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Exploring the Inflation and Economic Growth Link: Evidence from a Panel Data Analysis of South Asian Economies

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ABSTRACT

Purpose: This paper explores the inflation-growth relationship within South Asia. It aims to see the country-wise effects of inflation for Bangladesh, Bhutan, India, Sri Lanka, Nepal, and Pakistan over the period 2000-2019, and specify a threshold of inflation for the sample.

Design/Methodology/Approach: Panel data techniques, including the Levin Lin Chu (LLC) unit root test and fixed effect model, are used to analyze the overall relationship and Ordinary Least Squares (OLS) regression is employed to dissipate the country-wise effects. The study further uses a Dynamic Panel Threshold Model to find a threshold of inflation and a bootstrap test to confirm the nonlinear relationship.

Findings: The study reveals an overall positive relationship between the two key variables. The country-wise results show a positive relationship between inflation and economic growth for Bangladesh, Sri Lanka and Pakistan, and a negative relationship for India, Bhutan, and Nepal. A significant nonlinear relationship is also confirmed over a threshold of 5.80%, beyond which inflation can have adverse effects on economic growth and vice versa.

Originality: This study contributes to existing literature by exploring the country-specific dimensions in the South Asian context. The country-wise analysis of this study is its distinguished feature, as it highlights the cross-country heterogeneities, specifies the nonlinear effects of inflation, and offers insights that can add value to both academics and policy design.

KEYWORDS

South Asia, Inflation,
Economic Growth,
Threshold Effects,
Nonlinear Relationship,
Panel Data Analysis

JEL CLASSIFICATION

E31; O47; O53; C23

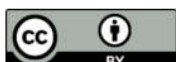
I. Introduction

Inflation and economic growth are two very important macroeconomic variables, and the relationship between the two is a question of great significance, as inflation is a crucial part of the formulation and implementation of monetary policies. While most empirical findings suggest that high rates of inflation are detrimental to economic growth (Tsoukis & Naqvi, 2007; Eggoh & Khan, 2014), they also suggest that up to a certain level, inflation can positively impact the economic growth rate (Khan & Senhadji, 2001;

Espinoza et al., 2012; Behera & Mishra, 2017). The Keynesian framework explains that inflation can be useful for growth when it arises from higher aggregate demand, and it can be impeding when it results from supply shocks (Pollin & Zhu, 2006).

Even though the inflation-growth relationship has been studied for decades, the results are often contradictory. The issue has also received comparatively limited attention in recent years, especially in the context of South Asia, suggesting a gap in the literature that this study seeks to address.

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Firstly, this study aims to investigate the overall relationship between inflation and economic growth for six South Asian countries, namely Bangladesh, India, Bhutan, Nepal, Sri Lanka and Pakistan, over the time period 2000-2019. The pre-COVID period of the study ensures that the effects are analyzed in a stable environment, avoiding shocks from the pandemic that may result in anomalies.

Secondly, this paper takes a distinctive approach and addresses a key gap by examining the potential presence of nonlinearity at the individual country level. Previously, similar studies reported country-specific thresholds of inflation but treated the nonlinear relationship as uniform across the full sample (Vinayagathan, 2013; Khan & Khan, 2018). This country-specific focus not only provides deeper insights into the heterogeneity of the inflation-growth nexus in South Asia but also strengthens the policy relevance of the findings.

Lastly, by applying a threshold model to estimate the inflation threshold for the region as a whole, the study also specifies a significant threshold of inflation, above which it can adversely affect economic growth.

This study employs empirical methods like the fixed effect model, OLS regression and the Dynamic Panel Threshold Model to analyze the inflation-growth relationship and investigate the nonlinearity that leads to a threshold of inflation. The results of this research can be used to make considerations on how macroeconomic policies involving inflation and economic growth in South Asia are to be formulated.

The next sections of the paper are organized as follows: Section 2 explains the previous literature that are coherent with this study followed by Section 3 where the data, descriptive statistics and models specifications are described. Section 4 presents the results of the panel unit root test, regressions, the threshold estimation

and discusses the findings. Finally, Section 5 concludes the study.

II. Literature Review

The existing literature on inflation and economic growth shows that inflation might impact economic growth via its components. It also reveals inconsistency in the findings of the relationship between inflation and growth. So, this section is divided into two parts: the first part explains some of the ways in which inflation can affect economic growth, and the second part elaborates on the correlation and thresholds found in previous literature.

How Inflation Affects Economic Growth

Inflation is defined as the increase in price levels across a period and GDP is the sum of all income or all expenditures within an economy over a certain period of time. The national income identity says GDP is the total consumption expenditures, investment expenditures, government expenditures and net exports (exports minus imports) in a year. Although inflation is not a part of this equation, inflation affects almost all components of the aggregate output or economic growth in one way or the other. The findings from relevant literature on the association of inflation and each of the components of GDP are briefly discussed below.

