Does Inflation Affect Economic Growth?
The case of Pakistan

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Abstract  
The major purpose of this study is to re-examine the existence of inflation growth relationship in the economy of Pakistan and to analyze empirically the impact of inflation on GDP growth of the economy. It is further, to investigate whether it encourages or hurts the economic growth in a uniform way or it behaves differently under different levels. Annual time-series data for the period 1972-73 to 2009-10 have been taken and analysis is made by employing the method of Ordinary Least Squares (OLS). A negative and significant inflation growth relationship has been found to be existed in the economy of Pakistan. The results of the study show that prevailing inflation is harmful to the GDP growth of the economy after a certain threshold level. On the basis of the descriptive and econometric analysis, we may suggest to the policy makers and the State Bank of Pakistan to restrict the inflation below the 7 percent level and to keep it stable. So that it may exert its positive effects on economic growth of the economy.

Keywords: Inflation; Economic Growth; Threshold level of Inflation; Pakistan

I. Introduction

High and sustained economic growth with low inflation is the central objective of the macroeconomic policy makers. Therefore, inflation has been one of the most researched topics in macroeconomics for the last many years because it has serious implications for growth and income distribution. What factors determine the inflation rates have also been widely debated all over the world. Inflation, by increase in aggregate demand is called ‘demand-pull inflation’ while supply shocks are supposed to cause ‘cost-push inflation’. This is supposed to have a strong positive correlation with the output gap.

The relationship between growth and inflation, however, depends on the state of the economy. High growth, without an increase in inflation, is possible if the potential output of the economy is growing enough to keep pace with demand. It is also possible if
the actual output is below the potential output (i.e. negative output gap) and there is sufficient spare capacity available to handle with the demand pressures. When the actual output becomes equal with the potential output, there remains no spare capacity and the economy is working on full employment level, any further gain in growth comes at the cost of rising inflation. If demand continues to grow at this stage, and the productive capacity does not expand, there is a danger of rapid increase in general price level in the long run without any additional growth in the output. This phase of rising inflation can have severe consequences for the economy.

High inflation is always correlated with increased price variability, which can lead to uncertainty about the future profitability of investment projects. This leads to more conservative investment decisions than would otherwise be the case. It will, ultimately, leads to lower levels of investment and economic growth. Inflation may also impact an economy’s balance of payments by making its exports relatively more costly. Moreover, inflation can interact with the tax system to disturb borrowing and lending decisions. Firms may have to allocate more resources to dealing with the effects of inflation. This study aims to consider these entire situations in the context of economy of Pakistan. It is to re-investigate inflation and growth relationship with the last 30 years’ data of the economy.

The rest of the paper is arranged as follows: In section II, a brief review of earlier studies has been presented. Objectives of the study have been classified in section III. The structure and trends of inflation and growth in Pakistan have been discussed in section IV. Data and Methodology have been briefly mentioned in section V. Econometric specification of the model is presented in section VI. Section VII is reserved for results and discussions. Finally, the conclusion and policy recommendations are presented in section VIII.

II. Review of Literature

Various studies have been presented on the issue of inflation and growth. Most of this research work has been done internationally. We have critically reviewed some of these important empirical studies to develop objectives in the context of Pakistan and, further, to analyze it to draw some important conclusions and policy recommendations.

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.

Bruno and Easterly (1995) address the issue of inflation and growth and find no evidence of any consistent relationship between these variables up to a certain level of inflation. They assess that the growth falls sharply during discrete high inflation crisis, above than 40 percent, and recovers after inflation falls. Their empirical analysis shows
that there exists a temporal negative relationship between these two variables beyond 40 percent threshold level. They conclude that there is no permanent damage to economic growth due to discrete high inflation crisis.

