

Does Growth Led Inflation Hypothesis & Locus Critique Exist in Pakistan? A Time Series Study

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Abstract: The impact of economic growth, international trade, unemployment and money supply on inflation has been subject to a long debate both in developing and developed countries. The advocates of economic growth, international trade and easy monetary policy are of the view that inflation increases because of increase in the economic growth, international trade and money supply. However, the existing literature sheds light on the inverse relationship between unemployment and inflation. Therefore, this article investigates the impact of economic growth, trade liberalization, unemployment and broad money supply on inflation for Pakistan for the data set from 1976-2010. This present study applies Augmented Dicky Fuller (ADF) and Phillip Perron (P-P) tests to investigate unit root problem, Autoregressive Distributed Lag Model (ARDL bounds testing approach) to test existence of co-integration among inflation and its factors, Fully Modified Ordinary Least Square Method (FMOLS) to compute long run dynamics, Error Correction Mechanism (ECM) to examine short run dynamics and Granger Causality Test to explore the direction of causality among the variables of this study. The empirical results demonstrate that only growth led inflation hypothesis works in long run, whereas, trade and unemployment led inflation hypothesis works for Pakistan both in long run and short run time spans. Economic growth and inflation have trade off in short run but money supply and inflation have trade off both in short run and in long run time spans. It is also evident that there exists unidirectional relationship that runs from economic growth to inflation; from trade to economic growth and from economic growth to money supply in the short run, but, money supply and inflation have bidirectional relationship between them in short run. Besides this, the study finds the existence of long run causality among inflation and its factors. Moreover, it is concluded that there prevails joint causality among inflation, economic growth, unemployment and money supply in Pakistan.

Key words: Pakistan • Inflation • Economic Growth • International Trade • Stagflation • Causality and Proportionality Thesis

INTRODUCTION

Policy of a country aims to achieve sustainable economic growth accompanied by price stability. Therefore, fiscal policy should be aligned with productivity growth and monetary policy with price stability. It is difficult for policy makers to maintain sustainable economic growth and price stability simultaneously. If a country experiences high economic growth, it is likely that there would be more demand for goods and services in the economy. Therefore, it would

shift the aggregate demand curve to the right whereas short run aggregate supply can't respond immediately to the change creating inflation. Hence, the higher the GDP is, the greater would be the demand for goods and services and the more the demand for goods and services, the higher would be the distortions into the overall price level. That simply elevates inflation into the country.

This study is designed to scrutinize the relationship among inflation, economic growth, trade, unemployment and money supply for the period of 1976-2010 for Pakistan. Different studies have conducted to explore

the relationship between inflation and many other macroeconomic variables for different countries. Many studies are conducted for the case of Pakistan and they provide different results which are discussed in the second section of the present study. Pakistan is a country who is facing many challenges; as political instability is at its peak in Pakistan; there is absence of governance in the country; confidence, coordination and connectivity among institutions are extremely poor in Pakistan and security conditions are getting worse off day by day. Consequently; macroeconomic indicators such as inflation; trade, economic growth, unemployment, money supply etc are exposing miserable performance in Pakistan.

The overall inflation during the fiscal year 2010-2011 stood at about 13% as reported by State Bank of Pakistan [1-4]. Fiscal year 2009-10 reports 11.73% consumer price index (CPI) and it is higher than its fiscal target of 10%; but, it is less than the targeted level of 12% of central bank. Trade in Pakistan is expanding but balance of trade is representing huge gap of \$3.946 billion for the year 2010 between the exports and imports in Pakistan. However; this deficit came down from \$9.261 billion as a consequence to the tight commercial policy of increasing tariff rates from the range of (20-25)% to the range of (30-35)% on the 300 luxury items during the year 2008.

It is anticipated that Pakistan will achieve 3.9% growth rate during the year 2012 as per reported by World Bank [5] into its report. This growth rate is slightly above than the growth rate (2.4%) of last year. Pakistan experienced unemployment rate 6.5% during the year 2007 which increased to 7.5% during the year 2008. Human Development Report [6] on South Asia reveals that labour force in Pakistan is growing at annual growth rate of 2.4% and unemployment is increasing at the pace of 6% per annum. Fiscal year 2010-11 reveals that monetary authority injected money into the economy by 14.26% or Rs 823.997 billion. Among one of the major reasons of expansion in monetary sector is government huge borrowings to finance its deficit which is around Rs. 800 billion during the first quarter of the July-September, of the year 2012. The expansion in the monetary sector is not even bringing any positive movement in the economy.

