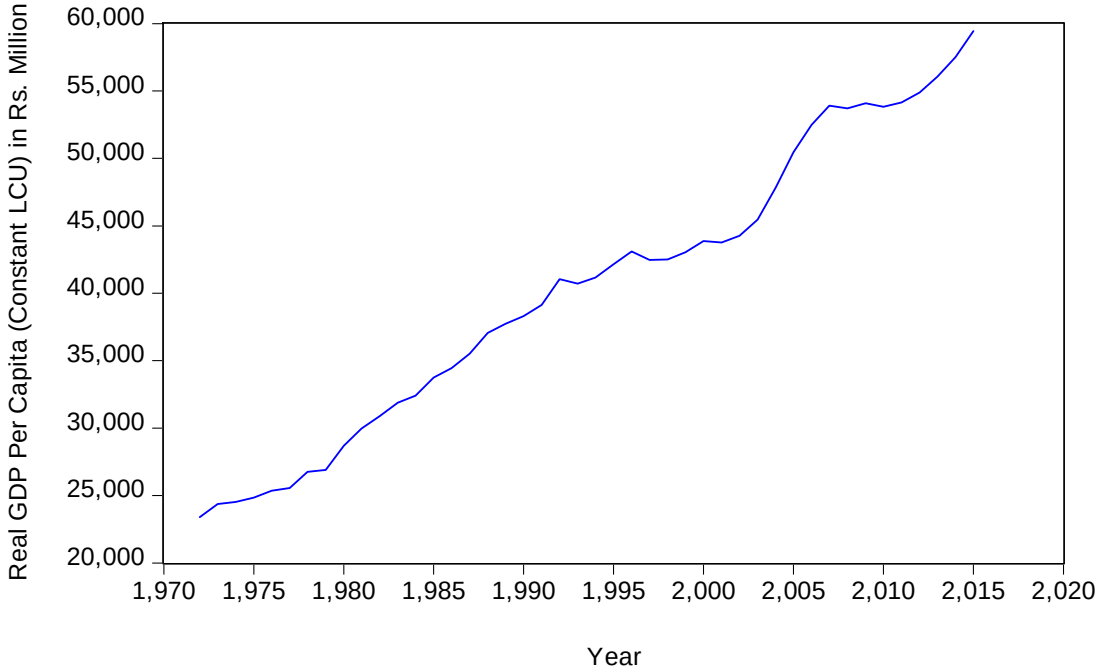


Figure 1. Trend in Real GDP Per Capita

The real GDP per capita has a rising trend during the period under study.

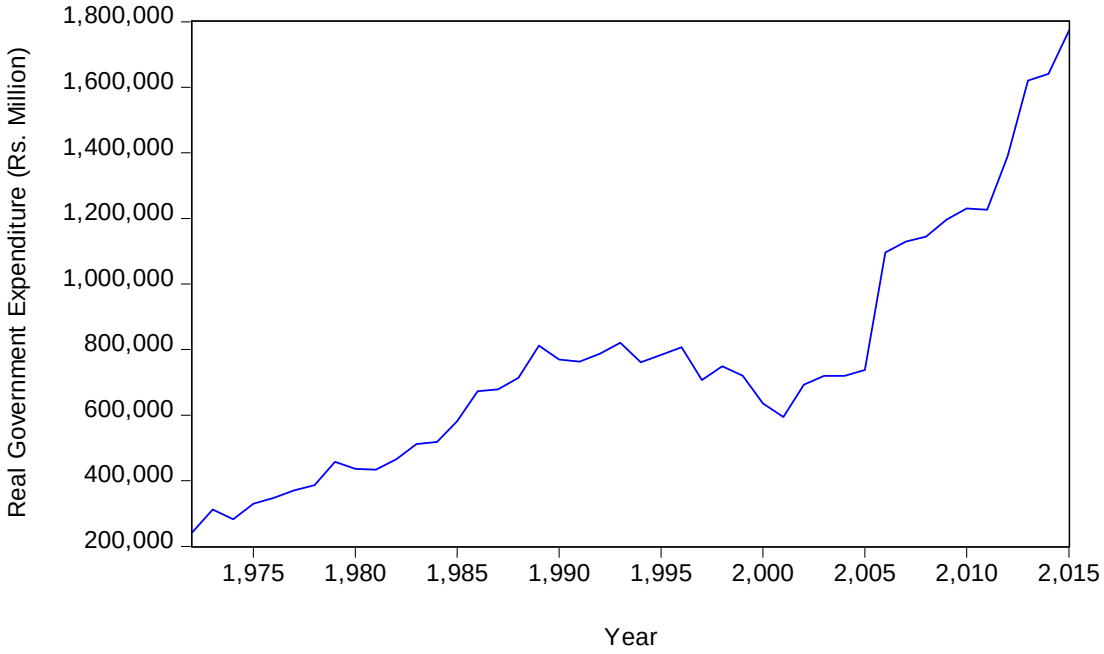


Figure 2. Trend in Real Government Expenditure.

The figure shows a mixed trend in Real Government Expenditure which is rising upto1990 then falling afterwards with sharp dip in 2001. It continued to rise after 2001.