Sarel (1996) explores the possibility of non-linear effects of inflation on economic growth and finds a significant structural break which occurs at annual average 8 percent inflation rate, in the function that relates economic growth to inflation. His results show that below that structural break, inflation has slightly positive effect on growth but after 8 percent inflation rate, it has powerful negative effect on growth. These results have been found by using OLS technique after constructing a joint panel database by collecting annual information of 87 countries for the period 1970-1990.

Using the annual time series data for the period 1971-1995, Khan and Qasim (1996) estimate the key determinants of inflation in Pakistan. They disaggregate inflation into food and non-food inflation and suggest a strong role of money supply in accelerating inflation in Pakistan. Other factors causing inflation, investigated by the researchers, are currency devaluation, value addition in agriculture sector, support price of wheat, import prices and price of electricity.

Short-run consequences of rapid disinflation are addressed by Ghosh and Phillips (1998), and find that 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. They find 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.

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.

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 Sidrauskis’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.

Using co-integration and error correction models, Malik and Chowdhury (2001) finds a long-run positive relationship between GDP growth rate and inflation for four South Asian countries. Supporting the Structuralists’ view, their results also suggest that
moderate inflation is helpful to growth and faster economic growth feeds back into inflation. Thus the authors recommend moderate inflation for growth of the economies of Bangladesh, India, Pakistan and Sri Lanka.

Khan and Senhadji (2001) examine threshold effects of inflation on growth separately for industrial and developing countries. The data set covers 140 countries from both groups and non-linear least squares (NLLS) and conditional least squares methods are used. The empirical results verify the existence of a threshold beyond which inflation exerts a negative effect on growth. Significant thresholds at 1-3 percent and 11-12 percent inflation levels for industrialized and developing countries have been found. The view of low inflation for sustainable growth is strongly supported by this study.

Gillman, Harris and Matyas (2002) present an econometric model with the feature of the inflation rate reducing the return to capital, by taking two samples of OECD and APEC member countries over the years 1961-1997. Inflation rate is included as central variable and the theory is related with the concept of equilibrium along the balanced growth path that is implicitly includes transitional approaches to the balanced growth rate. The results, consistent with Khan and Senhadji (2000), show that the effective is negative and significant at low inflation rates for the OECD. When inflation rate going from 0-10 percent range to a 0-5 percent range, the negative coefficient nearly doubles in magnitude and remains highly significant.

Gokal and Hanif (2004) review several different economic theories to develop consensus on the inflation and growth relationship for the economy of Fiji. Their 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.

Ahmed and Mortaza (2005) explore the relationship between real GDP and CPI and find threshold at 6 percent level of inflation for the economy of Bangladesh. The empirical evidence demonstrates that their exists a statistically significant long-run negative relationship between these two variables.

Mubarik (2005) estimates the threshold level of inflation in Pakistan using annual data for the period 1973 to 2000. The empirical results from his study suggest 9 percent threshold level of inflation for the economy of Pakistan, above which inflation is very unfavorable for economic growth. The study follows the work of Khan and Senhadji (2001) in which they calculate threshold level for both the developing, including Pakistan, and developed economies. They use panel data for 140 developing and developed economies for the period 1960 to 1998 and suggest threshold levels, 1-3 percent and 7-11 percent, for both group of countries respectively.
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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 percent threshold level for Pakistan appears to be on the very high side. He also follows 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) construct 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. They examine 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. Their estimated results suggest 5 percent inflation target for sustained economic growth and macroeconomic stability for the economy.

Kemal (2006) finds that 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. This study contradicts with Hussain (2005) as its results imply that inflation in Pakistan is a monetary phenomenon.

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), they find an 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 statistical significant positive relationship between inflation rate and growth.

III. Objectives of the Study
Keeping in view the above presented research, we classify the following study objectives:

i) The major objective of the present study is to analyze the impact of inflation on GDP growth in Pakistan. It is to evaluate the GDP growth performance and to assess the historical trends of the inflation in Pakistan

ii) To determine and examine the feasible threshold level of inflation for GDP growth. It is needed to explore if the inflation in the time-series caused to reduce the growth of the economy or not.

iii) To state the policy implications, keeping in view the statistical significance of the estimated results about inflation and growth relationship and its effects on the economy of Pakistan.

