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INFLATION AND ECONOMIC GROWTH IN SEVEN SOUTH ASIAN COUNTRIES: EVIDENCE FROM PANEL DATA ANALYSIS

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ABSTRACT

This paper examined the relationship between inflation and GDP growth for Seven South Asian countries. Comparison of empirical evidence is obtained from the panel data analysis. The study used the annual data for the period of 1980 to 2013 which is collected from World Economic Outlook (WEO). The study found that there is a negative relationship exists between inflation and economic growth for the Seven South Asian countries. The Pedronic cointegration result suggests that there is long run relationship exist between inflation and economic growth for the South Asian countries. The panel causality test reveals that there is a unidirectional causality between CPI and GDP in the context of all the seven South Asian countries.

KEY WORDS: *Inflation, Growth, Panel cointegration, South Asian, Causality.*

1. INTRODUCTION

The primary objective of macroeconomic policies is to attain high and sustainable output growth rates coupled with low and stable inflation rates (Kan and Omay, 2010). Implying that a certain magnitude of inflation is necessary to “grease the wheels” of the economy (Temple, 2000). Therefore, policy makers find it important to understand this relationship in order to ensure

sound policy making if inflation is detrimental to economic growth. This states that policy makers should aim for low rates of inflation.

The common objective of macroeconomic policy is a low inflation rate, which usually creates a conducive environment for rapid economic growth. Low inflation may facilitate economic

growth by encouraging capital accumulation and increasing price flexibility. However, macroeconomic stability defined as a low inflation rate is necessary, but not sufficient condition for sustained economic growth. The study analyses the inflation growth relationship in the BRICS countries. The importance of investigating the inflation growth nexus in this region stems from the notion that the member states are striving towards common goals and therefore are likely to pursue similar macroeconomic policies.

2. REVIEW OF LITERATURE

Gylfason, et al (2001) studied to investigate the cross country link between inflation and growth. This study has dealt with cross country analysis for 170 developing and developed countries. The study used annual data series covering the frequency from 1960-1992. The study has employed simple regression techniques in order to determine the link between inflation and growth. The empirical findings suggest that the cross country links between inflation and growth are economically and statistically significant and robust.

Valdovinos, et al (2003) Studied to examine the growth rate of the economy and the level of inflation from a non-structural, low frequency point of view. The study has used annual data for the eight Latin American countries covering the period from 1970-2000. The study employed spectral analysis to examine the growth inflation levels. The empirical findings of the study emphasized that the average long run rate of inflation in a country is negatively associated with the countries long run rate of growth.

Gokal, et al (2004) attempted to investigate the meaningful relationship between inflation and growth in Fiji. The study used the annual data from the period 1970-2003. The study employed the econometric techniques like Unit Root Test

(ADF, PP) and Granger Causality. The study found that there exists a weak negative correlation between inflation and growth.

