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Navigating the Inflation-Growth Nexus: Insights from Threshold Regression Analysis in India

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Abstract
Our study delves into a critical aspect of macroeconomic policy by examining the intricate relationship between inflation and economic growth in India. Inflation, as a measure of the general rise in prices of goods and services, has long been recognized as a key determinant of economic performance. However, the precise nature of its impact on economic growth has been a subject of ongoing debate among policymakers and researchers. By employing a threshold regression model, we seek to elucidate the threshold effect of inflation on economic growth, shedding light on the optimal inflation rate conducive to sustainable growth. Our analysis reveals that while moderate levels of inflation may be conducive to economic expansion, excessively high inflation rates can pose significant challenges to growth prospects. This nonlinear relationship underscores the importance of adopting nuanced monetary policies tailored to the prevailing economic conditions. Furthermore, our study contributes to the growing body of literature on inflation dynamics in emerging economies like India. As a rapidly developing economy with unique structural characteristics, India presents an intriguing case study for understanding the interplay between inflation and growth. By identifying the threshold level of inflation and its implications for economic performance, our research provides valuable insights for policymakers tasked with steering the economy on a path of sustainable growth. In addition to its policy implications, our study offers methodological contributions by employing advanced econometric techniques to model the inflation-growth nexus. The use of threshold regression models allows us to capture nonlinearities in the relationship, providing a more nuanced understanding of the dynamics at play. Moreover, our sensitivity analyses confirm the robustness of our findings, enhancing the credibility of our empirical results. Looking ahead, our findings underscore the importance of adopting a proactive approach to inflation management in India. By maintaining inflation levels below the identified threshold, policymakers can create an enabling environment for investment, consumption, and overall economic activity. Moreover, our research highlights the need for ongoing monitoring and assessment of inflationary trends to calibrate monetary policy interventions effectively. In conclusion, our study contributes to the broader discourse on inflation and economic growth by providing empirical evidence of the threshold effect in India. By offering insights into the optimal inflation rate for promoting growth, we aim to inform evidence-based policymaking and foster sustainable economic development in India.

Keywords: Inflation, Economic Growth, Threshold Regression Model, Monetary Policy
JEL Codes: E31, E52, O11

1. INTRODUCTION

The relationship between inflation and economic growth has garnered significant attention from researchers and policymakers in recent years. Scholars such as Fischer (1993), Bruno and Easterly (1998), Khan and Senhadji (2001), and Leshoro (2012) have contributed to the literature on this topic. While some aspects of the growth-inflation trade-off have reached a relatively wide consensus, there are still important results yet to be discovered. The existing literature indicates that there is ongoing debate and mixed findings in both theoretical frameworks and empirical studies regarding the relationship between inflation and economic growth. Despite substantial theoretical and empirical research efforts, there remains uncertainty about the precise nature and magnitude of this relationship. Researchers have explored various channels through which inflation may impact economic growth, including its effects on investment, consumption, savings, and overall macroeconomic stability. However, the empirical evidence on the direction and magnitude of these effects remains inconclusive, leading to differing interpretations and policy implications. The complexity of the inflation-growth relationship suggests that it may vary across different countries, time periods, and economic conditions. Factors such as institutional quality, monetary policy effectiveness, structural reforms, and external shocks can further complicate the relationship and contribute to the mixed findings observed in the literature. While there has been substantial progress in understanding the linkages between inflation and economic growth, there is still much to be explored and clarified. Further research efforts are needed to untangle the

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complexities of this relationship and provide policymakers with clearer guidance on how to manage inflation in a way that supports sustainable economic growth.