IV. The Structure and Trends of Inflation and Growth in Pakistan
Much of the inflation in Pakistan is caused by the increase in food prices. It might be due to less productivity of agriculture sector or could be the result of 'so called'
shortage of goods and services in the economy developed by manufacturing sector’s “giants”. Several supply side and demand side factors could also be responsible for the increase in inflation in Pakistan. Inflation could be the result of shocks to the supply of certain food items and to world oil markets. In addition, fluctuating oil prices in world market could also be, due to rigid wage and price structure, another cause of rise in general price level of almost all other commodities.

Rising import prices also considered one important factor affecting the inflation. Depreciating exchange rate in this scenario can also put upward pressure on price level. Similarly, some people blamed indirect taxes for being the main cause of inflation. Wheat support price has also been estimated as an important determinant of inflation in Pakistan. Inflation, result of any factor, hurts the poor more since more than half of the budget of the low income persons is spent for food. It also redistributes income from fixed income earners to owners of assets and earners of large and variable income, such as profits (Hasan et al. 1995 and, Khan and Qasim 1996). Excess money supply is the main factor responsible for inflation in the long run, however at the same time, other factors; including structural problems also influence the rate of inflation (Khan and Schimmelpfennig, 2006). This discussion indicates that inflation and different sectors of the economy of Pakistan are inter-related with each other. Inflation may cause to increase the productivity of the economy, but at the same time, hyper inflation hurts the growth of all the sectors of Economy.

In this section, we are interested to examine the historical trends of inflation and GDP growth rate during the study period. A number of severe fluctuations have been observed in CPI inflation and GDP growth rate for the economy of Pakistan during the period 1972-73 to 2009-10. Negative growth rate of GDP has not been observed in any fiscal year, whereas we are, at the same time, unable to declare it as a steady growth rate for the economy.

**Figure 1 Trends in GDP Growth in Relation to CPI Inflation in Pakistan**

![Graph showing trends in GDP Growth in Relation to CPI Inflation in Pakistan](image)
The trends presented in figure 1 show that GDP growth rate and CPI inflation are negatively correlated with each other. GDP growth rate went down as the inflation in economy crossed the double-digit figure. Maximum GDP growth rate 8.7 percent had been observed during the fiscal year 1984-85, when the corresponding CPI inflation rate was at of 5.7 percent level. It is also shown that the minimum GDP growth rate remained 1.2 percent during FY 2008-2009 with significantly high inflation rate of 20.8 percent. This situation depicts that inflation and GDP growth rates are having negative association with each other. In subsequent sections, we will develop a model with the help of econometric techniques, by using the data for this period to verify and to estimate this relation with some other important explanatory variables.

V. Data and Methodology

An adequate source of the data and construction of variables are necessary not only for empirical analysis but also for the validity of the research. A number of studies regarding inflation and growth have been undertaking during the last five decades to assess the impact of inflation on growth. OLS estimation technique has been used in most of the studies to analyze this relationship; whereas the sources of data were primarily based on secondary data. The methodology and variables for the present study have been selected keeping in view their relative importance on theoretical and empirical basis. It is also attempted to include the variables which mostly determine the level and rate of growth in the economy of Pakistan. The choice of variables is consistent with the choice made by other researchers (Sarel 1996, Bruno and Easterly 1996, Ghosh and Phillips 1998, Khan and Senhadji, 2001, Mubarik 2005, Hussain 2005, Li 2006).

The data for this study are taken from Pakistan Economic Survey (various issues), Ministry of Finance, Fifty Year Economy of Pakistan (SBP) and World Bank Quick Query selected from World Development Indicators. Data are ranging from 1972-73 to 2009-10 and consists of wide range of important variables which explain their relationship with CPI inflation to affect the growth of the economy.