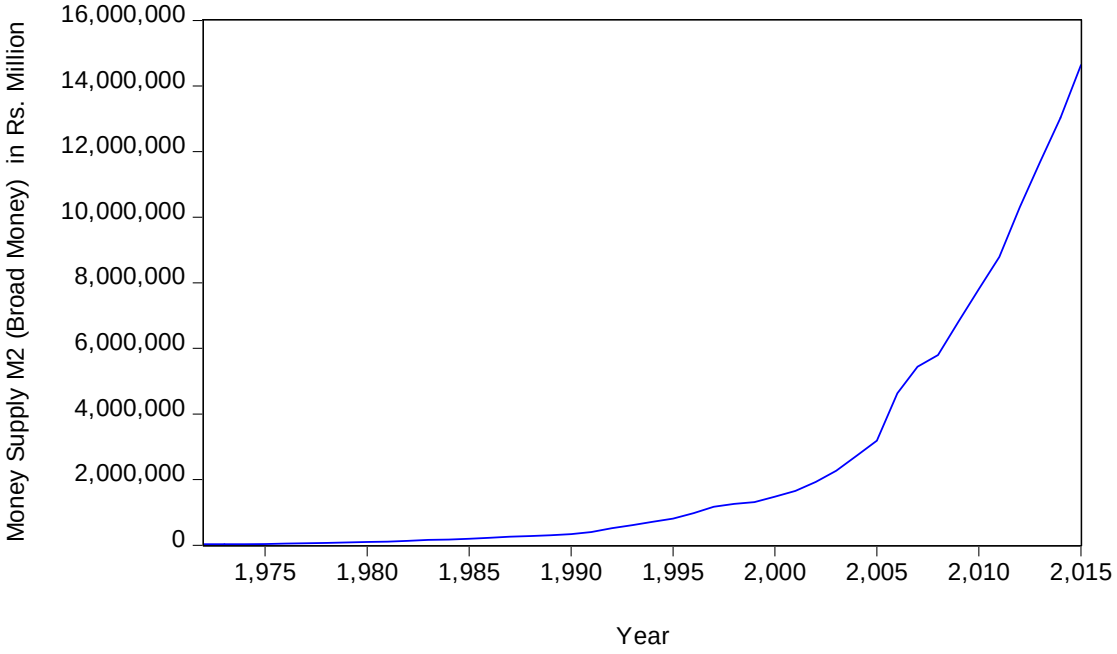


Figure 3. Trend in Money Supply M2 (Broad Money)

Money Supply increases slowly up to 1990 and start rising afterwards with a sharp increase from 2005 onwards.

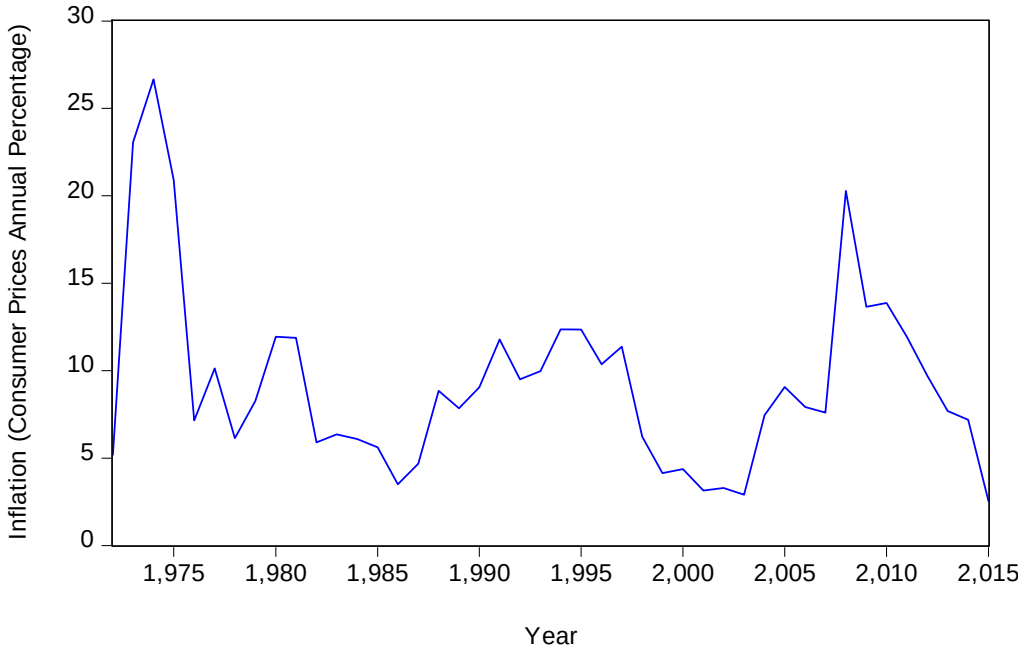


Figure 4. Trend in Inflation

Inflation has an erratic trend of rise and fall from 1972 to 2015. It was highest in 1974 with 26.7%, due to oil embargo after war in Middle East in 1973 and also due to drastic devaluation of Pakistan Rupee in 1972. However it was lowest in 2015 with 2.5% due to lower International oil prices.

Econometric Technique

ARDL bounds testing approach for cointegration has been applied to find out a long run relationship among Real GDP per capita, Real Government Expenditure, Money Supply (M2) and Inflation. A pre-condition for this technique is that either all the variables are I(0) or I(1) or I(0)/I(1) (A mix of I(0) and I(1). However none of the variable should be I(2) in which case F-statistic becomes invalid for interpretation of long run relationship amongst the variables.

Unit Root Tests

In order to determine the integrating order of the variables the natural log of all the variables was obtained as the variables with Natural Log become stationary at lower level of integration. Further to that it is easy to interpret the results in percentage term. Three tests viz. Augmented Dicky Fuller unit root test developed by Dicky and Fuller (1979), Dicky-Fuller GLS unit root test developed by Elliot et al. (1996) and Phillips-Perron unit root test developed by Phillips & Perron (1988), were applied. The results of these tests are given in Table 3, Table 4 and Table 5 respectively.

The results of ADF Test in Table 3 indicate that L_R_GDP_PC and L_GE are stationary at 1% at their respective first difference in all the three cases of Intercept, Intercept and Trend, No Intercept and No Trend. Hence both variables L_R_GDP_PC and L_GE are of integrating order 1 i.e. I(1). L_M2 is not stationary at levels and at first difference in case of no intercept and no trend. However in case of intercept, intercept and trend, L_M2 is stationary at first difference at 1% level. Hence L_M2 will be accepted as I(1). ADF test further reveals that L_P is stationary at levels in

case of intercept, intercept and trend at 5% level of significance but stationary at first difference in case of no intercept and no trend. However it is stationary at first difference at 1% level of significance in all three cases under ADF Test. We may accept it as I(1) at 1% level of significance.

Table 3: Augmented Dickey – Fuller (ADF) Unit Root Test Results

Null Hypothesis: Variable has a unit root						
Variables	Test with Intercept		Test with Intercept and Trend		Test with no Intercept or Trend	
	Levels	1st Differences	Levels	1st Differences	Levels	1st Differences
	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)
L_R_GDP_PC	-0.934865	-4.992901*	-1.667628	-4.981089*	3.732972	-2.830567*
L_GE	-1.004344	-7.438944*	-2.030601	-7.32648*	3.063141	-6.320775*
L_M2	-0.213686	-5.345626*	-3.146687	-5.280001*	13.82449	-0.816493
L_P	-3.29774**	-7.127943*	-3.540604**	-7.032852*	-0.839829	-7.173952*
Level of Significance	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.
1% level	-3.592462	-3.596616	-4.186481	-4.192337	-2.621185	-2.621185
5% level	-2.931404	-2.933158	-3.518090	-3.520787	-1.948886	-1.948886
10% level	-2.603944	-2.604867	-3.189732	-3.191277	-1.611932	-1.611932

Note: *, **, *** denote significance at 1%, 5% and 10% respectively.