The relationship between inflation and consumption has been well established, and the relationship arises via interest rates. Real interest rates are negatively related to inflation rates in the short run and since the relationship between real interest rate and consumption is negative, it follows from here that inflation and consumption are positively related. Thus, the propensity to consume is directly proportional to the rate of inflation and inversely proportional to the nominal interest rate. Inflation increases consumption at the cost of saving; when inflation increases, the nominal interest rates increase and income (output) increases.

Then, for investment to increase, savings fall and so does the real interest rate. Inflation is sure to affect consumption and unemployment in the short run, regardless of whether there are changes in investment (Gylfason, 1981).

Early studies confirm the long run correlation between inflation and investment. Empirical evidence finds that the long run relationship between inflation and investment are significantly positive (McClain & Nichols, 1993). However, some studies also find that inflation can discourage investors to make investments that take a long time to mature. Similar to the effects on economic growth, inflation also has a nonlinear relationship with investment, which is positive at low levels and negative at higher levels of inflation (Iqbal & Nawaz, 2009).

Inflation can cause structural changes in the economy, which may encourage imports and discourage exports. Hence, inflation tends to reduce diversification and hamper the expansion of exports in the long run (Lovasy, 1962). In a recent study based on India, exports are stated to have a strong causal relationship with inflation, and inflation can lead to higher imports (Sahoo & Sethi, 2020). Studies have often found inflation to negatively affect trade (Afzal et al., 2013, Sahoo & Sethi, 2020); and trade openness or higher trade is suggested to be a measure to control inflation (Jin, 2006). High inflation causes less output to be traded, and trade is more feasible at lower rates of inflation (Lagos & Rocheteau, 2005). Studies have also confirmed an inverse relationship between inflation and openness, which is more robust in the short run than the long run (Afzal et al., 2013).

As discussed above, previous literature finds inflation to evidently affect the components of economic growth, like consumption, investment, and trade. Hence, it can be said that inflation is also likely to affect economic growth through its components.

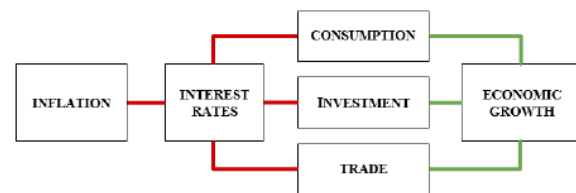


Figure 1. Conceptual Flow Diagram: How Inflation Affects Economic Growth

The flow diagram above shows how the inflation-growth relationship is derived. The inverse relationships are indicated with red connectors and the direct relationships with green connectors.

The next section elaborates on the findings of the previous literature regarding the inflation-growth relationship.

The Relationship between Inflation and Economic Growth

Studies from the early 1990s confirmed a nonlinear relationship between inflation and economic growth (Fischer, 1993; Sarel, 1996). The nonlinear relationship can be explained in various ways. A study on the effect of inflation on endogenous growth concluded that the nonlinear relationship is proportional to the decrease of real interest rates and increase in capital to effective labor rate (Gillman & Kejak, 2005).

The debate over whether the relationship between inflation and output positive or negative divides economists into two camps: structuralists and monetarists. Structuralists believe that inflation is helpful for economic growth, while monetarists believe the opposite (Mallik & Chowdhury, 2001). Some studies also found that low levels of inflation are either positively or insignificantly related to economic growth (Sarel, 1996; Ghosh & Phillips, 1998). However, inflation was always thought to have a negative impact on growth except at very low rates.

There is much disparity as to why higher levels of inflation can have negative impacts on the growth of an economy. In the early 1990s, the negative association found between the two was explained to have arisen from investment such that inflation affects investment and productivity growth and thus high inflation rates are inconsistent with sustained growth (Fischer, 1993). As inflation and economic growth have a negative relationship, some studies thoroughly discuss the negative effects of inflation on growth.

A negative association was proven to exist between inflation and welfare, whereby higher inflation comes with higher price dispersion. This higher dispersion in prices affects consumer welfare because when high rates of inflation persist, there is inefficient allocation of resources. This inefficiency, in turn, holds back the economic growth rate (Peterson & Shi, 2004).

Inflation can also have a negative effect on economic growth via inventories whereby inventories increase as inflation increases and hence the resources available for growth decreases (Tsoukis & Naqvi, 2007). An analysis on developing and developed countries showed that heavy public size amplifies the negative effects of inflation on economic growth (Eggoh & Khan, 2014). This study also states that for open and developed economies, the cost of inflation is high.

Inflation can especially be detrimental to transition economies as inflation causes higher money usage and so the higher the inflation rate, the higher the decrease in growth rate (Gillman & Harris, 2010). Also, when inflation rises, savings are discouraged and there is more speculative asset buying and consumption, which may pull down the growth of the economy (Das & Loxley, 2015).

Inflation also impacts unemployment rates via growth. A study based on Bhutan (Tenzin, 2019) found that higher levels of inflation slow down economic growth,

which can lead to higher levels of unemployment in the long run.