VI. Econometric Specification

In order to examine the impact of inflation on GDP growth, we have specified following two econometric equations. These equations have been estimated by employing the method of Ordinary Least Squares (OLS). Regression errors in equations of these models have been tested for autocorrelation with the help of Durban Watson (DW) test statistic. All results have been arranged in Table 3.

\[
GDP_{t} = \beta_{0} + \beta_{1}CINF_{t} + \beta_{2}OPNS_{t} + \beta_{3}INVG_{t} + \beta_{4}LFPR_{t} + \beta_{5}LPOPOM_{t} + \epsilon_{t}
\]

(Equation – 1)

\[
GDP_{t} = \gamma_{0} + \gamma_{1}CINF_{t} + \gamma_{2}OPNS_{t} + \gamma_{3}INVG_{t} + \gamma_{4}LFPR_{t} + \gamma_{5}LPOPOM_{t} + \gamma_{6}INF_{t} + \mu_{t}
\]

(Equation – 2)

Where;

GDPG = Gross Domestic Product Growth
CINF = CPI Inflation
OPNS = Trade Openness
INVG = Investment Growth Rate
LFPR  =  Labor Force Participation Rate  
LPOPM  =  Log of Population in Millions  
INF7  =  Inflation Level ≤ 7 Percent as Dummy Variable  
       [1 = Inflation Level ≤ 7 Percent, 0= Otherwise]  
ε , μ =  Error Terms  

and  
\[ \beta_2, \beta_3, \gamma_2, \gamma_3, \gamma_4, \gamma_5 > 0 \]  
\[ \beta_0, \beta_1, \gamma_0, \gamma_1, \gamma_5 < 0 \]  

VII. Results and Discussions  
A). Elementary Data Analysis  
Elementary data analysis performs an important role in the understanding of the study. It helps the researcher and the viewer to prepare their minds for further explanation of the econometric analysis of the specified model of the study.

Table 1 shows that the mean value of GDP growth (GDPG) is 5.17 which is an encouraging indicator for the developing economy of Pakistan. The maximum growth rate has been observed at the level 8.7 percent and the minimum level remained at 1.2 percent. The standard deviation is calculated at the level 1.97 which is the sign that there are fewer deviations from the average value of GDPG.

If we look at the values of CPI inflation, it has some different results from GDP growth. It has mean value less than median value which indicates that the distribution of CPI inflation is positively skewed; it is also supported by the positive measures of skewness. These descriptive statistics explain that the distribution of CPI inflation is not symmetrical. Standard deviation, 5.85, of CPI inflation indicates that there is huge dispersion in the data supported by the high value of measure of kurtosis 6.80 indicating that the distribution of the CPI inflation values is leptokurtic. The maximum value that CPI inflation attained is 30 percent, with a minimum value of 3.10. This shows that the range of CPI inflation is having large dispersion in the data.

Table 1  Descriptive Statistics of the Variables Regarding GDP Growth and CPI Inflation in Pakistan