The results of AD-GLS Test in Table 4 indicate that L_R_GDP_PC is stationary at first difference at 1% level in case of Intercept, Intercept and Trend. L_GE is stationary at first difference at 1% level in case of Intercept and Trend. L_M2 is stationary at levels at 5% level of significance in case of intercept and trend. However in case of intercept L_M2 is stationary at first difference at 1% level. Hence L_M2 will be accepted as I(1) at 1% level of significance. L_P in case of intercept is stationary at levels at 1% level of significance. However L_P is stationary at levels at 5% level of significance in case of intercept and trend. We may accept L_P as I(1) at 1% level of significance with intercept and trend.

Table 4: Dickey – Fuller GLS (DF-GLS) Unit Root Test Results

Null Hypothesis: Variable has a unit root						
Variables	Test with Intercept		Test with Intercept and Trend		Test with no Intercept or Trend	
	Levels	1st Differences	Levels	1st Differences	Levels	1st Difference
	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)
L_R_GDP_PC	0.985817	-4.287476*	-1.616356	-4.996331*	Option not applicable	
L_GE	0.937940	-0.904286	-1.754643	-6.050160*		
L_M2	-0.002189	-5.328833*	-3.234740**	-5.396147*		
L_P	-3.00681*	-0.405638	-3.559557**	-4.454193*		
Level of Significance	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.
1% level	-2.621185	-2.621185	-3.770000	-3.770000		
5% level	-1.948886	-1.948886	-3.190000	-3.190000		
10% level	-1.611932	-1.611932	-2.890000	-2.890000		

Note: *, **, *** denote significance at 1%, 5% and 10% respectively.

The results of PP test in Table 5 indicate that L_R_GDP_PC and L_GE are stationary at first difference at 1% level in all cases i.e. Intercept, Intercept and Trend, No Intercept and No Trend. Hence both these variables are of integrating order of 1 i.e. I(1). L_M2 is not stationary at levels and at first difference in case of no intercept and no trend. However in case of intercept, intercept and trend L_M2 is stationary at first difference at 1% level. Hence L_M2 will be accepted as of Integral order 1 i.e. I(1). L_P is stationary at levels in case of intercept at 10% level of significance but stationary at first difference at 1% level, in case of intercept and trend and in case of no intercept and no trend. However it is stationary at first difference at 1% level of significance in all three cases under PP Test. We may accept L_P as I(1) at 1% level of significance. Hence all these results indicate that all variables in this study are I(1). These tests do not include any information about structural breaks occurring in the series. Hence these unit tests are not reliable (Baum (2004)).

Table 5: Phillips-Perron (PP) Unit Root Test Results

Null Hypothesis: Variable has a unit root						
Variables	Test with Intercept		Test with Intercept and Trend		Test with no Intercept or Trend	
	Levels	1st Differences	Levels	1st Differences	Levels	1st Differences
	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)	Augmented Dickey-Fuller Test Statistic (t-Statistic)
L_R_GDP_PC	-1.318242	-4.989671*	-1.678064	-4.981804*	6.187878	-2.679017*
L_GE	-0.992497	-7.381691*	-2.099702	-7.276074*	3.253063	-6.394755*
L_M2	-0.214478	-5.268431*	-2.434831	-5.194159*	12.30253	-1.390699
L_P	-2.771589***	-7.165482*	-3.115504	-7.065676*	-0.783467	-7.202416*
Level of Significance	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.
1% level	-3.592462	-3.596616	-4.186481	-4.192337	-2.619851	-2.621185
5% level	-2.931404	-2.933158	-3.518090	-3.520787	-1.948686	-1.948886
10% level	-2.603944	-2.604867	-3.189732	-3.191277	-1.612036	-1.611932

Note: *, **, *** denote significance at 1%, 5% and 10% respectively.

Unit Root Test with Structural Break

Since the above mentioned Unit Root Tests do not consider any structural break hence Zivot-Andrews structural break unit root test developed by Zivot & Andrews (1992) was applied to find out the information about single break point unit root. The results with intercept, trend and both intercept and trend are given in Table 6.

These results indicate different Time Breaks in case of intercept, trend, and intercept and trend at levels and at first difference. However in all the cases all variables are stationary at first difference. Hence we may conclude that all the variables are of integral order 1 i.e., I(1). In such a case Johnson Approach for cointegration or ARDL bounds Testing Technique for cointegration may be applied to study the long run relationship amongst the variables. The latter technique has been applied in this study.

Table 6: Zivot Andrews Unit Root Test Results

Null Hypothesis: Variable has a unit root						
Variables	Test for Break in Intercept		Test for Break in Trend		Test for Break in Intercept and Trend	
	Levels	1st Differences	Levels	1st Differences	Levels	1st Differences
	Test Statistic (Minimum t-Statistic)	Test Statistic (Minimum t-Statistic)	Test Statistic (Minimum t-Statistic)	Test Statistic (Minimum t-Statistic)	Test Statistic (Minimum t-Statistic)	Test Statistic (Minimum t-Statistic)
L_R_GDP_PC	-3.734 at 1980 (obs 9) [1]	-5.547* at 1993 (obs 22) [0]	-3.627 at 1988 (obs 17) [1]	-5.266* at 1981 (obs 10) [0]	-3.667 at 1980 (obs 9) [1]	-5.473** at 1993 (obs 22) [0]
L_GE	-3.516 at 1994 (obs 23) [0]	-8.997* at 2002 (obs 31) [0]	-2.646 at 2005 (obs 34) [0]	-8.006* at 1998 (obs 27) [0]	-3.652 at 1997 (obs 26) [0]	-8.904* at 2002 (obs 31) [0]
L_M2	-4.170 at 2006 (obs 35) [1]	-5.805* at 1975 (obs 4) [0]	-3.524 at 1977 (obs 6) [1]	-5.805* at 1976 (obs 5) [0]	-4.051 at 2006 (obs 35) [1]	-6.014* at 1977 (obs 6) [0]
L_P	-3.888 at 1976 (obs 5) [0]	-7.558* at 2015 (obs 44) [0]	-3.763 at 1978 (obs 7) [0]	-7.710* at 2009 (obs 38) [0]	-3.817 at 2008 (obs 37) [0]	-8.211* at 2004 (obs 33) [0]
Level of Signific	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.	Test critical Values.
1% level	-5.34	-5.34	-4.93	-4.93	-5.57	-5.57
5% level	-4.80	-4.80	-4.42	-4.42	-5.08	-5.08
10%	-4.58	-4.58	-4.11	-4.11	-4.82	-4.82