The positive effects of inflation have also been reasoned in the past. Higher inflation was found to be associated with economic growth in a cross-country analysis on lower- and middle-income countries (Pollin & Zhu, 2006). Studies suggest that inflation up to a certain level can trigger output as inflation makes capital easier to hold than money and since real wages become variable, labor markets are made more efficient (Das & Loxley, 2015). The proper estimation of inflation is emphasized because of its implications on medium and short run guides for policy making. Policy makers always refer to inflation rates while formulating monetary policies (Shahiduzzaman, 2009). This is because high inflation aids monetary policy to reduce real interest rates in times of financial crises (Espinoza et al., 2012).

Since there is a broad scholarly consensus that high levels of inflation impede economic growth, economists have been wondering if a threshold exists beyond which the relationship becomes negative. Studies have found threshold levels as low as 1-3% and as high as 15-18%. The threshold for inflation found in the previous literature is unique to each sample. For example, the lower threshold was found for industrial countries (Khan & Senhadji, 2001), and middle-income countries were found to have the highest threshold at 15-18% (Pollin & Zhu, 2006). An early study on a mixed sample of eighty-seven countries (Sarel, 1996) found a threshold level of inflation at 8%. For developing countries, the threshold was found to be between 10-12% (Khan & Senhadji, 2001; Espinoza et al., 2012). Studies on South Asia found thresholds as low as 5.73% (Vinayagathan, 2013) to as high as 11% (Das & Loxley, 2015) with negative effects beyond the threshold, and positive effects below it.

A recent study on the effect of inflation on economic growth and unemployment in

South Asia (Nguyen, 2018) reported a negative long-run association of inflation and economic growth. Another similar study (Khan & Khan, 2018) reported the same results for their sample of five Asian countries.

But, in some studies, a positive relationship was also reported for South Asian countries (Behera, 2014). Other studies mentioned that the inflation and economic growth in South Asia are highly positively correlated up to a threshold (Pollin & Zhu, 2006; Das & Loxley, 2015).

Hence, despite some generalization, there are also disparities in the findings of literature which proves that the exact relationship between inflation and growth is not yet robustly pronounced.

The methods used to find the inflation-growth relationships and inflation thresholds in some of the relevant studies are summarized in Table I. The pooled OLS, fixed effects and random effect models were mostly used to find the correlation between inflation and growth in panel data, but the methods for the threshold estimation were unique to each study.

Table 1. Summary of Literature Review

Author(s)	Sample	Methodology	Results
Muhammad Azam Khan and Saleem Khan (2018)	Bangladesh, Iran, Indonesia, Malaysia, and Pakistan [1973-2016]	Levin, Lin, and Chu (LLC) and Im, Pesaran and Shin (IPS) Panel Root tests, OLS Regression, Fixed and Random effects models	Significant negative relationship between inflation and growth.
Anupam Das and John Loxley (2015)	54 developing countries [1971-2010]	Pooled OLS, Fixed and Random effects models, and turning point to estimate the threshold	Positive relationship up to a threshold: 11% for Asia, 23.5% for Latin America and the Caribbean, 23.6% for Sub Saharan Africa
Thanabalasingam Vinayagathan (2013)	32 Asian Countries [1980-2009]	Dynamic Panel Threshold Model, generalized method of moments (GMM)	Threshold of inflation of 5.43% with higher levels having negative impacts but lower levels have no significant impact.
Robert Pollin and Andong Zhu (2006)	80 countries [1961-2000]	Pooled OLS, between, fixed and random effects models, and turning point to find a threshold	Positive effects up to 15-18%, and negative effects above it.
Mohsin S. Khan and Abdelhak S. Senhadji (2001)	140 developing and industrial countries [1960-1998]	OLS, NLSS fixed effects and RSS models to find the threshold	Thresholds: 1-3% (industrial countries) 11-13% (developing countries) with negative effects beyond the threshold.

Thus, inspired by the studies in the past, this paper attempts to explore the growth-inflation relationship for six countries in South Asia - Bangladesh, Bhutan, India, Sri Lanka, Nepal, and Pakistan and contribute to existing literature by presenting results that are coherent with previous studies using more recent data.

The empirical findings reviewed above suggest that the relationship between inflation and economic growth is complex and potentially nonlinear. While moderate inflation may stimulate output, excessive inflation can undermine growth. Given the diverse economic structures of South Asian countries, it is reasonable to expect that the inflation-growth relationship and its threshold effects may differ across countries. In the context of South Asia, the empirical literature is relatively limited, and the findings remain inconclusive. However, based on the previous findings, we propose the following hypotheses:

H₁: Inflation has a significant positive relationship with economic growth in South Asia.

H₂: The effect of inflation on economic growth differs across individual South Asian countries.

H₃: The relationship between inflation and economic growth is nonlinear.

H₄: There exists a threshold level of inflation, above which inflation negatively affects economic growth.