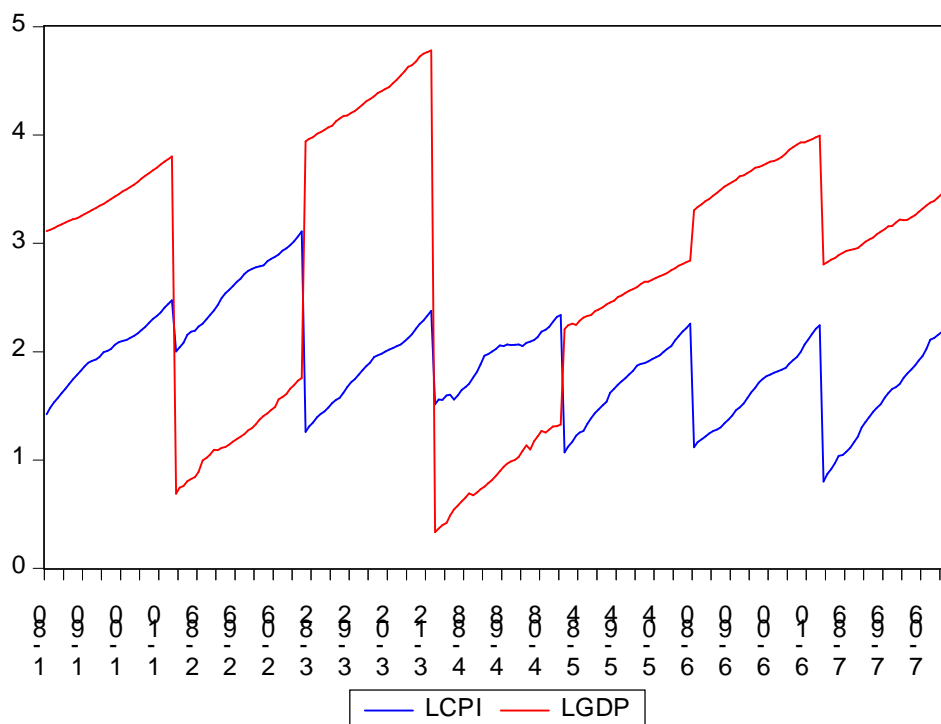
Kin, et al (2005) studied the long run and the short run relationship between inflation and financial development using the sample of 87 countries. The study used annual data for the period 1960-2005. The study employed pooled mean group estimator of Pesoran, Shin and Smith (1999) to unbalanced panel data. The study empirically found that there is a negative long run relationship between inflation and financial development coexists with a positive short run relationship.

3. DATA AND METHODOLOGY

This study uses the CPI data as a proxy for inflation and GDP as an indicator of economic growth for the period of 1980 to 2013. The data were collected from the World Economic Outlook (WEO) and they were converted into their natural log values. The study employed panel unit root test to examine the unit root properties of the data. The present study indicates four alternative which are meant for testing unit root in heterogeneous panel, proposed by Peasaran and Shin (IPS, 2003), Levin, Lin and Chu (LLC, 2002), Fisher-Augmented Dickey Fuller (Fisher-ADF) and Fisher- Phillip- Perron (Fisher-PP) tests proposed by Maddala and Wu (1999) and Chai (2001) respectively. These tests are chosen especially for the reason that they accommodate individual member specific unit root process unlike other unit root tests that assume common unit root processes. Moreover, the study also employed pedroni cointegration test to find out the long run relationship between the two variables. The study also used Granger causality test in order to find the causal relationship between inflation and economic growth for the countries.

4. THE EMPIRICAL RESULTS

Graph- (Figure-1) Inflation Growth Relationship in the South Asian Countries



4.1 Descriptive Statistics:-

The objective of the descriptive statistics is to summarize sample, rather than use that data to learn about the population that the sample of the data is thought to represent. The use of summary and descriptive statistics has an extensive history and indeed, the sample tabulation of population and of economic data was the first way the topic of statistics appeared more recently, a collection and summarization techniques has been formulated under the heading of exploratory data analysis.

(Table-1): Descriptive Statistics

	LCPI	LGDP
Mean	1.89	2.74
Median	1.91	3.11
Maximum	3.10	4.78
Minimum	0.79	0.33
Std. Dev.	0.45	1.21
Skewness	0.20	-0.41
Kurtosis	2.96	1.96
Jarque-Bera	1.70	17.60
Probability	0.42	0.00
Sum	451.57	653.02
Sum Sq. Dev.	49.60	349.69

The Table-1 depicts that an average inflation rate in the South Asian countries around 1.89 percent and economic growth rate was 2.74 percent. The minimum growth rate was 0.33 from 1980 to 2013 along with minimum inflation rate were 0.79 percent during the study period. The table also reveals that skewness for GDP is negative that is -0.41.

4.2 Correlation Result:-

(Table-2): Correlation Result

	LCPI	LGDP
LCPI	1	
LGDP	-0.25	1

The Table-2 represents correlation between the variables. The result shows that there is a negative correlation between inflation and economic growth. Therefore, the primary inspection of the data reveals that there is an indeed an existence of negative correlation between inflation and economic growth for the South Asian countries.