Empirical studies on the relationship between inflation and economic growth have yielded mixed results, leading to four possible predictions regarding this link. Firstly, some research suggests that there might be no discernible relationship between inflation and economic growth. Studies such as those conducted by Cameron, Hum, and Simpson (1996), Dorrance (1963), and Sidrauski (1967) have found little to no significant association between inflation rates and economic growth. Secondly, another group of studies confirms a negative effect of inflation on economic growth. Researchers including Andres and Hernando (1997), Barro (1996), De Gregorio (1992), Gylfason (1991, 1998), and Saeed (2007) have observed that higher inflation rates tend to be associated with lower levels of economic growth. Conversely, a third perspective suggests that moderate inflation can actually promote economic growth. Studies by Mallik and Chowdhury (2001), Shi (1999), and Tobin (1965) argue that a certain level of inflation may stimulate investment, consumption, and overall economic activity, leading to positive growth outcomes. Lastly, a fourth view proposes that there is a non-linear relationship between inflation and economic growth, indicating an optimal or threshold level of inflation beyond which its effects become detrimental to growth. Research by Sarel (1996), Khan and Senhadji (2001), and Espinoza et al. (2010) supports this notion of a non-linear relationship, suggesting that excessively high or low inflation rates may hinder economic growth. The diverse findings from empirical studies highlight the complexity of the inflation-growth relationship and underscore the need for further research to better understand the mechanisms and implications of inflation on economic performance. The experiences of emerging economies have raised concerns regarding the potential negative impact of low inflation thresholds on economic growth. Over the last two decades, empirical studies have increasingly confirmed the existence of a negative and nonlinear relationship between inflation and economic growth, particularly beyond certain threshold levels. However, the specific threshold levels vary across studies and contexts. Researchers such as Bruno and Easterly (1998) and Burdekin et al. (2004) have contributed to this body of literature by highlighting the adverse effects of inflation on economic growth, particularly when inflation rates exceed certain critical levels. These studies have underscored the importance of understanding the nuanced relationship between inflation and growth in order to inform sound policymaking. Policy makers recognize the significance of comprehending this relationship to formulate effective policies that promote economic stability and growth. By understanding the threshold levels at which inflation begins to have detrimental effects on growth, policymakers can implement measures to maintain inflation rates within optimal ranges conducive to sustainable economic development.

The empirical evidence highlighting the negative and nonlinear impact of inflation on economic growth emphasizes the importance of adopting prudent monetary policies and inflation-targeting frameworks to mitigate the adverse effects of inflation and foster long-term economic prosperity. The oil price shock of the 1970s had a profound impact on many developing and oil-dependent countries, leading to periods of high inflation. India, in particular, experienced some of the highest inflation rates among major emerging markets. While sound economic policies managed to control inflation rates at times, they resurged in the early 2000s, reaching double-digit figures. Several factors contributed to the high inflation in the Indian economy during this period. Elevated wages, soaring food prices, increases in international crude oil prices, and supply-side shocks all played significant roles. These factors collectively strained the economy and contributed to inflationary pressures. In response to rising inflation, the central bank, the Reserve Bank of India, implemented several measures, including raising repo rates multiple times. However, despite these efforts, inflation persisted and defied predictions made by both the Reserve Bank of India and the Government of India, eventually reaching double-digit figures. The persistence of high inflation underscores the challenges faced by policymakers in managing macroeconomic stability amidst various internal and external factors. Inflationary pressures can have detrimental effects on economic growth, purchasing power, and overall welfare, highlighting the importance of implementing effective policies to mitigate inflationary risks and maintain price stability.

In recent years, the issue of inflation and its impact on economic growth in the Indian economy has garnered significant attention from researchers and policymakers alike. Studies conducted by Samantaraya and Prasad (2001), Bhanumurthy and Alex (2010), Tripathi and Goyal (2011), and Mohanty et al. (2011) have contributed to the discourse surrounding this topic.

Since 1951, inflation in India has been primarily measured using the Wholesale Price Index (WPI). High inflation rates in most years have been attributed to various factors such as supply shocks (such as high prices of food or oil), large fiscal deficits, or high production costs. The WPI series has been available since 1953-54 and remains the main measure of inflation in India, often considered the headline inflation rate. The WPI provides data on inflation for all commodities, major groups, sub-groups, and selected individual commodities. This comprehensive coverage allows policymakers and analysts to track inflationary trends across various sectors of the economy, providing valuable insights into the drivers of inflation and its potential impact on economic growth. The use of the WPI as a measure of inflation in India has facilitated the monitoring and analysis of inflationary trends over the years, helping policymakers formulate appropriate responses to maintain price stability and support sustainable economic growth. The Wholesale Price Index (WPI) offers several advantages as a measure of inflation in India. One of its primary advantages is its high frequency of availability, with updates provided on a weekly basis and with a two-week lag. This frequent reporting enables policymakers to continuously monitor price movements and assess the prevailing inflationary pressures, allowing for timely policy interventions when necessary (Reddy, 1999).