The next section describes the data used in the study and the empirical methods used to address the research questions.

III. Methodology

Data

The dataset used in the study is a balanced panel for six South Asian countries, namely Bangladesh, India, Bhutan, Nepal, Sri

Lanka, and Pakistan for the years 2000 to 2019.

The threshold model used in the empirical analysis demanded a strongly balanced panel. As such, among the eight countries in South Asia, Afghanistan, and the Maldives were excluded from the analysis due to the unavailability of data.

The dataset was deliberately restricted to these specific years due to the economic disruptions expected during the COVID and post-COVID period. While the pandemic is a profound shock to the world economy, it is an exceptional situation that is atypical from normal business cycles. Hence, this tailored time period ensures that the trends have been observed within a comparatively stable macroeconomic environment, which avoids any short-term anomalies present otherwise.

The variables chosen for the sample follow the national income identity having GDP as a function of consumption, government expenditures, investment, and net exports. Data on the sample is collected for GDP Growth Rate (annual percentage), Final Household Consumption Expenditure (as a percentage of GDP), Gross Capital Formation (as a percentage of GDP), General Government Expenditures (as a percentage of GDP), Exports (as a percentage of GDP), Imports (as a percentage of GDP) and Inflation (in percentage, Consumer Prices) from the World Bank, (World Development Indicators). Net Exports (as a percentage of GDP) was then calculated as the difference between exports and imports.

Previous empirical works used openness or terms of trade and in their models (Iqbal a& Nawaz, 2009; Khan & Senhadji, 2001; Sarel, 1996). In this model, net exports have been used as openness or terms of trade and inflation is added as the key independent variable for the research question. Gross Capital Formation was previously termed gross domestic investment and includes public and private investment, net acquisition of valuables and change in

inventories (Meta Data Glossary, World Bank). Hence, it is the investment component that is part of the expenditure side of GDP. The table below summarizes the variables along with the notations used.

All figures and tables were produced in Microsoft Excel, and all statistical tests and regressions were computed using Stata 14.

Table 2. Variable Descriptions and Notations

Variable	Notation	Source
GDP Growth Rate (annual %)	GDP	
Final Consumption Expenditure (as a % of GDP)	CONS	
Gross Capital Formation (as a % of GDP)	GCF	World Development Indicators, World Bank
General Government Expenditures (as a % of GDP)	GOV	
Net Exports (as a % of GDP)	NX	
Inflation (Consumer Prices, in %)	INF	

The next sub-section describes the dataset, and the descriptive statistics show the trends in the variables.

Descriptive Statistics

The table below summarizes the data for inflation and GDP for all six countries in the sample over the period 2000-2019.

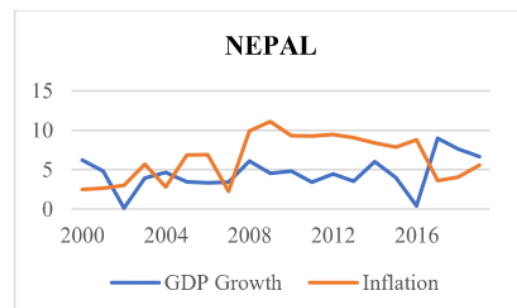
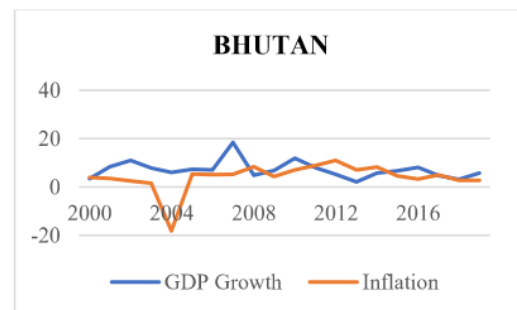
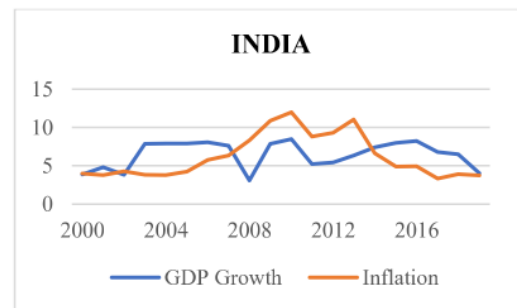
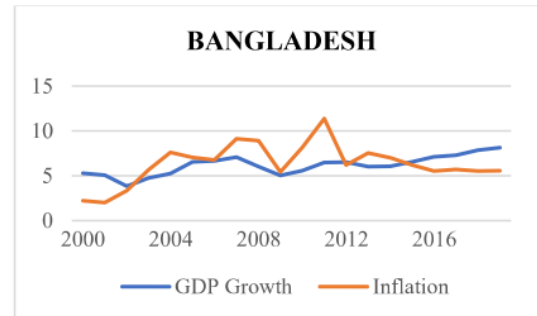
Table 3. Summary of Inflation and GDP for the Sample