<table>
<thead>
<tr>
<th>Variable</th>
<th>GDPG</th>
<th>CINF</th>
<th>OPNS</th>
<th>INVG</th>
<th>LFPR</th>
<th>LPOPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>5.17</td>
<td>9.71</td>
<td>0.31</td>
<td>16.24</td>
<td>29.68</td>
<td>4.70</td>
</tr>
<tr>
<td>Median</td>
<td>5.15</td>
<td>9.50</td>
<td>0.31</td>
<td>12.80</td>
<td>29.60</td>
<td>4.74</td>
</tr>
<tr>
<td>Maximum</td>
<td>8.70</td>
<td>30.00</td>
<td>0.37</td>
<td>56.90</td>
<td>32.80</td>
<td>5.11</td>
</tr>
<tr>
<td>Minimum</td>
<td>1.20</td>
<td>3.10</td>
<td>0.25</td>
<td>-3.60</td>
<td>27.50</td>
<td>4.19</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>1.97</td>
<td>5.77</td>
<td>0.03</td>
<td>12.14</td>
<td>1.37</td>
<td>0.28</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.15</td>
<td>1.85</td>
<td>-0.07</td>
<td>1.62</td>
<td>0.63</td>
<td>-0.25</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.11</td>
<td>6.99</td>
<td>2.68</td>
<td>5.88</td>
<td>3.08</td>
<td>1.83</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>1.39</td>
<td>46.81</td>
<td>0.19</td>
<td>29.77</td>
<td>2.52</td>
<td>2.59</td>
</tr>
<tr>
<td>Probability</td>
<td>0.50</td>
<td>0.00</td>
<td>0.91</td>
<td>0.00</td>
<td>0.28</td>
<td>0.27</td>
</tr>
<tr>
<td>Observations</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
</tbody>
</table>

Note: All the calculations are carried out by E-views.

Investment in the different sectors of the economy increases the development in the economy. It is very important for the economy to boost it up. The data of the variable
investment growth rate (INVG) shows that overall growth rate of investment remains 16.34 percent on the average. The maximum investment growth rate in the economy remained 56.90 percent. Data also shows that there remained a negative investment growth in the economy at its level of –3.60 percent. The value of standard deviation is high enough at 12.29 percent with a positively skewed distribution. The measure of kurtosis for this variable shows that the distribution of the data is leptokurtic.

To see the impact of population growth on GDP growth of economy, a variable log of population in millions is used in the model. Descriptive statistics of the data indicate that the distribution of population is negatively skewed with extreme values of 4.76 and 5.11. These values of proportionate change of population describes that there are not high variation is the population trend. The value of the measure of kurtosis of proportionate change of population shows that the distribution of this variable is platykurtic having most of the values dispersed around the average.

**Correlation Matrix of the model**

The correlation matrix Table 2 explains the association of GDP growth (GDPG) with some other desired variables. The estimated results are almost according to expectations of the study. Our main focus is on GDPG in relation to other relevant variables. The results of the time series data indicate that GDPG is not correlated at the extreme level with any attempted variable. It means it is not having perfect or zero correlation with the independent variables of the model.

<table>
<thead>
<tr>
<th>Variables</th>
<th>GDPG</th>
<th>CINF</th>
<th>OPNS</th>
<th>INVG</th>
<th>LFPR</th>
<th>LPOPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPG</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CINF</td>
<td>-0.08</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPNS</td>
<td>0.17</td>
<td>-0.16</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INVG</td>
<td>0.18</td>
<td>0.54</td>
<td>-0.27</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFPR</td>
<td>0.06</td>
<td>0.15</td>
<td>-0.51</td>
<td>0.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>LPOPM</td>
<td>-0.31</td>
<td>-0.31</td>
<td>0.17</td>
<td>-0.38</td>
<td>0.08</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: All the calculations are carried out by E-views

The results describe that there is a weak negative association between GDPG and CPI inflation (CINF). This explains that both the variables are depending upon each other in a negative and less sensitive way. Any increase in the CPI inflation has an inverse impact on the GDP growth.

Another negative interdependence has been found between GDPG and proportionate change in the total population of the economy (LPOPM). The result implies that level of negative association between GDPG and LPOPM is moderate. It indicates that any increase in the population will cause GDPG to decrease and vice versa. The remaining explanatory variables are positively correlated with GDPG. The Table: 2 shows that openness (OPNS), investment growth rate (INVG), and labor force participation rate (LFPR) are positively associated with GDPG. LFPR is weakly correlated with GDPG, as the correlation co-efficient between these two variables is just 0.06.
B). Econometric Analysis