4.3 Unit Root Test:-

Testing for cointegration involves examination of the unit root properties of the data because the variable must be integrated of the same order. The present study indicates four alternatives which are meant for testing unit roots in the panel data proposed by Pesaran and Shin (IPS, 2003), Levin, Lin and Chu (LLC, 2002), Fisher-Augmented Dicky Fuller (Fisher-ADF) and Fisher-Phillip-Perron (Fisher-pp) tests proposed by Maddala and Wu (1999) and Chai (2001) respectively.

The specification concerning LLC, Fisher-ADF, Fisher-PP and IPS test will have consisted of three specifications: individual intercept, Individual intercept and trend and none. The statistics chosen unit root tests to test the null hypothesis the variables (Table-3A and 3B) are nonstationary at its level. Whereas, all the variables are stationary at its first difference, Thus, the unit root test statistics presented in the following table indicates that all the four tests reject the null hypothesis for the all variables, hence, the unit root test follows I (1) process.

(Table-3A): Unit Root Test

Variable	LLC-Test				Fisher-ADF			
	Level		First Difference		Level		First Difference	
	c	c&t	c	c&t	c	c&t	c	c&t
CPI	-0.91 (0.18)	0.04 (0.51)	-2.66 (0.00)	-1.76 (0.03)	2.88 (0.99)	0.64 (0.74)	-4.05 (0.00)	-2.34 (0.00)
GDP	2.12 (0.98)	-0.64 (0.25)	-5.31 (0.00)	-6.12 (0.00)	4.60 (1.00)	1.26 (0.89)	-6.46 (0.00)	-6.25 (0.00)

(Table-3B)

Variable	Fisher-PP Test				IPS-Test			
	Level		First Difference		Level		First Difference	
	c	c&t	c	c&t	c	c&t	c	c&t
CPI	1.11 (0.86)	0.42 (0.66)	-6.64 (0.00)	-5.16 (0.00)	2.82 (0.99)	0.62 (0.73)	-3.93 (0.00)	-2.20 (0.01)
GDP	4.08 (1.00)	1.34 (0.91)	-8.47 (0.00)	-8.54 (0.00)	4.91 (1.00)	1.20 (0.88)	-7.13 (0.00)	-6.99 (0.00)

(Note: Numbers in parenthesis are p-values.)

Thus, the evidence regarding unit root largely indicate that all the variables are integrated of order series one; hence we can proceed to test for cointegration among the variables. In the cointegration test for the purpose of interpretation, we consider the panel-ADF and the Group- ADF tests statistics to test for the cointegration among the variables.

4.4 Panel Cointegration Result:-

In this study we use the econometric method proposed by Pedroni (1999, 2004) which is meant for testing cointegration among a set of variables using panel data. This test is an extension of Engal and Granger (1987) two step residual based procedure for testing the null

hypothesis of no cointegration in the case of heterogeneous panel. The major advantage of this test is that it allows for individual member specific fixed effects, deterministic trends and slope co-efficient. The major approach proposed by Pedroni (1999) involves the following steps. In this case, a panel regression of inflation on economic growth of the following forms is estimated.

$$GDP_{i,t} = \alpha_i + \beta_{1i} INF_{it} + e_{it} \dots\dots\dots (1)$$

Where, i=1,2,3, ..., N; N is the number of cross sectional units; t=1,2,3,....,T; T is the time period: β_i is the slope coefficients: α_i is the number of specific intercept. The variables in the equation (1) are integrated of same order and said to be cointegrated if e_{it} is stationary process;

hence testing for cointegration between GDP and INF involves testing for stationarity of e_{it} . The stationarity of the residuals from equation (1) can be tested by estimating the following auxiliary regression.

$$e_{it} = \rho_i e_{it-1} + u_{it} \dots \dots \dots (2)$$

The null hypothesis $\rho_i = 1$ implies that e_{it} has unit root, hence accepting the null hypothesis of no-cointegration. In order to test the null hypothesis of no-cointegration, Pedroni (1999) proposes two different set of statistics, namely, the within dimension statistics and the between dimension statistics. Within dimension statistics are also known as panel co-integration statistics and between dimension statistics as group mean panel cointegration statistics. There are seven test statistics of which, panel variance, pane Rho, panel PP and panel ADF statistics are within dimension statistics, while group Rho, Group PP and group ADF statistics are between dimension statistics.