Note:- i) Nos. in parentheses [] indicate No. of Lags selected using AIC

ii) *, **, * indicate significance at 1%, 5% and 10%**

ARDL Bounds Testing Approach for cointegration

As developed by Pesaran & Shin (1998) and Pesaran et al. (2001) ARDL bounds testing Technique has been applied. This technique has following three advantages over the other traditional techniques for cointegration:-

i. The variables need not be integrated of same order and technique can be applied to any mix of variables of integrating order of zero or one or partially integrated variables.

ii. It is more efficient for finite and small sample data

iii. We obtain unbiased estimates of the long run model as suggested by Harris & Sollis (2003)

First task in applying the ARDL Technique is to determine the lag length. STATA command (STATA 14) **varsoc** with all the variables included as endogenous variables with maximum lag of 4 was applied and the results are given in Table 7.

Table 7: Lag Order Selection

VAR Lag Order Selection Criteria Sample: 1976 - 2015				Number of obs = 40				
Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-15.9663				.000032	.998313	1.05938	1.1672
1	197.208	426.35	16	0.000	1.7e-09	-8.86041	-8.55509*	-8.01597*
2	216.28	38.143	16	0-001	1.5e-09	-9.01398	-8.4644	-7.49399
3	237.698	42.836*	16	0.000	1.2e-09*	-9.28489*	-8.49105	-7.08934
4	251.091	26.787	16	0.044	1.6e-09	-9.15455	-8.11646	-6.28346

LL: Log L

LR: sequential modified LR test statistic (each test at 5% level).
FPE: Final prediction error.
AIC: Akaike information criterion.
HQIC: Hannan–Quinn information criterion.
SBIC: Schwarz information criterion.
* Indicates lag order selected by the criterion

The results indicate that lag length cannot exceed 3 as indicated with the maximum number of asterisk (*) in the results. Once maximum lag order is determined then ARDL bounds Test for cointegration is applied to determine the long run relationship amongst the variables.

Model

The ARDL model applied in this study is as follows:-

$$D(\ln((R\_GDP\_PC)_t)) = \alpha_{01} + \beta_{11}\ln((R\_GDP\_PC)_{t-1}) + \beta_{21}\ln((GE)_{t-1}) + \beta_{31}\ln((M2)_{t-1}) + \beta_{41}\ln((P)_{t-1}) + \sum_{i=1}^{p}\alpha_{1i}D(\ln((R\_GDP\_PC)_{t-i})) + \sum_{i=1}^{q}\alpha_{2i}D(\ln((GE)_{t-i})) + \sum_{i=1}^{q}\alpha_{3i}D(\ln((M2)_{t-i})) + \sum_{i=1}^{q}\alpha_{4i}D(\ln((P)_{t-i})) + u_{1t} \quad (1)$$

$$D(\ln((GE)_t)) = \alpha_{02} + \beta_{12}\ln((R\_GDP\_PC)_{t-1}) + \beta_{22}\ln((GE)_{t-1}) + \beta_{32}\ln((M2)_{t-1}) + \beta_{42}\ln((P)_{t-1}) + \sum_{i=1}^{p}\alpha_{1i}D(\ln((GE)_{t-i})) + \sum_{i=1}^{q}\alpha_{2i}D(\ln((R\_GDP\_PC)_{t-i})) + \sum_{i=1}^{q}\alpha_{3i}D(\ln((M2)_{t-i})) + \sum_{i=1}^{q}\alpha_{4i}D(\ln((P)_{t-i})) + u_{2t} \quad (2)$$

$$D(\ln((M2)_t)) = \alpha_{03} + \beta_{13}\ln((R\_GDP\_PC)_{t-1}) + \beta_{23}\ln((GE)_{t-1}) + \beta_{33}\ln((M2)_{t-1}) + \beta_{43}\ln((P)_{t-1}) + \sum_{i=1}^{p}\alpha_{1i}D(\ln((M2)_{t-i})) + \sum_{i=1}^{q}\alpha_{2i}D(\ln((GE)_{t-i})) + \sum_{i=1}^{q}\alpha_{3i}D(\ln((R\_GDP\_PC)_{t-i})) + \sum_{i=1}^{q}\alpha_{4i}D(\ln((P)_{t-i})) + u_{3t} \quad (3)$$

$$D(\ln((P)_t)) = \alpha_{04} + \beta_{14}\ln((R\_GDP\_PC)_{t-1}) + \beta_{24}\ln((GE)_{t-1}) + \beta_{34}\ln((M2)_{t-1}) + \beta_{44}\ln((P)_{t-1}) + \sum_{i=1}^{p}\alpha_{1i}D(\ln((P)_{t-i})) + \sum_{i=1}^{q}\alpha_{2i}D(\ln((M2)_{t-i})) + \sum_{i=1}^{q}\alpha_{3i}D(\ln((GE)_{t-i})) + \sum_{i=1}^{q}\alpha_{4i}D(\ln((R\_GDP\_PC)_{t-i})) + u_{4t} \quad (4)$$

Here **ln** is for Natural Log and D is difference operator and u_t is error terms.