The results of the estimated model (Equation 1 and Equation 2) are arranged in Table 3, which explain that our specified model performed quite well in terms of F-statistic. On the basis of our hypothesis that all the variables are jointly significant, the results describe that our model is highly significant. Though the size of $R^2$ is moderate in the present model, but we just not look at the size of $R^2$. It is a co-efficient of determination that explains how much linear relationship has the dependent variable with independent variables. The value of $R^2$ in Equation 1 is 0.33, which explains that 33 percent variations in the GDP growth are explained by the attempted independent variables, whereas its value is 0.35 in Equation 2. These moderate values of $R^2$ also show that none of the independent variables is highly correlated with the GDP growth variable (GDPG). Thus there are no chances of multicollinearity to be presented in the model. If the DW-statistic is considered, the value of it does not fall in the rejection region/critical region. In this case DW-statistic has a value that is within the acceptance range. Thus we can accept the null hypothesis that autocorrelation is absent from the regression errors.

Now, coming to the behavior of individual regression co-efficients, we find that the estimated co-efficients are according to the theory. The negative intercept in the GDP growth function indicates that controlling all the independent variables in the model, as the level of CPI inflation rises; it impacts the GDP growth in the negative way as predicted by the theories. Our estimated model shows that, fixation of these independent variables to zero will harm the GDP growth. Analyzing the regression co-efficients individually, the results indicate that the co-efficient of CPI inflation is negative and significant at 5 percent level. This shows that 1 percentage increase in CPI inflation will cause about 0.13 percentage point decrease in GDP growth of the economy.

Table 3 Parameter Estimates of Estimated GDP Growth Model (Dependent Variable is GDP Growth Rate)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Equation (1)</th>
<th>Equation (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-9.054 (-0.841)</td>
<td>-13.07 (-1.126)</td>
</tr>
<tr>
<td>CPI Inflation (CINF)</td>
<td>-0.130 (-2.152)**</td>
<td>-0.099 (-1.435)</td>
</tr>
<tr>
<td>Trade Openness (OPNS)</td>
<td>33.840 (2.664)*</td>
<td>37.732 (2.818)*</td>
</tr>
<tr>
<td>Investment Growth (INVG)</td>
<td>0.059</td>
<td>0.065</td>
</tr>
<tr>
<td>Labor Force Participation Rate (LFPR)</td>
<td>(1.982)**</td>
<td>(2.122)**</td>
</tr>
<tr>
<td>Log of Population in Millions (LPOPM)</td>
<td>-2.784</td>
<td>-2.826</td>
</tr>
<tr>
<td>Dummy Variable for Inflation ≤ 7 Percent (INF7)</td>
<td>-2.482*</td>
<td>(-2.512)*</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.579 0.659</td>
<td>0.579 0.659</td>
</tr>
<tr>
<td>Adjusted R-Squared</td>
<td>0.33 0.35</td>
<td>0.33 0.35</td>
</tr>
<tr>
<td>D W Statistic</td>
<td>1.97 1.94</td>
<td>1.97 1.94</td>
</tr>
<tr>
<td>Sample Size</td>
<td>38 38</td>
<td>38 38</td>
</tr>
</tbody>
</table>

Note: The t-Statistics (in Parenthesis) significant at 1% and 5% levels are indicated by *, ** respectively. All the estimations are carried out by E-views 3.1 (Quantitative Micro Software).

Thus we accept the null hypothesis that CPI inflation has a negative impact on GDP growth. This result is in support with the estimated results of Fischer (1979), Gosh
and Phillips (1998) and Faria and Carneiro (2001), while Sidrauski (1967) and Malik and Chowdhury (2001) estimated the opposite result for these two variables.