Although the null hypothesis is the same, the alternative hypothesis is, however, different for the two sets of statistics. The null hypothesis relating to within dimension statistics is defined as $\rho_i = 1$ for all i against the alternative of $\rho_i < 1$ for all i . The alternative hypothesis implies that there is cointegration among the variables of all the members of the panel. The null hypothesis pertaining to between dimension statistics is defined as $\rho_i = 1$ for all i against the alternative of $\rho_i < 1$ for all i . In this case unlike within dimension statistics, a common value for ρ_i is not assumed. Thus, the alternative hypothesis implies that cointegration exists for at least one individual member of the panel. The between dimension of the statistics, therefore, allows to model on traditional sources of potential heterogeneity across individual member of the panel.

Table-4: Panel cointegration Test

Panel Cointegration Result: CPI GDP
(Null Hypothesis: H_0 : no cointegration)

Test Statistics	S ₁	S ₂	S ₃
Within Dimension Statistics			
Panel-v	-1.76(0.96)	1.36(0.08)	3.38 (0.00)
Panel Rho	0.40 (0.67)	0.39(0.34)	0.45(0.67)
Panel PP	-0.02 (0.26)	-0.85(0.19)	-0.39(0.34)
Panel ADF	0.02 (0.73)	-0.59(0.27)	-0.37(0.35)
Between Dimension Statistics			
Group Rho	2.49 (0.99)	0.84(0.80)	1.70 (0.00)
Group PP	0.13 (0.55)	-0.11(0.45)	0.95(0.83)
Group ADF	2.59 (0.99)	-0.20 (0.41)	0.80 (0.78)

(Note- In parenthesis is p-values, S₁-refers to the specification without intercept and trend, S₂ refers to the specification with intercept, and S₃ refers to the specification with intercept and trend.)

Panel-v and Group Rho statistics in (Table-4) indicates that the null of no cointegration between CPI and GDP is rejected. Thus the test statistics consistently conform the existence of long run equilibrium relationship between economic growth and inflation. Since there is cointegration between inflation and economic growth it is worth examining the long run cointegration parameter of the model.

4.5 Panel Granger Causality Test:-

(Table-5): Panel Granger Causality Test

Null Hypothesis	obs.	F-statistics	Prob.
LGDP does not Granger cause LCPI	224	0.37248	0.6895
LCPI does not Granger cause LGDP		4.84896	0.0087

The (table-5) indicates that the panel Granger Causality test between GDP and CPI. The test suggest that the null hypothesis can be rejected in case of LCPI does not Granger cause LGDP at 1percent significance level.

5. CONCLUDING REMARKS

In this study we have investigated the inflation growth nexus in the context of South Asian countries. The result of the study indicates that there is a negative correlation between inflation and economic growth. Therefore, the primary inspection of the data reveals that there is indeed an existence of negative correlation between inflation and economic growth for the South Asian countries. The unit root result of the



study reveals that all the variables are non-stationary at their respective levels whereas, all the variables are stationary in the first difference with order of integration I(1). The panel cointegration result suggests that Panel-v and Group Rho statistics indicates that the null of no cointegration between CPI and GDP is rejected. Thus the test statistics consistently conform the existence of long run equilibrium relationship between economic growth and inflation. The panel Granger Causality test reveals that there is a unidirectional causality between CPI and GDP in the context of all the seven South Asian countries. From the above analysis the study concluded that there is a negative relationship exists for all the Seven South Asian countries. As a result of which inflation affects to the growth rate negatively. Moreover, the study also suggests that there is a long run relationship exists between GDP and CPI. The major limitation of the study is that to investigate what is the threshold level of inflation beyond which inflation affects the growth rate negatively. Therefore, the study need further research to examine the optimum threshold level of inflation for the seven South Asian countries. From the policy implication point of view, the study suggest that the South Asian countries Government should keep the inflation rate below which will not hamper the growth rate of the respective countries.

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