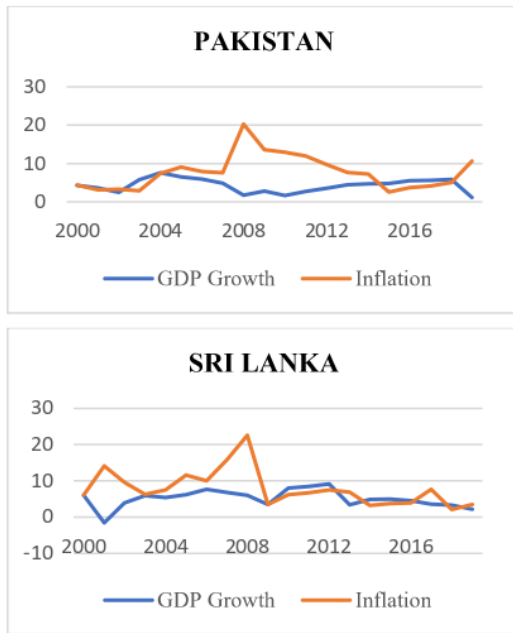
Country	GDP Growth Rate (%)			Inflation, Consumer Prices (%)		
	Min	Mean	Max	Min	Mean	Max
Bangladesh	3.8331	6.1554	8.1527	2.0072	6.3428	11.3952
India	3.0867	6.4730	8.4976	3.3282	6.2016	11.9894
Bhutan	2.1200	7.0949	18.3609	-	4.0887	10.9197
Nepal	0.1202	4.5260	8.9773	2.2692	6.4553	11.0948
Pakistan	1.1447	4.2579	7.5469	2.5293	7.7884	20.2861
Sri Lanka	-	5.1261	9.1446	2.1350	47.9484	22.5645
		1.5454				

Source: Prepared by the authors (2025)

From the table, we can see that the variations in GDP and inflation are the highest for Bhutan, with the highest mean GDP and the lowest inflation among all countries. The lowest average GDP was for Nepal and the highest average inflation was in Sri Lanka. In terms of absolute values also, the highest GDP was in Bhutan while the maximum inflation was in Sri Lanka.

The figures below show the inflation and GDP trends for each country over the period 2000-2019.





It can be seen from the figures that the countries experienced some turmoil in the growth rates of both GDP and inflation. For example, Bhutan experienced negative inflation around 2004 and a peak in GDP in 2007. Similarly, sharp peaks in GDP are also present for Bangladesh and Pakistan, while for India, Nepal, and Sri Lanka, there are peaks that show sharp declines in GDP.

However, it is difficult to establish a clear relationship between inflation and economic growth solely through an analysis of these trends. The next section of the study presents the results from the econometric analysis.

Model Specifications

This study uses a simple regression model used to analyze the relationship between inflation and economic growth for South Asia. This model is used to test the first hypothesis and assess the overall relationship in the panel. The model used is built on the basic national income identity by the expenditure approach which is:

$$GDP = Consumption + Investment + Government Expenditures + Net Exports \quad (1)$$

$$\widehat{Y}_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it} \quad (2)$$

where,

$\widehat{Y}_{it}$ is the dependent variable, GDP, of country 'i' at time 't'

α is the y-intercept (constant term)

X_{nit} are the explanatory (independent) variables - Consumption, Investment, Government Expenditures and Net Exports of country 'i' at time 't'

$\beta_1, \beta_2, \beta_3, \beta_4$ are the parameters or slope coefficients of each explanatory variable

ε_{it} is the error (residual) term country 'i' at time 't'

The variables were tested using the Levin-Lin-Chu (LLC) unit root test to detect non-stationary behavior. This test was done in line with previous works (Khan & Khan, 2018) because macroeconomic variables often show non-stationary behavior and presence of unit root and non-stationarity can lead to spurious regressions. The LLC Unit Root Test for panels is a specific test used to detect non-stationary behavior or presence of unit roots in panel data. The LLC Unit Root test uses an Augmented Dickey-Fuller (ADF) regression for each panel. The test has the null hypothesis that the variable contains a unit root and is non-stationary across all cross sections and the alternative hypothesis that the variable does not contain any unit roots and is stationary across at least one cross section.

H_0 : Panel contains unit root (non-stationary across all cross sections)

H_A : Panel does not contain unit root (stationary across at least one cross section)

Non-stationary variables can be differenced to make them stationary. The test result is detected by checking the p-value whereby

we can reject the null hypothesis at 1%, 5% or 10% significance levels.

The variables consumption and gross capital formation were not stationary at level and so they had to be differenced in order to make them stationary (Table 4 in Section 4.1) and so are denoted as $\delta CONS_{it}$ and δGCF_{it} respectively.