The bounds test is based on joint F-Statistic which has non-standard symmetric distribution under the Null Hypothesis of no cointegration. Firstly the above mentioned 4 equations are estimated using ordinary least squares. The existence of long run relationship among the variables is established through these estimates by testing the joint significance of the coefficients of lagged levels of the variables by applying F test. The Null Hypothesis is H_0: $\beta_{1i} = \beta_{2i} = \beta_{3i} = \beta_{4i} = 0$ and Alternative Hypothesis is H_1: $\beta_{1i} \neq \beta_{2i} \neq \beta_{3i} \neq \beta_{4i} \neq 0$ for i=1,2,3,4. The F-statistic which normalizes the function in a given equation is denoted by F_{DV}(DV\IV(List)), where DV is Dependent Variable and IV is Independent Variable(s); List means all the independent variables are to be included in the expression. Two sets of critical values are obtained for a given level of

significance (Pesaran et al. (2001)). The set of lower values is called the lower bound which is obtained on the assumption that all variables are of integral order of zero i.e. I(0). The set of higher values is called upper bound which is obtained on the assumption that all variables are of integral order of one i.e. I(1). If the F-test statistic is more than the upper bound of the Critical Values then Null Hypothesis is rejected and it is concluded that there is cointegration amongst the dependent variable and independent variables. If the F-test statistic is less than the lower bound of the critical values then Null Hypothesis is not rejected and we conclude that there is no cointegration amongst the dependent and independent variables. In case the F-test statistic falls between the upper bound and lower bound values then it is indeterminate case; neither the Null Hypothesis can be accepted nor can it be rejected.

ARDL bounds test was carried out with a maximum lag of 3 using Bayesian Information Criteria. The Unrestricted Constant and Unrestricted Trend were included as exogenous variables. The results are reported in Table 8.

Table 8: Tests Results of ARDL Bounds Testing (Unrestricted Constant and Unrestricted Trend)

			Null Hypothesis: No long-run relationships exist			
Equation No.	Dependent Variable	Independent Variables	Model (Indicating BIC Lags)*	F-Statistic	K	Decision
1	2	3	4	5	6	7
1	L_R_GDP_PC	L_GE,L_M2, L_P	(1 0 1 2)	6.568	3	Cointegration
2	L_GE	L_R_GDP_PC , L_M2,L_P	(1 0 1 0)	0.785	3	No Cointegration
3	L_M2	L_R_GDP_PC , L_GE, L_P	(2 1 1 2)	7.965	3	Cointegration
4	L_P	L_R_GDP_PC , L_GE, L_M2	(1 0 0 0)	2.256	3	No Cointegration
			Critical Value Bounds			
			Significance	I0 Bound	I1 Bound	
			10%	3.47	4.45	
			5%	4.01	5.07	
			2.5%	4.52	5.62	
			1%	5.17	6.36	

Note:- * The figures in parentheses in Col 4 indicate the No. of BIC Lags of Dependent Variable and Independent Variables as given in Col 2 and Col 3 respectively, in the same order.

These results indicate that there is long run relationship amongst the variables when Growth represented by Real GDP per Capita in logarithmic form is dependent variable (Equation 1) and also when Broad Money (M2) in logarithmic form is dependent variable (Equation 3) since the F-statistic in each case, 6.568 and 7.965 respectively, is higher than the upper bound (I1) at all level of

significance. However there is no long run relationship amongst the variables when Real Government Expenditure (Equation 2) and Inflation (Equation 4) in logarithmic form are the dependent variables, since the F-statistic in each case, 0.785 and 2.256 respectively, is lower than the critical values at all level of significance. Hence Null Hypothesis of no cointegration is rejected for Equation 1 and Equation 3 while it is not rejected for Equation 2 and Equation 4. These results reveal that there are two Cointegrating Vectors which imply that there is robust relationship amongst the variables i.e. Real GDP per capita, Real Government Expenditure, Broad Money (M2) and Inflation.

Granger Short-Run and Long-Run Causality Tests

Once the cointegration is established the long run conditional ARDL model (p,q_1, q_2, q_3) for the Equation 1 with L_R_GDP_PC (Growth in logarithmic form) as dependent variable is estimated as follows:-

$$\ln((\text{R\_GDP\_PC})_t)) = \alpha_{01} + \sum_{i=1}^{p} \alpha_{1i}(\ln((\text{R\_GDP\_PC})_{t-i})) + \sum_{i=0}^{q1} \alpha_{2i}(\ln((GE)_{t-i})) + \sum_{i=0}^{q2} \alpha_{3i}(\ln((M2)_{t-i})) + \sum_{i=0}^{q3} \alpha_{4i}(\ln((P)_{t-i})) + \varepsilon_{1t} \quad (5)$$

The ARDL model selected using Schwarz Bayesian Criterion (BIC) in Equation 5 is ARDL (1,0,1,2). The results of long run relationship are reported in Table 9.

Table 9: Estimated Long Run Coefficients (Dependent Variable LN(R_GDP_PC))

Variable	Coefficient	Standard Error	t-Statistic	Probability
Ln(GE)	0.18515	0.067751	2.7328	0.010
Ln(M2)	0.10935	0.14996	0.72921	0.471
Ln(P)	-.10343	0.040544	-2.5511	0.016
Constant	6.9275	1.4831	4.6708	0.000
Trend	-0.0029521	0.021780	-0.13554	0.893
R-squared	0.99785	-	-	-
F-statistic(8,32)	1857.0	-	-	0.000
DW-statistic	2.0462	-	-	-

The estimated long run coefficients are significant for Real Government Expenditure and for inflation but not significant for Broad Money (M2). Real Government Expenditure has a positive significant impact on Real GDP per capita (representing Growth) at 5% level of significance. This implies that Pakistan economy complies with Keynesian Hypothesis and Real Government Expenditure contributes towards economic Growth. A study carried out by Farooq (2016) also supports that Government Expenditure has a positive impact on Economic Growth in Pakistan. Inflation has a significant negative impact on Real GDP per capita at 5% level of significance. It implies that inflation dampens the economic growth and this conclusion is supported by the study carried out by Hussain & Mallick (2011) that inflation above the threshold level of 9% decelerates the economic growth in Pakistan while there is positive relationship between inflation and economic

growth below 9% threshold inflation rate. Mubarik (2005) also estimated 9% threshold inflation rate and concluded the same relationship between inflation and economic growth above (negative) and below (positive) the threshold inflation rate, for Pakistan economy.

Money Supply (M2) has no impact on economic growth. This implies that change in Money Supply (M2) does not affect Real GDP per Capita directly. This is in line with a study by Ihsan (2013) wherein he reported that Money Supply has no direct impact on GDP; however Money Supply has impact on GDP through interest rate, CPI and high inflation rate. Excessive Money Supply causes inflation in double digit and badly affects the GDP in case of Pakistan. He further concludes that lower inflation rate in the range of 5%-6% will not adversely affect GDP.