The results of this study have important implications for the policy makers regarding the nature of relationship among inflation; unemployment, economic growth, trade and broad money supply. Therefore, it is imperative for the monetary authority to circulate such an amount of money supply into the economy which would be helpful to achieve stable price level in the country. Also, growth

rate must be aimed at the level by the fiscal players which do not harm price stability. There will be rare economies almost all across the world where rate of unemployment approaches to zero. No economy can avoid unemployment; but, it is a real challenge for the policy makers to formulate such a policy which keeps unemployment level up to the level which stabilizes price mechanism and also stops inflation to its lowest level. Moreover, trade policy must be designed in such a way that exports may arise whereas imports of consumer goods may restrict. Since imports of consumer goods are increasing in the country which are ultimately putting pressure on the inflation.

Review of the Literature: The existing literature provides both theoretical and empirical aspects of the possible changes which exist in inflation because of change in the economic growth, international trade, unemployment and money supply. The present study is aimed at exploring the link between inflation and GDP per capita; inflation and volume of trade as share of GDP, inflation and unemployment and finally inflation and money supply in Pakistan for the period of 1976 to 2010. Literature on the link between inflation and the factors that are responsible in bringing change into inflation has been investigated by different researchers in different time in different context. A brief review of some of the researches on the link between inflation and the factors determining inflation are given as below:

Determinants of inflation in Tanzania were investigated by Laryea and Sumaila [7] by applying ordinary least square technique on quarterly based data from 1992 to 1998. Their findings enumerated that consumer price index changes positively because of change in exchange rate and money supply; whereas, it was evidenced that GDP had an adverse impact on consumer price index. The factors that influence food inflation in Pakistan were scrutinized by Abdullah and Kalim [8] by applying Johansen Maximum Likelihood Approach for Co-integration and Ordinary Least Square for long run dynamics and Error Correction Mechanism for short run dynamics on the time series data ranges from 1972-2008. They found that food inflation and its determinants such as money supply; GDP per capita, food exports, food imports and agriculture support price were positively linked to each other.

Mosayed and Mohammad [9] tested the impact of indicators of inflation on inflation by applying Autoregressive and distributed lag (ARDL) model for the period of 1971-2006 for the case of Iran. They concluded

that prices in Iran had direct relationship with their indicators such as money supply; GDP, exchange rate, foreign price level and domestic price level. Khan and Gill [10] conducted a research in which they had tested the strength of relationship between determinants of inflation and different proxies for inflation such as consumer price index (CPI), wholesale price index (WPI), sensitive price index (SPI) and gross domestic product (GDP) deflator by using ordinary least square (OLS) method for the time period of 1971-2005. The study found that interest rate had an adverse impact on inflation; whereas other determinants of inflation such as exchange rate, budget deficit, Imports, wheat support price, Support price of sugarcane and cotton and money supply had positive impact on inflation in Pakistan.

The link between inflation and its indicators were empirically examined by Abidemi and Malik [11] by using Johansen Co-integration for estimating long run relationship among the running actors of the study and to estimate short run dynamics they applied error correction mechanism approach on the time series data ranged from 1970-2007 for the case of Nigeria. They came up with the evidence that exchange rate and fiscal imbalance were inversely connected with inflation but indicators like money supply; GDP growth rate, volume of imports, interest rate and 1st lag of inflation were found in bringing positive hike to inflation in Nigeria.

Chen, Gentle and Upadhyaya [12] diagnosed the trade off between inflation and unemployment by using Auto Regressive Distributed Lag Model for the period of 1961 to 2005 in the United Kingdom. The study concluded that the existence of Phillip's curve is possible only if real interest is considered into the estimated model otherwise model would lead to the problem of misspecification. Hussain, Farooq and Akram [13] conducted a study to explore the significance of monetary and cost push factors for inflation by using Ordinary Least Square Method for the period of 1971-72 to 2006-07. They concluded that the role of monetary and cost push factors of inflation can not be ignored while considering demand pull factors of inflation. They added that monetary factors of inflation were significantly contributing towards inflation in Pakistan. Finally, they suggested that the inflation in Pakistan could be achieved because of the active role of the government. As far as

trade off between unemployment and inflation is concerned there are different views; some researches validate the co-existence of unemployment and inflation in negative direction but some researches deny this fact. Inflation and unemployment does not have any trade off as explored by Friedman [14] and Phelps [15]. Lucas [16] enumerated the simultaneous existence of both inflation and unemployment. This situation is referred as Lucas Critique. This proposition was investigated by Alogoskoufis and Smith [17] and they came up with conclusion that Lucas Critique does exist and hence there does not prevail an inverse relation between inflation and unemployment. Masso and Staehr [18] found an insignificant relation between rate of inflation and rate of unemployment by applying dynamic panel model.