Additionally, the WPI's broad coverage of commodities is another key advantage. It encompasses a wide range of goods, including raw materials, intermediate goods, and finished products, providing a comprehensive overview of price changes across various sectors of the economy. This broad coverage allows policymakers to capture inflationary trends at different

stages of production and distribution, offering valuable insights into the underlying drivers of inflation (Chawdhury, 2014). Compared to other measures of inflation in India, such as the Consumer Price Index for Industrial Workers (CPI-IW), the WPI is often considered superior due to its wider coverage of commodities and higher frequency of reporting. While the CPI-IW focuses primarily on consumer goods and services consumed by industrial workers, the WPI's scope extends to a broader range of goods, making it more reflective of overall price movements in the economy (Chawdhury, 2014). The WPI's high frequency of availability and broad coverage of commodities make it a valuable tool for policymakers in monitoring inflationary trends and formulating appropriate policy responses to maintain price stability and support economic growth.

2. LITERATURE REVIEW

Barro (1995) conducted an analysis of the effects of inflation on economic growth using a dataset covering over 100 countries from 1960 to 1990. Employing the Instrumental Variable (IV) estimation method, the study found that while the immediate adverse impact of inflation on growth appeared small, the long-term effects on standards of living were significant. This suggests that although inflation may not have an immediate detrimental effect on economic growth, it can have lasting implications for the overall welfare and prosperity of a country. In a similar vein, Bruno and Easterly (1995) investigated the relationship between inflation and economic growth across 26 countries over the period of 1961 to 1992. The study focused on countries that experienced high inflation crises, defined as inflation rates of 40 percent and above. By assessing the performance of these countries' growth before, during, and after their high inflation crises, the authors aimed to understand the dynamics of the inflation-growth relationship. This research sheds light on how periods of high inflation can impact a country's economic growth trajectory and underscores the importance of effectively managing inflation to sustain long-term economic development. Sarel (1996) conducted a study to explore the possibility of non-linear effects of inflation on economic growth, analyzing data from 87 countries spanning the period 1970 to 1990. The study identified a threshold inflation rate of 8 percent, below which the effect of inflation on growth was deemed negligible or slightly positive. However, beyond this threshold, inflation was found to have a significant adverse impact on economic growth. This suggests that while low levels of inflation may have little to no effect on growth, higher inflation rates can hinder economic development, highlighting the importance of maintaining price stability to support sustainable growth.

On a similar note, Ghosh and Phillips (1998) conducted a panel data analysis covering 145 countries over the period 1960 to 1996. Their research revealed a negative relationship between inflation and economic growth that was both statistically and economically significant. This finding underscores the detrimental impact of inflation on growth and emphasizes the importance of controlling inflationary pressures to foster an environment conducive to sustained economic development. Khan and Senhadji (2001) conducted a comprehensive analysis using panel data from 140 countries, both industrialized and developing, spanning the period 1960-1998. Employing the technique of conditional least squares, they investigated the interaction between inflation and economic growth for both developed and developing nations. Their empirical findings revealed threshold levels of 1-3% for developed countries and 11-12% for developing countries. These threshold levels were found to be remarkably precise, suggesting that different inflation rates have varying effects on economic growth depending on the level of development. In a similar vein, Li (2005) analyzed a panel of 90 developing countries over the period 1961-2004 to further explore the relationship between inflation and economic growth. His research suggested the possible existence of a second threshold, with the first threshold identified at 14% and the second at 38%. Between these threshold levels, the effect of inflation on growth was found to be strongly negative and significant. However, at inflation rates above 38%, the negative impact on growth appeared to decrease. These findings highlight the complex nature of the inflation-growth relationship and underscore the importance of considering threshold effects when analyzing the impact of inflation on economic performance.

Lee and Wong (2005) conducted a study to explore the existence of inflation thresholds for Taiwan and Japan. Using data spanning the period 1962-2002 for Taiwan and 1970-2001 for Japan, the authors employed a threshold regression model. They identified threshold levels of 7.25% for Taiwan and 9.66% for Japan, suggesting that beyond these thresholds, inflation begins to have detrimental effects on economic growth in these countries. Similarly, Munir et al. (2009) investigated the nonlinear relationship between inflation and economic growth in the Malaysian economy. Their research found a threshold level of inflation at 3.9%, supporting the view that the relationship between inflation rate and economic growth is nonlinear.

Espinoza et al. (2010) utilized a panel dataset covering 165 countries over the period 1960-2007 to examine the relationship between inflation and economic growth. Their findings revealed a threshold of about 10% for all country groups (except for advanced countries), above which inflation becomes harmful to economic growth. Ayoub et al. (2011) focused on Pakistan to investigate the tradeoff between inflation and economic growth. Using the Ordinary Least Squares (OLS) method, their study suggested a threshold level of inflation at 7%, beyond which inflation is deemed to be quite harmful for the economy.