The long run coefficients further reveal that a 1% increase in Real Government Expenditure will increase economic growth by 0.18%, however a 1% increase in inflation will affect economic growth negatively and it will decline by 0.10%

An error correction model associated with the long run estimates is estimated to obtain the dynamic short run parameters following Odhiambo (2009), Naryan & Smyth (2008). The Equation 1 above where Null Hypothesis of No Cointegration was rejected is estimated with the lagged error-correction term following Naryan & Smyth (2008) and Morley (2006).

The Vector Error Correction Model (VECM) is specified as follows:-

$$D(\ln((\text{R\_GDP\_PC})_t)) = \alpha_{01} + \sum_{i=1}^{p} \alpha_{1i} D(\ln((\text{R\_GDP\_PC})_{t-i})) + \sum_{i=1}^{q} \alpha_{2i} D(\ln((GE)_{t-i})) + \sum_{i=1}^{q} \alpha_{3i} D(\ln((M2)_{t-i})) + \sum_{i=1}^{q} \alpha_{4i} D(\ln((P)_{t-i})) + \beta_1 \, ect_{t-1} + v_{1t} \quad (6)$$

$$D(\ln((GE)_t)) = \alpha_{02} + \sum_{i=1}^{p} \alpha_{1i} D(\ln((GE)_{t-i})) + \sum_{i=1}^{q} \alpha_{2i} D(\ln((\text{R\_GDP\_PC})_{t-i})) + \sum_{i=1}^{q} \alpha_{3i} D(\ln((M2)_{t-i})) + \sum_{i=1}^{q} \alpha_{4i} D(\ln((P)_{t-i})) + v_{2t} \quad (7)$$

$$D(\ln((M2)_t)) = \alpha_{03} + \sum_{i=1}^{p} \alpha_{1i} D(\ln((M2)_{t-i})) + \sum_{i=1}^{q} \alpha_{2i} D(\ln((GE)_{t-i})) + \sum_{i=1}^{q} \alpha_{3i} D(\ln((\text{R\_GDP\_PC})_{t-i})) + \sum_{i=1}^{q} \alpha_{4i} D(\ln((P)_{t-i})) + \beta_2\, ect_{t-1} + v_{3t} \quad (8)$$

$$D(\ln((P)_t)) = \alpha_{04} + \sum_{i=1}^{p} \alpha_{1i} D(\ln((P)_{t-i})) + \sum_{i=1}^{q} \alpha_{2i} D(\ln((M2)_{t-i})) + \sum_{i=1}^{q} \alpha_{3i} D(\ln((GE)_{t-i})) + \sum_{i=1}^{q} \alpha_{4i} D(\ln((\text{R\_GDP\_PC})_{t-i})) + v_{4t} \quad (9)$$

Here $\alpha_{1i}, \alpha_{2i}, \alpha_{3i}, \alpha_{4i}$ are the short run dynamic coefficients of the convergence of the model while β_1 and β_2 are the speed of adjustments in the respective equation.

The results of short run dynamic coefficients associated with long run relationships estimated from Equation 6 are given in Table 10.

Table 10: Estimated Coefficients of VECM (Dependent Variable D(L_R_GDP_PC). ARDL Model (1,0,1,2) based on Schwarz Bayesian Criterion

Variable	Coefficient	Standard Error	t-Statistic	Probability
D(L_GE)	0.036699	0.015305	2.3979	0.022
D(L_M2)	0.11116	0.040189	2.7659	0.009
D(L_P)	0.0023637	0.0057569	0.41060	0.684
D(L_P(-1))	0.029644	0.0059616	4.9725	0.000
D(C)	1.3731	0.57771	2.3768	0.023
D(T)	-.5851E-3	0.0042607	-0.13733	0.892
ect(-1)	-.19821	0.057925	-3.4219	0.002
R-squared	0.57869	-	-	-
F-statistic(6,34)	7.3256	-	-	0.000
DW-statistic	2.0462	-	-	-

The model is globally significant as Probability of F-statistic is 0.000 implying that underlying ARDL Model of Equation 6 fits well. The coefficients of Real Government Expenditure, Money Supply (M2) and inflation rate of previous year are significant at 5% level of significance. However coefficient of current year inflation rate is insignificant at 5% level of significance. A 1% increase in Real Government Expenditure will increase Real GDP per capita by 0.037%. A 1% increase in Broad Money (M2) will increase Real GDP per capita by 0,11% and 1% increase in last

year inflation will increase Real GDP per capita by 0.0296%. These results imply that increase in Real Government Expenditure enhances Aggregate Demand which in turn increases Real GDP per capita through multiplier. An increase in Money Supply makes available cash in the economy and that lowers the interest rate which stimulates private investment. Hence Real GDP per capita increases with increase in Private Investment through multiplier. Inflation of previous year gives a signal to the producers that prices are increasing; hence the producers enhance production in the hope of earning profit at higher prices. The coefficient of the lagged error correction term is 0.19821 with negative sign and significant at 1% level of significance. It implies that any disequilibrium will be corrected 19.82% in the next year, though the speed of adjustment to equilibrium is slow.

Diagnostic Tests

The diagnostics tests were carried out and model passed all the tests. There is no serial correlation, no heteroskedasticity (White), No Arch effects. The functional form is correctly specified as depicted by Ramsey RESET Test. The normality test indicates that residuals are normally distributed. The Tests Results are given in Table 11.