Data Source and Methodological Framework: Section 3-describes that which sources are used to collect data and what technique is applied to estimate empirical results for the present study?

Data Source: The data¹ for CPI (Annual%) as proxy for Inflation, Volume of Trade as Percentage of GDP, Real Per capita GDP, Unemployment² as Percentage of Labour Force and Real Money Supply (M2/CPI) as share of GDP is taken as proxy for money supply is obtained from the World Development Indicator [19], World Bank for the time span from 1976 to 2010.

Methodological Framework: Present study aims to investigate the following model:

$$P_t = \alpha_C + \alpha_{G_t} G_t + \alpha_{T_t} T_t + \alpha_{U_t} U_t + \alpha_{M_t} M_t + \mu_t \quad (3.1)$$

Whereas,

P_t = CPI (Proxy for Inflation)

G_t = Real GDP Per capita

T_t = Trade as Share of GDP

U_t = Unemployment as share of Labor Force.

M_t = Monetary Asset as share of GDP
(Proxy for money supply)

Method to Estimate Results: Unit Root problem is investigated by applying two unit root tests such as Phillips-Perron [20] and Augmented Dicky Fuller [21]

¹ The data on all the variables is available on the special request from the authors.

² The data on Unemployment starts from 1980 to 2009. We have generated values for unemployment from 1976 to 1979 and 2009 to 2010 based on the formula. Also, some observations were missing in between the data; those were also generated by the author by following the formula.

tests; besides this, Lag Length is found by Microfit automatically, afterwards, the existence of co-integration among the running actors of the present study is scrutinized by using Autoregressive Distributed Lag Model [22]³ bounds testing approach and finally, the results for long run and short run dynamics are computed by applying Fully Modified Ordinary Least Square (FMOLS) Method and Unrestricted Vector Error Correction Method (UVECM) respectively.

The unit root problem is estimated with P-P [20] test by applying the following equation:

$$\Delta P_t = \beta_0 D_t + \pi P_{t-1} + u_t \quad (3.2)$$

The problem of unit root is inspected with ADF [21] test by following the equation 3.3:

$$\Delta P_t = \sum_{i=1}^{p-1} \Pi_i \Delta P_{t-i} + \Delta P_{t-k} + \alpha_1 + \mu_t \quad (3.3)$$

The existence of Long run relationship among inflation, GDP per capita, volume of trade, unemployment and money supply is estimated by using ARDL bounds testing approach [22]. This approach is more reliable when sample size is small; and when order of integration of the variables is mixed such as I(0) and I(1). The existence of co-integration is estimated by following the equations from 3.4 to 3.8.

$$\begin{aligned} \Delta P_t = & \alpha_C + \alpha_{11} P_{t-1} + \alpha_{12} G_{t-1} + \alpha_{13} T_{t-1} + \alpha_{14} U_{t-1} + \alpha_{15} M_{t-1} + \\ & \beta_{11} \sum_{i=1}^p \Delta P_{t-i} + \beta_{12} \sum_{i=0}^p \Delta G_{t-i} + \beta_{13} \sum_{i=0}^p \Delta L T_{t-i} + \beta_{14} \sum_{i=0}^p \Delta L U_{t-i} + \beta_{15} \sum_{i=0}^p \Delta M_{t-i} + \eta_1 \end{aligned} \quad (3.4)$$

$$\begin{aligned} \Delta G_t = & \alpha_C + \alpha_{21} P_{t-1} + \alpha_{22} G_{t-1} + \alpha_{23} T_{t-1} + \alpha_{24} U_{t-1} + \alpha_{25} M_{t-1} + \\ & \beta_{21} \sum_{i=0}^p \Delta P_{t-i} + \beta_{22} \sum_{i=1}^p \Delta G_{t-i} + \beta_{23} \sum_{i=0}^p \Delta T_{t-i} + \beta_{24} \sum_{i=0}^p \Delta U_{t-i} + \beta_{25} \sum_{i=0}^p \Delta M_{t-i} + \eta_2 \end{aligned} \quad (3.5)$$

$$\begin{aligned} \Delta T_t = & \alpha_C + \alpha_{31} P_{t-1} + \alpha_{32} G_{t-1} + \alpha_{33} T_{t-1} + \alpha_{34} U_{t-1} + \alpha_{35} M_{t-1} + \\ & \beta_{31} \sum_{i=0}^p \Delta P_{t-i} + \beta_{32} \sum_{i=0}^p \Delta G_{t-i} + \beta_{33} \sum_{i=1}^p \Delta T_{t-i} + \beta_{34} \sum_{i=0}^p \Delta U_{t-i} + \beta_{35} \sum_{i=0}^p \Delta M_{t-i} + \eta_3 \end{aligned} \quad (3.6)$$