In line with previous empirical works which have incorporated inflation and inflation-squared as independent variables in their estimations to find a nonlinear relationship between inflation and growth (Pollin & Zhu, 2006; Das & Loxley, 2015), the final model incorporates inflation and inflation-squared into Equation (2) to evaluate the second hypothesis. The final equation is a second-degree polynomial regression as follows:

$$\widehat{GDP}_{it} = \alpha + \beta_1 (INF)_{it} + \beta_2 (INF)_{it}^2 + \beta_3 (\delta CONS)_{it} + \beta_4 (\delta GCF)_{it} + \beta_5 (GOV)_{it} + \beta_6 (NX)_{it} + \varepsilon_{it}$$

where,

$\widehat{GDP}_{it}$ = dependent variable, GDP, of country 'i' at time 't'

α = y-intercept (constant term)

INF_{it} = Inflation in country 'i' at time 't'

$(INF)_{it}^2$ = Inflation-squared in country 'i' at time 't'

$\delta CONS_{it}$ = first-difference of Consumption in country 'i' at time 't'

δGCF_{it} = first-difference of Gross Capital Formation in country 'i' at time 't'

GOV_{it} = Government Expenditures in country 'i' at time 't'

NX_{it} = Net Exports in country 'i' at time 't'

ε_{it} = Error (residual) term of country 'i' at time 't'

Here, GDP is our dependent variable, and the independent variables are, inflation, inflation squared, consumption, gross capital formation (as investment), government expenditures and net exports respectively.

Next, using Equation (3), the variables were first regressed under the panel fixed and random effects models and then, the Hausman test was used to distinguish between the two.

Both fixed effects and random effects models were used in the model estimation because, the fixed effect model controls for unobserved, time-invariant heterogeneity across the cross-sections that may introduce bias if ignored. So, the fixed effects model can isolate the impact of inflation and the other predictors in the model within each country over time.

On the other hand, the random effects model was used to allow for variation both within and across countries. This model assumes that the unobserved country-specific effects are uncorrelated with the explanatory variables. This approach provides more efficient estimates (by utilizing both within and between country variations).

By estimating both models and conducting a Hausman test, we were able to determine which model was more appropriate for our study and confirm the reliability of our findings. The Hausman is a determinant test to choose between the fixed and random effects. It has the null hypothesis that the preferred model is random effects. The results from the Hausman test suggested that the fixed effect model was more fitted to the sample.

This study also attempted to distinguish the individual or country-specific effects of inflation on economic growth. The country-specific effects were identified using the regular OLS model based on Equation (3). But, since the model was estimated individually for each country, the regressions were for time series data. Equation (3) is used to examine the country specific effects because the equation allows to check for the presence of nonlinearity in each country and examine the third hypothesis.

In some of the previous studies that estimated inflation thresholds, they have used conditional least squares to find a threshold of inflation (Khan & Senhadji, 2001). But, to estimate the threshold of inflation in this study, the Dynamic Panel Threshold Model was used. Although this model was used previously (Vinayagathan, 2013), the sample was for the time period 1980-2009. This study uses the model on a more recent dataset (2000-2019).

The dynamic panel threshold model is used to clarify threshold levels for a nonlinear relationship. It not only specifies a value over which the relationship between a dependent variable and threshold variable can change but also states the direction in which the relationship changes beyond the threshold. The model is a good fit here since it allows for fixed effects, hence controls any unobserved country-specific effects from biasing the results. The model also controls for endogeneity by changing the dependent variable to its lagged value and uses the independent variables as instruments.

In this model, GDP Growth is the dependent variable, inflation is the threshold variable, and all other independent variables are defined as additional instruments. The use of this

model tests the final hypothesis of this study and specifies a threshold of inflation over which the relationship between inflation and economic growth changes direction.

The bootstrap linearity test was also used to confirm the presence of a nonlinear relationship and test the statistical significance of the threshold. The test operates under the null hypothesis that the dependent and threshold variables are linearly related.

H_0 : The relationship is linear.

H_A : The relationship is nonlinear.

The results of the empirical analysis are discussed in Section 4.

IV. Results and Discussion

Panel Unit Root Test

Since most macroeconomic variables show non-stationary behavior, the variables in the panel were tested under the Levin-Lin-Chu (LLC) test for unit root. The variables consumption and gross capital formation were found to be non-stationary at the level. So, their first differences were taken to make them stationary. The first differenced variables are denoted by δ . The table below shows the results of the LLC Unit Root test.

Table 4. Results of LLC Panel Unit Root Test

Variables	Unadjusted T-statistic	Adjusted T-statistic	P-value	Result
GDP	-6.2069	-2.7481	0.0030***	Stationary
Inflation (INF)	-5.2081	-1.7082	0.0438**	Stationary
Consumption (CONS)	-3.6766	-0.8955	0.1853	Non-Stationary
δ Consumption (δ CONS)	-9.0012	-4.4874	0.0000***	Stationary
Gross Capital Formation (GCF)	-0.6495	-2.8723	0.9979	Non-Stationary
δ Gross Capital Formation (δ GCF)	-8.0475	-4.2095	0.0000***	Stationary
Government Expenditures (GOV)	-3.8620	-1.2758	0.1010*	Stationary
Net Exports (NX)	-3.6180	-1.5776	0.0573*	Stationary

H_0 : Panel contains unit root; H_A : Panel does not contain unit root

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Regression Results

The sample was regressed under the fixed effects and random effect models. The Hausman test confirmed that the fixed effect model was more fitted to the sample.