Table 11: Results of Diagnostic Tests

Tests	F-Statistic	df	Prob.	CHSQ	Prob.
1. Breusch-Godfrey Serial Correlation LM Test	0.029474	(1,31)	0.865	0.038944	0.844
2. White Heteroskedasticity Test	0.24521	(1,39)	0.623	0.25618	0.613
3.Ramsey RESET Test	1.8718	(1,31)	0.181	2.3346	0.127
4. ARCH Test	0.042313	(1,31)	0.838	0.055886	0.813
5. Normality Test	Not Applicable			1.1010	0.577

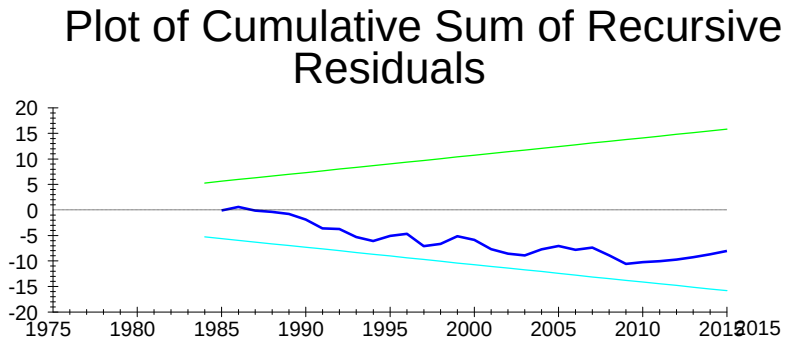
Note: - 1. Lagrange multiplier test of residual serial correlation

2. Heteroskedasticity test Based on the regression of squared residuals on squared fitted values

3. Ramsey's RESET test using the square of the fitted values

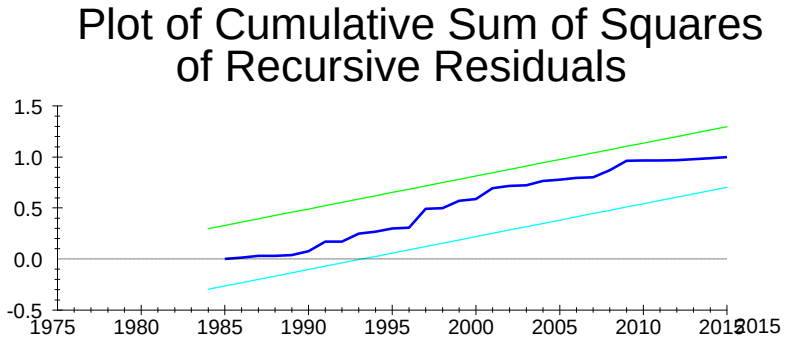
4. Normality Test Based on a test of skewness and kurtosis of residuals

The stability of long run and short run parameters was checked through CUSUM Test and CUSUMSQ Test. The parameters are stable as plot of Cumulative Sum of Recursive Residuals in Fig. 5 and Plot of Cumulative Sum of Squares of Residuals in Fig. 6 are within 5% confidence interval of parameter stability. This confirms that long run and short run relationship amongst Real GDP per capita, Real Government Expenditure, Money Supply (M2) and Inflation are stable and there is no structural break.



The straight lines represent critical bounds at 5% significance level

Figure 5. Plot of CUSUM Test for Equation.



The straight lines represent critical bounds at 5% significance level

Figure 6. Plot of CUSUMSQ Test for Equation.

Short Run Granger Causality Test

The results of Short Run Granger Causality Test are given in Table 13 which are based on the Pairwise Granger Causality Tests given in Table 12

Table 12: Pairwise Granger Causality Tests

Sample: 1972 2015 : Observations : 41		
Lags: 2		
Null Hypothesis:	F-Statistic	Prob.
D_L_GE does not Granger Cause D_L_R_GDP_PC	0.37273	0.6915
D_L_R_GDP_PC does not Granger Cause D_L_GE	2.34936	0.1099
D_L_M2 does not Granger Cause D_L_R_GDP_PC	0.12562	0.8823
D_L_R_GDP_PC does not Granger Cause D_L_M2	1.90267	0.1639
D_L_P does not Granger Cause D_L_R_GDP_PC	3.37595	0.0453
D_L_R_GDP_PC does not Granger Cause D_L_P	0.89104	0.4191
D_L_M2 does not Granger Cause D_L_GE	0.07475	0.9281
D_L_GE does not Granger Cause D_L_M2	0.46579	0.6314
D_L_P does not Granger Cause D_L_GE	4.16359	0.0236
D_L_GE does not Granger Cause D_L_P	6.47099	0.0040
D_L_P does not Granger Cause D_L_M2	3.72099	0.0340
D_L_M2 does not Granger Cause D_L_P	3.81751	0.0314

Table 13: Results of Short Run Granger Causality

Dependent Variable	Independent Variables: F-statistic and P-Value				Direction of Causality
	D(Ln(R_GDP_PC))	D(Ln(GE))	D(Ln(M2))	D(Ln(P))	
D(Ln(R_GDP_PC))	-	0.37273 (0.6915)	0.12562 (0.8823)	3.3759** (0.0453)	P→R_GDP_PC
D(Ln(GE))	2.34936 (0.1099)	-	0.07475 (0.9281)	4.1635** (0.0236)	P→GE
D(Ln(M2))	1.90267 (0.1639)	0.46579 (0.6314)	-	3.7209** (0.0340)	P→M2
D(Ln(P))	0.89104 (0.4191)	6.47099* (0.0040)	3.81751** (0.0314)	-	GE→P M2→P

*Significant at 1%

**Significant at 5%

The values in parentheses ( ) indicate p-value

The results of Short Run Granger Causality Test given in Table 13 reveal that there is unidirectional causality from inflation to Real GDP per capita at 5% level. However there is bidirectional causality between inflation and Real Government Expenditure, and between inflation

and Money Supply at 5% level. The causality running from Real Government Expenditure to Inflation is significant at 1% level.

Conclusions

This study investigated the interrelationship of important macroeconomic variables, viz. Money Supply, Inflation, Government Expenditure and Economic Growth for Pakistan economy. ARDL bounds Testing Approach in section 4.6 was applied to find out the long run relationship amongst the variables. The results reveal that there are two Cointegrating vectors; one between economic growth and rest of the variables and second between Money Supply and rest of the variables. The long run coefficients in Table 9 indicate that there is significant relationship between Real Government expenditure and economic growth and also between inflation and economic growth. However the long run relationship between Money Supply and economic growth is not statistically significant.

Vector Error Correction Mechanism (VECM) was estimated in section 4.7 to examine the short run relationship associated with the long run relationship amongst the variables. The results given in Table 10 indicate a short run significant relationship amongst Government Expenditure, Money Supply, Inflation of previous year and economic growth. However current year inflation has insignificant short run impact on economic growth. There is positive statistically significant short run relationship between previous year inflation and current year economic growth. The error correction coefficient is -0.1982 and it is significant which implies that any disturbance in the long run equilibrium in any period will be corrected by 19.82% in the next period.