Trade openness plays a significant role to promote GDP growth as was hypothesized in our analysis. The co-efficient of the variable trade openness (OPNS) discloses the fact that it has a positive significant impact on GDPG. The co-efficient is significant at 1 percent level, so we accept the hypothesis that an increase in the trade openness increases the GDP growth. The co-efficient of trade openness is high, indicating that a 1 percent change in trade openness will bring about 33.8 percent positive changes in GDP growth. This result is reconciled with Gosh and Phillips (1998). As far as the investment growth variable (INVG) is concerned, its coefficient has very low value and significant at 5 percent level. The co-efficient of investment growth rate indicates that GDPG is less sensitive to change in investment growth but has positive impact on GDPG. Mubarik (2005) also estimated similar results for investment growth. A hundred percent change in investment growth brings just only 5.9 percent change in GDPG.

Labor force participation rate (LFPR) has higher magnitude of sensitivity than investment growth rate; both the variables have same level of significance. The co-efficient of LFPR explains that about 10 percent change in labor force participation rate has about 5.8 percent positive impact on GDP growth. Another explanatory variable, the log of population in millions is included in the model to see its impact on GDPG. This variable brought highly significant result in the model as per expectations. In the study log of population in million has been taken just to rescale the variable. The result explains that level of population in Pakistan has very significant and sensitive relation with GDPG. About 1 percentage point increase in the population cause to decreases the GDP growth by 2.78 percentage points. This result is also significant at 1 percent level. This result is in consistent with Sarel (1996) and contradicts with Mubarik (2005) and Hussain (2005).

Now another explanatory variable (INF7) is introduced in the model (Equation 2) to analyze the impact of inflation on economic growth. In order to find an optimal and feasible threshold level of inflation for growth, we have taken this dummy variable of inflation less than or equal to 7 percent levels of inflation. The positive impact of this variable has been assumed on the growth of GDP. It is also assumed that the sum of squared residuals on this level of inflation is minimized in this estimated equation. INF7 is a dummy variable which states the condition ‘1’ for inflation below or equal to 7 percent level and ‘0’ for the condition when inflation in the economy exceeds the 7 percent level.

The results of the econometric equation 2 are described in table 3 which implies that all other explanatory variables respond in the same manner as in equation 1, except the CINF. If we consider this level of inflation as a threshold for the economy, our results reveal the fact that up-to a certain level (7 percent in this model), inflation causes GDP growth to increase in the economy. This result is found statistically insignificant but the positive co-efficient shows its positive association with GDPG. The value of R² is also increased from 0.33 to 0.35, but the negative impact of CINF has not been found significant in the whole time-series.
VIII. Conclusion and Policy Recommendations

This study has been an attempt to examine the inflationary situation in Pakistan with special focus on its impact on GDP growth. The second object is to re-examine the existence of inflation growth relationship in the economy of Pakistan. Our focus is on the basic question of whether the negative inflation-growth relationship exists in the economy or the situation is something else? The analysis has been made on the basis of annual time-series data for the period 1972-73 to 2009-10. This study employs simple descriptive statistics and regression analysis to perform the task.

The findings of the study are evidence to conclude that the trade-off between inflation and GDP growth has been found for the studied time-series data. Inflation in the economy of Pakistan is harmful for the growth of GDP. This statistically significant result indicates that persistent increase in the general price level hurts the economic growth. The study also finds the feasible threshold level of inflation which causes to reduce the growth of GDP. This threshold has been found at the level of 7 percent of inflation. Inflation below this level brings positive impact to the economic growth. But after this level it seriously hurts the growth of the economy of Pakistan.

On the basis of this study, it can be recommended to keep the inflation below the level of 7 percent in the economy. Therefore, the policy makers and the State Bank of Pakistan should concentrate on those options which keep the inflation rate stable and below the level which has been found helpful for the achievement of sustainable economic growth. Moderate and stable inflation is also helpful for minimizing the fluctuations and uncertainties in the financial sector of economy, which, in turn, boost the capital formation activities in the country. So that it may exert its positive effects on the economy. So, maintaining price stability will ultimately be the best policy recommendation to stable and sustained economic growth of the economy.

References


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