$$\begin{aligned} \Delta U_t = & \alpha_C + \alpha_{41} P_{t-1} + \alpha_{42} G_{t-1} + \alpha_{43} T_{t-1} + \alpha_{44} U_{t-1} + \alpha_{45} M_{t-1} + \\ & \beta_{41} \sum_{i=0}^p \Delta P_{t-i} + \beta_{42} \sum_{i=0}^p \Delta G_{t-i} + \beta_{43} \sum_{i=0}^p \Delta T_{t-i} + \beta_{44} \sum_{i=1}^p \Delta U_{t-i} + \beta_{45} \sum_{i=0}^p \Delta M_{t-i} + \eta_4 \end{aligned} \quad (3.7)$$

$$\begin{aligned} \Delta M_t = & \alpha_C + \alpha_{51} P_{t-1} + \alpha_{52} G_{t-1} + \alpha_{53} T_{t-1} + \alpha_{54} U_{t-1} + \alpha_{55} M_{t-1} + \\ & \beta_{51} \sum_{i=0}^p \Delta P_{t-i} + \beta_{52} \sum_{i=0}^p \Delta G_{t-i} + \beta_{53} \sum_{i=0}^p \Delta T_{t-i} + \beta_{54} \sum_{i=0}^p \Delta U_{t-i} + \beta_{55} \sum_{i=1}^p \Delta M_{t-i} + \eta_5 \end{aligned} \quad (3.8)$$

The equations from 3.9 to 3.13 are developed to estimate short run dynamics and these are given as below:

$$\Delta P_t = \beta_C + \beta_{11} \sum_{i=1}^p \Delta P_{t-i} + \beta_{12} \sum_{i=0}^p \Delta G_{t-i} + \beta_{13} \sum_{i=0}^p \Delta T_{t-i} + \beta_{14} \sum_{i=0}^p \Delta U_{t-i} + \beta_{15} \sum_{i=0}^p \Delta M_{t-i} + \gamma_{11} ECM_{t-1} + \varepsilon_1 \quad (3.9)$$

$$\Delta G_t = \beta_C + \beta_{21} \sum_{i=0}^p \Delta P_{t-i} + \beta_{22} \sum_{i=1}^p \Delta G_{t-i} + \beta_{23} \sum_{i=0}^p \Delta T_{t-i} + \beta_{24} \sum_{i=0}^p \Delta U_{t-i} + \beta_{25} \sum_{i=0}^p \Delta M_{t-i} + \gamma_{21} ECM_{t-1} + \varepsilon_2 \quad (3.10)$$

³ Results for ARDL Bounds Testing Approach are obtained by using Demo Version of Microfit 5.0 developed by Bahram Pesaran and M. Hashem Pesaran [22].

$$\Delta T_t = \alpha_C + \beta_{31} \sum_{i=0}^p \Delta P_{t-i} + \beta_{32} \sum_{i=0}^p \Delta G_{t-i} + \beta_{33} \sum_{i=1}^p \Delta T_{t-i} + \beta_{34} \sum_{i=0}^p \Delta U_{t-i} + \beta_{35} \sum_{i=0}^p \Delta M_{t-i} + \gamma_{31} ECM_{t-1} + \varepsilon_3 \quad (3.11)$$

$$\Delta U_t = \beta_C + \beta_{41} \sum_{i=0}^p \Delta P_{t-i} + \beta_{42} \sum_{i=0}^p \Delta G_{t-i} + \beta_{43} \sum_{i=0}^p \Delta T_{t-i} + \beta_{44} \sum_{i=1}^p \Delta U_{t-i} + \beta_{45} \sum_{i=0}^p \Delta M_{t-i} + \gamma_{41} ECM_{t-1} + \varepsilon_4 \quad (3.12)$$

$$\Delta M_t = \beta_C + \beta_{51} \sum_{i=0}^p \Delta P_{t-i} + \beta_{52} \sum_{i=0}^p \Delta G_{t-i} + \beta_{53} \sum_{i=0}^p \Delta T_{t-i} + \beta_{54} \sum_{i=0}^p \Delta U_{t-i} + \beta_{55} \sum_{i=1}^p \Delta M_{t-i} + \gamma_{51} ECM_{t-1} + \varepsilon_5 \quad (3.13)$$

Variables and Their Explanation

Inflation: Inflation has remained among key macroeconomic indicators of all the economies especially, Pakistan. It has an inverse relation with the purchasing power; as it increases, it declines the purchasing power and hence reduces overall demand in the country. The present study uses CPI (annual percentage) as proxy for inflation. The present study is aimed at finding the link between inflation and international trade; inflation and unemployment, inflation and economic growth and finally inflation and money supply for the period of 1976 to 2010.