The fixed effects model confirms that the country-specific characteristics significantly impact the inflation-growth relationship within each country.

The fixed effect model estimated based on Equation (3) yielded the following results:

$$\begin{aligned} \widehat{GDP}_{it} = & \alpha + \beta_1 INF_{it} + \beta_2 INF_{it}^2 + \beta_3 \delta CONS_{it} + \\ & \beta_4 \delta GCF_{it} + \beta_5 GOV_{it} + \beta_6 NX_{it} + \varepsilon_{it} \quad (3) \\ = & 3.957 + 0.022 INF_{it} - 0.006 INF_{it}^2 + 0.044 \delta CONS_{it} + \\ & 0.078 \delta GCF_{it} + 0.152 GOV_{it} - 0.0217 NX_{it} + \varepsilon_{it} \end{aligned}$$

The positive coefficient of the inflation variable is significant and thus implies a positive relationship between inflation and economic growth. The model predicts that for the given sample, if all the other factors are held constant, an increase in inflation of 1% causes an increase in GDP growth by 2.22% and vice versa.

The coefficient in inflation-squared is negative and significant at 95% confidence interval, implying that the relationship between inflation and economic growth is significantly nonlinear. The nonlinear relationship suggests that inflation does not have a unidirectional relationship with economic growth. Rather, the relationship varies depending on the level of inflation. This negative nonlinear relationship implies that inflation positively affects growth up to a certain level but has adverse effects beyond it. The positive relationship on growth can be spurred through consumption. However, the negative relationship can distort investments and trade balances.

The R-squared values show that the model captures a higher variation in GDP between the countries (26%) than within them (10%). All variables have a positive correlation with GDP, as expected, except for Net Exports. The regression results are summarized in the table below.

Table 5. Regression Results for the Overall Sample

Dependent Variable: GDP Growth		
Variable	Fixed Effect	Random Effect
Inflation (INF)	0.0222 (0.0632)	-0.0032 (0.0656)
Inflation-squared (INF^2)	-0.0060 (0.0038) *	-0.0063 (0.0038) *
δ Consumption ($\delta CONS$)	0.0440 (0.0651)	0.0404 (0.0672)
δ Gross Capital Formation (δGCF)	0.0782 (0.0704)	0.0867 (0.0714)
Government Expenditures (GOV)	0.1524 (0.1359)	0.1472 (0.0536) ***
Net Exports (NX)	-0.0217 (0.0167)	0.0229 (0.0287)
Constant	3.957 (1.5466) ***	11.6254 (3.2860) ***
R-squared		
Within	0.1019	0.0826
Between	0.2634	0.4223
Overall	0.4052	0.2994
Countries	6	
Observations	120	
Hausman test (p-value)	0.0121	

* H_0 : The preferred model is random effects; H_A : The preferred model is fixed effects

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

The standard errors for each variable are quoted in parenthesis.

From the model, the highest contribution to GDP growth in terms of the regression results is seen to come from government expenditures (15.2%), followed by gross capital formation (7.82%) and consumption (4.4%). However, none of these are seen to have significant effects.

The overall positive relationship among inflation and economic growth for the sample is consistent with previous literature, where a positive relationship between growth and inflation was found for South Asia (Behera, 2014; Das & Loxley, 2015). The coefficient of inflation-squared is negative and significant at 90%. This suggests the presence of a significant nonlinear relationship. This result is also coherent with those found in previous studies (Pollin & Zhu, 2006, Eggoh & Khan, 2014).

The OLS regressions with the country-specific effects are summarized in the table below. Although the model was run separately for each country, only the results of the inflation and inflation-squared coefficients are reported in the table.

Table 6. Results for the Country-Specific Effects of Inflation on Economic Growth

Dependent Variable: GDP Growth		
Country	Inflation Coefficient	Inflation – Squared Coefficient
Bangladesh	0.1375 (0.2650)	-0.0013 (0.0203)
India	-1.3242 (1.1644)	0.0999 (0.0743)
Bhutan	-0.0053 (0.2022)	-0.0054 (0.0159)
Nepal	-0.0146 (0.9885)	-0.0052 (0.0788)
Pakistan	0.2692 (0.2610)	-0.0178 (0.0122)
Sri Lanka	0.0622 (0.2708)	-0.0070 (0.0118)

*The standard errors for each variable are quoted in parenthesis

In this model, the coefficient for inflation is positive but statistically insignificant for Bangladesh, Sri Lanka and Pakistan, and negative for India, Bhutan and Nepal. The positive relationship between inflation and economic growth in Bangladesh, Sri Lanka and Pakistan is coherent with that found in previous literature (Majumder, 2016; Behera, 2014; Afzal et al., 2013). The negative relationship found for India, Bhutan and Nepal is also consistent with previous results (Mohaddes & Raissi, 2014; Tenzin, 2019; Nguyen, 2018).