The model passed through all the diagnostics tests as given in section4.8. There is no serial correlation, no heteroskedasticity, no ARCH effects, the residuals are normally distributed, and there is correct functional form and stable parameters.

Granger Causality Test was carried out in section 4.9 to determine the direction of causality. The empirical results given in Table 12 reveal that unidirectional causality runs from inflation to economic growth; however there is bidirectional causality between inflation and government expenditure and between inflation and money supply.

Since Government expenditure has a positive impact on economic growth both in the short run as well as in the long run while money supply has a short run positive impact on the economic growth and an insignificant impact in the long run, hence it is concluded that both monetary and fiscal policies can be geared to have an impact on economic growth.

Policy Implications

In the light of above mentioned empirical results and conclusions drawn the following Policy Implications are given for the consideration of Policy Makers:-

i. Government should enhance its expenditure which will enhance economic activity in the economy and economic growth will increase with the increase in output. However it may be ensured that development projects wherein mostly government expenditure is involved are started and completed on time to avoid any cost escalation. This will ensure that excessive capital expenditure may not become unproductive at the margin.

ii. It may be ensured that Government expenditure may not result in crowding out private investment. Such projects should be undertaken by the Government which does not compete with the projects in the Private Sector. Accordingly misallocation of resources may be avoided.

iii. Money supply growth should be regulated in such a way that it controls the inflation, as inflation has a positive impact on economic growth significantly at least in the short run while persistent inflation in the long run is inimical to economic growth.

References

Albatel, A. H. (2000). The relationship between government expenditure and economic growth in Saudi Arabia. Journal of King Saud University Vol. 12, Admin. Sci., (2), pp.173-191

Attari, M. I. J., & Javed, A. Y. (2013). Inflation, economic growth and government expenditure of Pakistan: 1980-2010. Procedia Economics and Finance, 5, 58-67.

Barro, R. J. (1995). Inflation and Economic Growth. NBER Working Paper No. 5326.

Barro, R. J. (1997). Determinants of Economic Growth. A Cross-Country Empirical Study. MIT Press, Cambridge, MA

Barro, R. J. (2013). Inflation and Economic Growth. Annals of Economics and Finance 14-1, 85–109

Baum, C. F. (2004). A review of Stata 8.1 and its time series capabilities. International Journal of Forecasting, 20(1), 151-161.

Chaudhry, S., Qamber, Y., & Farooq, F. (2012). Monetary Policy, Inflation and Economic Growth in Pakistan: Exploring the Co-integration and Causality Relationships. Pakistan Journal of Commerce and Social Sciences, 6(2), 332- 347.

Devarajan, S., Swaroop, V., & Zou, H. F. (1996). The composition of public expenditure and economic growth. Journal of monetary economics,37(2), 313-344.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American statistical association, 74(366a), 427-431.

Eggoh, J. C., & Khan, M. (2014). On the nonlinear relationship between inflation and economic growth. Research in Economics, 68(2), 133-143.

Elliot, G., Rothenberg, T. J., & Stock, J. H. (1996). Efficient tests for an autoregressive unit root. Econometrica, 64(4), 813-836.

Farooq, N. (2016). Public Expenditures and Economic Growth: A Case study of Pakistan. American journal of social and management sciences 7(2), 33-41.

Georgantopoulos, A. G., & Tsamis, A. (2012). The interrelationship between money supply, prices and government expenditures and economic growth: A causality analysis for the case of Cyprus. International Journal of Economic Sciences and Applied Research, 5(3), 115-128.

Guerrero, F. (2006). Does inflation cause poor long-term growth performance? Japan and the world economy, 18(1), 72-89.

Harris, R., & Sollis, R. (2003). Applied time series modelling and forecasting. Wiley. West Sussex.

Hussain, S., & Malik, S. (2011). Inflation and economic growth: Evidence from Pakistan. International Journal of Economics and Finance, 3(5), 262.

Ihsan, S. A. (2013). Impact of Money Supply (M2) on GDP of Pakistan. Global Journal of Management and Business Research, 13(6).

Jha, R., & Dang, T. N. (2012). Inflation variability and the relationship between inflation and growth. Macroeconomics and Finance in Emerging Market Economies, 5(1), 3-17.

Khan, M. S., & Senhadji, A. S. (2001). Threshold effects in the relationship between inflation and growth. IMF Staff papers, 48(1), 1-21.

Landau, D. L. (1985). Government expenditure and economic growth in the developed countries: 1952–76. Public Choice, 47(3), 459-477.

Mallik, G., & Chowdhury, A. (2002). Inflation, government expenditure and real income in the long-run. Journal of Economic studies, 29(3), 240-250.

Manamperi, N. (2014). The short and long-run dynamics between inflation and economic growth in BRICS. Applied Economics Letters, 21(2), 140-145.

Morley, B. (2006). Causality between economic growth and immigration: An ARDL bounds testing approach. Economics Letters, 90(1), 72-76.

Mubarik, Y. A.(2005). Inflation and growth: An estimate of the threshold level of inflation in Pakistan. State Bank of Pakistan. Research Bulletin, 1-2, 35-44.

Narayan, P. K., & Smyth, R. (2006). Higher education, real income and real investment in China: evidence from Granger causality tests. Education Economics, 14(1), 107-125.

Odhiambo, N. M. (2009). Energy consumption and economic growth nexus in Tanzania: An ARDL bounds testing approach. Energy Policy, 37(2), 617-622.

Pesaran, M. H., & Shin, Y. (1998). An autoregressive distributed-lag modelling approach to cointegration analysis. Econometric Society Monographs, 31, 371-413.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing Approaches to the Analysis of level relationships. Journal of Applied Econometrics,16(3), 289-326.

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. Biometrika, 75(2), 335-346.

Qayyum, A. (2006). Money, inflation, and growth in Pakistan. The Pakistan Development Review, 45: 2 (Summer 2006) pp.203-212.

Ruge-Murcia, F. J. (1999). Government expenditure and the dynamics of high inflation. Journal of Development Economics, 58(2), 333-358.

Vinayagathasan, T. (2013). Inflation and economic growth: A dynamic panel threshold analysis for Asian economies. Journal of Asian Economics, 26, 31-41.

Zivot, E., & Andrews, D. W. 1992. Further evidence on the Great Crash, the oil price shock, and the unit-root hypothesis. Journal of Business and Economic Statistics, 10, 251-70.