Per Capita Gross Domestic Product: The present study uses per capita real GDP as proxy for economic growth. It is obtained by taking the ratio of Real GDP to the total Population. Economic growth represents the size of the economy. If economic growth expands; it indicates that an economy is widening in terms of its size. Theoretically; it is observed that there exists positive relation between economic growth and inflation. Therefore, present study is aimed at investigating the link between inflation and economic growth in Pakistan for the period of 1976-2010.

Trade as Share of GDP: Trade as share of GDP is obtained by dividing the volume of trade on Real GDP. As far as volume of trade is concerned, it is taken by adding volume of exports and volume of imports. It is expected that expansion in volume of trade as percentage of Real GDP will boost up inflation in Pakistan for the period of 1976-2010.

Unemployment: Unemployment rate is obtained by dividing Total Numbers of Unemployed Workers on Total Labour Force. Unemployment is another major macroeconomic problem in Pakistan. This variable is incorporated in the present study to investigate whether there exists trade off or no trade off or positive relation between inflation and unemployment in case of Pakistan for the period of 1976-2010.

Real Money Supply as Share of GDP: Real money supply as percentage of GDP is taken by dividing Real money supply on Real GDP. According to causality and proportionality thesis proposed by classical school of thought that; if money supply increases it also expands inflation in the country and vice versa. This variable is incorporated in the present study to empirically test that whether money supply led inflation hypothesis exists in Pakistan or there is trade off between money supply and inflation in Pakistan for the period of 1976-2010.

Empirical Estimation and Interpretation of the Results:

Table-4.1 exposes the descriptive statistics and coefficient of correlation matrix.

Table-4.1 summarizes that the data series is normally distributed. Table-4.2 is computed to detect the unit root problem in the data series. The problem of unit root is investigated by using two unit root estimators such as Philip and Perron [20] and Augmented Dicky Fuller test [21]. Computed results are given as below:

Table-4.2 has diagnosed that there prevails mixed order of integration such as $I(0)$ and $I(1)$ for the data series this article. Pesaran *et al.* [22] suggested that ARDL bounds testing approach is more suitable to inspect the co-integration among the operating variables if the data series reports mixed order of integration such as $I(0)$ and $I(1)$. Table-4.3 reports the estimated results of ARDL bounds testing approach and it is given as below:

Table-4.3 reveals that Wald Statistics is greater than the upper critical bound in model no. 1; model no. 2 and model no. 5. Therefore; there exists long run relationship among the inflation, GDP per capita, trade, unemployment and money supply in case of Pakistan for the period of 1976-2010. Besides Table-4.3; the long run and short run dynamics are estimated in Table-4.4 by using equations from 3.4 to 3.8 and from 3.9 to 3.13 respectively.

Table-4.4 reveals the long run and short run dynamics for the present study respectively. It is evidenced that growth led inflation hypothesis

Table 4.1: Descriptive Statistics and Correlation Matrix

	P_t	G_t	T_t	U_t	M_t
Mean	8.777141	24080.84	33.82795	4.821743	4.372844
Median	8.094066	24831.13	34.24202	4.300000	2.029588
Maximum	20.90451	34588.90	43.24486	8.643900	18.39324
Minimum	2.914135	15282.39	27.74585	2.550000	0.172764
Std. Dev.	4.245930	5527.219	3.369045	1.695903	4.530736
Skewness	1.016096	0.177246	0.659220	0.690523	1.402690
Kurtosis	4.197487	2.212256	3.918237	2.431855	4.264830
Jarque-Bera	8.345667	1.119309	3.872166	3.345113	14.20492
Probability	0.015409	0.571407	0.144268	0.187766	0.000823
P_t	1.000000				
G_t	0.105015	1.000000			
T_t	0.239421	-0.322237	1.000000		
U_t	-0.244072	0.630929	-0.309003	1.000000	
M_t	-0.410417	0.637462	-0.342170	0.845129	1.000000

Table 4.2: Unit Root Test (P-P Test & ADF Test)

Variables	P-P-TEST At Level		ADF-TEST At Level	
	t-Value	Prob. Value	t-Value	Prob. Value
P_t	-4.375295	0.0014	-2.069620	0.2575
G_t	0.589086	0.9874	0.355859	0.9779
T_t	-2.771737	0.0727	-3.071756	0.0384
U_t	-1.648175	0.4480	-1.483411	0.5298
M_t	-1.615739	0.4641	-1.484119	0.5294
Variables	P-P-TEST At First Difference		ADF-TEST At First Difference	
	t-Value	Prob. Value	t-Value	Prob. Value
ΔP_t	-9.587488	0.0000	-4.996442	0.0003
ΔG_t	-4.008939	0.0039	-3.136559	0.0335
ΔT_t	-5.829559	0.0000	-5.335486	0.0001
ΔU_t	-6.576254	0.0000	-4.170017	0.0026
ΔM_t	-6.846983	0.0000	-4.536525	0.0010

*MacKinnon [23] one-sided p-values.