The coefficient for inflation-squared shows that the relationship between inflation and economic growth is negative and nonlinear for all countries in the sample, except India. Although the results are not significant at the country level, they are aligned with the results from previous literature, hence, can be deemed reliable.

Threshold Estimation

The results from the Dynamic Panel Threshold model show that in the panel, the threshold of inflation is 5.80%.

The bootstrap linearity test confirms the presence of a nonlinear relationship. Since the p-value is 0, we can say we can reject the null hypothesis that the dependent variable (i.e. economic growth), and the threshold variable (i.e. inflation) have a linear relationship. Hence the effect of inflation on economic growth is positive below this threshold and it becomes negative above the threshold.

The threshold found in this study matches well with previous literature, which found the threshold in South Asia to be around 5% (Behera & Mishra, 2017; Vinayagathan, 2013).

The table below summarizes the results from the threshold model.

Table 7. Results from the Dynamic Panel Threshold Model

Dependent Variable: GDP Growth	
Threshold Variable: Inflation	
Threshold	5.8029
Above	-2.6107
Under	2.0261
No. of Panels	6
Time periods	20
Bootstrap p-value for linearity test	0

H_0 : The relationship is linear; H_A : The relationship is non – linear.

Discussion

Following the presentation of the empirical results, this section discusses the findings in relation to the study's hypotheses.

The first proposed hypothesis was that inflation has a significant positive relationship with economic growth in South Asia. Although the regression result found a positive coefficient, the results are not statistically significant. However, given the coherence with results from the previous studies, we conclude a credible positive relationship.

The second hypothesis suggested that the effect of inflation on growth differs across individual countries in the sample. The country specific results support the hypothesis to the extent that the direction of the relationship is positive for some countries and negative for others. As the results are statistically insignificant, these differences may account to structural changes and cross-country heterogeneities rather than inflation rates alone.

The third proposition hypothesized that the relationship between inflation and economic growth is nonlinear. Results from the fixed effects model, the Dynamic Panel Threshold Model, and the bootstrap test confirm a

significant nonlinear relationship to support this hypothesis.

Finally, the last hypothesis indicated the existence of a threshold level of inflation. The results strongly support this hypothesis by finding a threshold at 5.8% which is statistically significant. The analysis implies that inflation rates should be kept below this level to avoid negative effects on economic growth.

The overall result of the study suggests that the policymakers in South Asia should keep inflation levels below a threshold of 5.85 to avoid risks of dampening consumption, investment and discouraging trade. However, the fixed effects model, together with the country-specific results suggest that an overall policy for the region would not be suitable. Rather, authorities should consider their internal heterogeneities and domestic structural characteristics while targeting inflation around the regional threshold of 5.80%.

The next section concludes the study and discusses some implications of the empirical findings.

V. Conclusion

This study attempted to find the relationship between inflation and economic growth for six countries in South Asia. The results of the entire quantitative analysis imply that there is an overall positive inflation-growth relationship for the countries in the sample. The country specific effects show a positive inflation-growth relationship in Bangladesh, Sri Lanka and Pakistan and a negative relationship in India, Bhutan, and Nepal. This study also confirms a statistically significant nonlinear relationship between inflation and economic growth for all countries except India. This suggests that inflation levels below a threshold of 5.80% can have positive effects on growth, while higher levels can have negative impacts. All results in the study are consistent with those in previous literature, as discussed in the previous section.

Although this study makes an important contribution by specifying the country-specific effects on inflation, it could not find individual thresholds for each country in the sample. Hence, this question remains open for further investigation. Also, constrained by the availability of data and the requirements of the threshold model, the study could not attempt to seek the specified relationship for countries beyond the sample. So, there remains scope of further research to test for the same relationship across a greater sample and a greater time period.

The results of this study are relevant such that Bangladesh, Sri Lanka and Pakistan historically demonstrate stable economic growth despite high levels of inflation. However, India, Nepal and Bhutan exhibit negative growth trends during periods of high inflation. The inflation threshold implies that while positive effects of inflation on growth may exist, excessive inflation can disrupt consumption patterns and discourage investments and trade. As such, to avoid negative impacts on economic growth, the countries in the sample should keep their inflation levels below the threshold, that is, below 5.80%.

Countries where the inflation-growth relationship is positive (such as Bangladesh, Pakistan, and Sri Lanka) have already exceeded the threshold in recent years, and these patterns are bound to have far reached consequences on growth. However, these countries can still address underlying issues such as supply disruptions to respond effectively to inflationary pressures and maintain steady growth. However, it is strongly emphasized that each country should essentially consider their intrinsic attributes and formulate individually tailored approaches to manage inflation levels.

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