Table 4.3: Ardl Bounds Testing Approach to Co-integration

Estimated Models	$P_t = f(G_t, T_t, U_t, M_t)$	$G_t = f(T_t, U_t, P_t, M_t)$	$T_t = f(U_t, G_t, P_t, M_t)$	$U_t = f(T_t, G_t, P_t, M_t)$	$M_t = f(P_t, G_t, T_t, U_t)$
Optimal lags	(1,1,0,0,1)	(1,0,1,0,0)	(1,0,0,0,0)	(1,1,0,1,1)	(1,1,0,1,1)
F-statistics	13.9864*	0.74373	2.4667	4.7506*	4.8090*
W-statistics	69.9321*	3.7187	12.3335	23.7529*	24.0451*
	Critical Bounds For F-Statistics			Critical Bounds For W-Statistics	
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Significance Level	Lower Critical Bound		Upper Critical Bound	Lower Critical Bound	Upper Critical Bound
5 per cent	3.2802		4.5773	16.4008	22.8863
10 per cent	2.6967		3.8965	13.4836	19.4827
	DIAGNOSTIC TESTS				
R^2	0.7569	0.99386	0.42411	0.86658	0.89500
Adjusted - R^2	0.6939	0.99254	0.32482	0.82552	0.86269
F-statistics	12.0089*	754.8251*	4.2713**	21.1084*	7.7019*
Breusch Godfrey LM Test	0.0668 [0.798]	1.1152 [0.300]	1.6753 [0.206]	3.0656 [0.092]	0.69830 [0.411]
Hetero-skedasticity Test	0.7128 [0.405]	1.1992 [0.281]	1.4325 [0.240]	0.12070 [0.730]	28.2846 [0.000]
Ramsey RESET	10.9892 [0.003]	1.0496 [0.315]	0.6753 [0.418]	0.23866 [0.629]	14.4387 [0.001]

Note: * & ** show significant at 5% & 10% level respectively. We have used critical bounds developed by Narayan [24] for W-Statistics.

Table 4.4: Long Run & Short Run Dynamics by Using Ardl Bounds Testing Approach

Estimated Long Run Coefficients using the ARDL Approach				
Dependent Variable: p_t				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
G_t	0.67184	0.1235	5.4412	0.000
T_t	0.40174	0.15790	2.5443	0.017
U_t	0.31626	0.5344	0.5918	0.559
M_t	-0.6959	0.2202	-3.1603	0.004
C	-18.5292	6.7052	-2.7634	0.010
Error Correction Representation for the Selected ARDL Model				
Dependent Variable: ΔP_t				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔG_t	-1.3354	0.8146E-3	-1.6393	0.112
ΔT_t	0.3087	0.1158	2.6657	0.012
ΔU_t	0.2431	0.4128	0.5888	0.561
ΔM_t	-0.9430	0.1752	-5.3811	0.000
ecm_{t-1}	-0.7685	0.1084	-7.090	0.000
R-squared	0.7982	Mean dependent variable		-0.20067
Adjusted R-squared	0.7459	S.D. dependent variable		4.1227
S.E. of regression	2.0783	Akaike info criterion		-78.7252
Sum squared resid	116.6188	Schwarz criterion		-84.9466
Log likelihood	-70.7252	Durbin-Watson stat		1.8524
F-statistic	21.3582	Prob. (F-statistic)		0.000

significantly works for Pakistan only in long run but in short run economic growth and inflation have insignificant trade off. It means that inflation is long run phenomenon if it is linked with economic growth. This evidence is more consistent with Abdullah and Kalim [8]; Mosayed and Mohammad [9] and Abidemi and Malik [11].

It is also found that as international trade increases in Pakistan; it is significantly giving upward hike to inflation both in long run and short run respectively. It is found that trade led inflation hypothesis does exist in Pakistan both in long run and short run respectively.

Also, the empirical findings disclose that unemployment and inflation do not have any trade off in case of Pakistan for both long run and short run respectively. This means that there is no evidence of Phillip's curve [25; 26] in case of Pakistan. Rather, Pakistan is experiencing stagflation which represents simultaneous increase in unemployment and inflation for both long run and short run respectively. However, this positive relationship between unemployment and inflation is insignificantly observed for case of Pakistan both in long run and short run respectively. It validates the findings of Phelps [15]; Friedman [14], Lucas [16] and Alogoskoufis and Smith [17].

Moreover; it has found that money supply and inflation have significant trade off in case of Pakistan for both long run and short run respectively. Also, it has

investigated that the causality thesis of classical school of thought does inversely exist in Pakistan, which means that change in money supply inversely changes inflation. As far as proportionality thesis is concerned; it does not hold completely, rather it prevails partially for both time spans.

Bannerjee; Dolado and Mestre [27] examined that the negative and significant coefficient of the error correction term during its first lag brings long run stability after correcting short run fluctuations. It is found that the coefficient of the lag term of error correction [$ecm_{(t-1)} = -0.7685(0.000)$] is negative and significant. This demonstrates that disequilibrium in inflation will be corrected 76 percent each year and ultimately it converges to long run equilibrium. The pace of adjustment is very strong as reported in Table-4.4. It takes almost $1.3012 = [1/0.7685]$ years to achieve long run and stable equilibrium. Finally, Table-4.5 reports the Granger Causality Test [28] which is applied to investigate the existence of direction of causality among the running actors of the study in short run; in long run and both in short run and long run spans of time. The results are given as below:

Table-4.5 diagnoses that there exists unidirectional relationship from economic growth to inflation; from trade to economic growth and from economic growth to money supply in the short run. However, money supply and inflation has bidirectional relationship between them in

Table 4.5: Granger Causality Test

Dependent variable	Granger Causality Test					Long-run
	Short-run					
	ΔP_t	ΔG_t	ΔT_t	ΔU_t	ΔM_t	ECM_{t-1}
	F-statistics [p-values]					[t-statistics] (p-value)
ΔP_t	–	3.420838 -0.05	0.435934 -0.6519	1.346875 -0.2798	16.08917 0	-0.386453 [-1.868237] -0.0745 -0.259573
ΔG_t	1.119074 -0.3437	–	2.938805 -0.073	1.814936 -0.1854	1.167327 -0.329	[-1.062092] -0.2992 -0.596343
ΔT_t	2.363626 -0.1165	0.506973 -0.6089	–	2.167555 -0.1373	2.249501 -0.1282	[-2.664765] -0.0138 -0.035186
ΔU_t	0.489047 -0.6194	0.35412 -0.7056	0.1056 -0.9002	–	0.780673 -0.4699	[-1.011923] -0.3221 -0.452955
ΔM_t	9.755768 -0.0009	2.574181 -0.098	0.541415 -0.5892	1.449551 -0.2553	–	[-2.052144] -0.0517
Joint Short and Long Run Granger Causality						
	F-statistics [p-values]					
	$\Delta P_t, ECM_{t-1}$	$\Delta G_t, ECM_{t-1}$	$\Delta T_t, ECM_{t-1}$	$\Delta U_t, ECM_{t-1}$	$\Delta M_t, ECM_{t-1}$	
ΔP_t	–	3.993174 -0.02	1.687565 -0.1975	3.515192 -0.0312	11.17892 -0.0001	
ΔG_t	1.632201 -0.2094	–	3.652066 -0.0274	2.630282 -0.0743	0.868436 -0.4716	
ΔT_t	4.297872 -0.0151	4.835643 -0.0094	–	4.162704 -0.0171	4.183496 -0.0168	
ΔU_t	0.78744 -0.5132	0.544889 -0.6565	0.505609 -0.6822	–	1.18799 -0.3362	
ΔM_t	11.18311 -0.0001	2.323006 -0.1016	2.215321 -0.1136	3.111869 -0.0461	–	

short run. It is also found that there does not exist long run causality in model no. 2 $G_t = f(T_t, U_t, P_t, M_t)$ and in model no. 4 $U_t = f(T_t, G_t, P_t, M_t)$. Finally, Table-4.5 also explores that in model no. 1 $P_t = f(G_t, T_t, U_t, M_t)$, there does exist joint causality among inflation, economic growth, unemployment and money supply; in model no. 2 $G_t = f(T_t, U_t, P_t, M_t)$, there is evidence of joint causality among economic growth, trade and unemployment, in model no. 3 $T_t = f(U_t, G_t, P_t, M_t)$, it is found that there exists joint granger causality among all the actors of the model. Also, the model no. 5 $M_t = f(P_t, G_t, T_t, U_t)$, reports the existence of joint causality among money supply, inflation and unemployment in Pakistan.

CONCLUSION

The contribution of this study is to examine the relationship among inflation, economic growth, international trade, unemployment and money supply in

Pakistan for the period of 1976-2010. It is concluded that growth led inflation hypothesis works for Pakistan in long run but in short run there is trade off between economic growth and inflation in Pakistan. It is further evident that trade led inflation hypothesis does exist in Pakistan both in long run and short run respectively. It is also evident that unemployment and inflation are directly connected to each other, therefore, there is no evidence of Phillip's curve in case of Pakistan, rather, there prevails stagflation. Additionally, the findings disclose that there exists an inverse relationship between money supply and inflation both in long run and short run respectively. It means that causality thesis of classical school of thought does exist but inversely and as far as proportionality thesis is concerned, it does not hold completely, rather it prevails partially for both time spans.

Finally, it has investigated that there exists unidirectional relationship which runs from economic growth to inflation; from trade to economic growth and

from economic growth to money supply in the short run, but, money supply and inflation have bidirectional relationship between them in short run. It is also found that there exists long run causality in case of model no. 1 $P_t = f(G_t, T_t, U_t, M_t)$, model no. 3 $T_t = f(U_t, G_t, P_t, M_t)$ and model no. 5 $M_t = f(P_t, G_t, T_t, U_t)$. It is also concluded that there prevails joint causality among inflation, economic growth, unemployment and money supply in model no. 1 $P_t = f(G_t, T_t, U_t, M_t)$; there exists joint causality among economic growth, trade and unemployment in model no. 2 $G_t = f(T_t, U_t, P_t, M_t)$, further it is found that there exists joint causality among all the actors in model no. 3 $T_t = f(U_t, G_t, P_t, M_t)$ and last but not the least, there is an evidence of joint causality among money supply, inflation and unemployment in model no. 5 $M_t = f(P_t, G_t, T_t, U_t)$, in Pakistan.

Policy Implications: The literature sheds light on the significance of inflation that it should be treated as cancer rather to be treated as flue. Pakistan is an under developing country. Cutting down inflation is not the solution. According to Robert Lucas; making policy in an uncertain world is not an easy job for the policy makers. Also, whenever policy is formulated, do consider the rational expectations of the people. As a result, the sacrifice ratio will come down and policy will be suitable to achieve its desirable results. In the light of present study, we suggest following policy implications:

- This study shows direct relation between economic growth and inflation in Pakistan. The impact of economic growth is quite strong after the impact of money supply on inflation; this means that if economic growth is required to be increased by 1% then as a result the cost of rising inflation will be 0.67184% in long run but in short run economic growth has an adverse impact on inflation. Therefore; policy advisors may design policies for both short run and long run time spans separately but such policies should be aimed at reducing sacrifice ratio in case of Pakistan (cost of rising inflation < gain in GDP growth).
- The advocates of trade liberalization are of the view that it increases inflation and this study validates the view point of the advocates of international trade for a case of Pakistan. There are two reasons for this positive impact of international trade on inflation. First, the exports of food items at cheap rates without meeting domestic demand and imports of same items at expensive rates. Consequently, inflation is

increasing. Second, the increase in international trade is the increase in the imports as compare to increase in exports. Due to which; overall demand for imports is increasing and as a result, inflation is rising. Therefore, the present study suggests that per annum aggregate demand of food items must be estimated firstly, then government must put quota on the exports of food items to abroad while keeping its per annum demand into its mind. This could meet the over burdened demand for food items in the country and as a result price mechanism may remains stable in the country. On the other side government must put restrictions both tariff and non-tariff barriers on the imports of luxury items for all the classes inclusive elite and politicians. This will bring overall prices at its normal level. As a result, inflation will be controlled.

- The results of present study report positive relationship between unemployment and inflation. In Pakistan; unemployment is increasing because of increase in power sector crises, terrorism, instable political environment and because of increase in the Population. All these factors are ultimately putting pressure on both cost of production and aggregate demand in the country. As a result; inflation is increasing in Pakistan. Therefore; on the one side, unemployment has to be controlled by shifting paradigm from hardware approach to software approach. It means that government must increase its development expenditures on the training and development of the rising population and unskilled insiders and outsiders and introducing them with latest research and scientific tools, so that they could be able to meet the challenges of the dynamic and volatile behaviour of the economy. Therefore; the skilled and trained labour force may contribute to rapid up the pace of economic growth. As a result, rise in purchasing power may offset the worse effects of inflation from the country.
- It is evident in Pakistan that terrorism and instable political system are among the mainstream reasons of capital flight from Pakistan. Also, the printing of new notes by the State bank to finance fiscal deficit on the special request of the government and legislation made by the parliament regarding printing of new notes are not actually expanding productive activities in the country. The core reason is that the rise in the money supply remains in the hands of politicians and it does not go into the active hands; therefore, monetary policy is not completely achieving its

targets and hence, overall economy is in crunch. To come out from this lurch; money market has to be channelized in such a way that the curse of inflation is removed from the country like Pakistan.

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