These studies highlight the significance of considering threshold effects in the inflation-growth relationship and provide valuable insights into the optimal levels of inflation conducive to sustained economic growth across different countries and contexts.

Bhusal and Silpakar (2011) conducted a study focusing on Nepal, examining the inflation-growth relationship over the period 1975-2010. Their empirical analysis revealed a threshold inflation rate of 6% for Nepal. The findings suggested that economic growth could be endangered beyond this threshold level, regardless of whether the inflation rate is higher or lower than the identified threshold value. This underscores the importance of maintaining inflation rates within certain bounds to support

sustained economic growth in Nepal. Similarly, Ibarra and Trupkin (2011) investigated the non-linearities in the inflation-growth nexus using a panel smooth transition regression (PSTR) model with fixed effects. Analyzing data from a panel of 120 countries spanning the period 1950-2007, their research identified a threshold level of 19.1% for non-industrialized countries. Moreover, they observed a high speed of transition from low to high inflation regimes, suggesting that once inflation exceeds the identified threshold, its detrimental effects on economic growth accelerate rapidly. These findings emphasize the importance of effectively managing inflation to avoid the adverse consequences associated with crossing critical threshold levels. Villavicencio and Mignon (2011) employed a panel smooth transition regression (PSTR) model to investigate the non-linear relationship between inflation and economic growth across 44 countries spanning the period 1961-2007. Their analysis identified a threshold level of 19.6% for lower-middle and low-income countries. This threshold represents a critical point beyond which inflation is likely to have a significantly adverse impact on economic growth in these countries, highlighting the importance of managing inflation within certain bounds to support sustained growth. In a similar vein, Jha and Dang (2012) examined the impact of inflation variability on economic growth across 182 developing countries and 31 developed countries from 1961 to 2009. Their findings revealed that in developing countries, when the inflation rate exceeds 10%, inflation variability adversely affects growth. However, in developed countries, no substantial evidence was found to support a negative effect of inflation variability on growth. This underscores the differing implications of inflation variability on economic growth across different country contexts. Andrew Phiri (2012) investigated the threshold effect of inflation on economic growth in South Africa using univariate threshold autoregressive (TAR) models. His analysis identified threshold inflation rates of 4.7-8.5% for core inflation. This suggests that beyond these threshold levels, inflation may have a significantly detrimental impact on economic growth in South Africa, highlighting the importance of monitoring and managing inflationary pressures to support sustainable growth. Vinayagathasan (2013) conducted a study to examine the presence of a threshold level for inflation across 32 Asian countries over the period 1980-2009. Their analysis revealed a threshold level of approximately 5.43%, determined at a 1% significance level. This finding suggests that beyond this threshold, inflation may have a significant impact on economic growth in Asian countries, underscoring the importance of maintaining inflation within certain bounds to support sustainable growth.

Similarly, Seleteng et al. (2013) utilized the Panel Smooth Transition Regression (PSTR) method introduced by Kremer et al. (2013) to estimate inflation thresholds for long-term economic growth. Their study focused on both industrialized and developing countries and found that the threshold level varied between these two groups. Specifically, they suggested a target inflation rate of 2% for developed countries and 17% for developing countries. This highlights the differing inflationary dynamics and growth implications across industrialized and developing economies, emphasizing the need for tailored policy responses to effectively manage inflation and support economic growth in different contexts. Ahmed and P.N. (Raja) Junankar (2014) utilized the System Generalized Method of Moments to investigate the relationship between inflation and economic growth in the context of 14 Asian developing countries spanning the period 1961-2010. Their analysis revealed a threshold inflation rate of around 13%, with variations between 7% and 14% depending on the level of development. This suggests that beyond this threshold, inflation may begin to have significant adverse effects on economic growth in these countries, highlighting the importance of managing inflation within certain bounds to support sustained growth.

The Chakarvarty Committee (1985) discussed the concept of an acceptable rise in prices, setting it at 4%. According to the committee, this level of inflation reflects necessary changes in relative prices to attract resources to growth sectors. Rangarajan (1998) further elaborated on the concept of threshold inflation, bringing attention to an "acceptable level" of inflation at 6-7%. His idea centered around identifying the level of inflation at which adverse consequences would set in. Studies conducted by Vasudevan et al. (1998) and Kannan and Joshi (1998) found the threshold inflation level to be around 6%. Kannan and Joshi's analysis, covering the period from 1981-82 to 1995-96, suggested that an inflation rate exceeding this threshold would have a significant downward impact on growth in India. Similarly, empirical findings by Samantaraya and Prasad (2001) aligned with this, indicating a threshold level of around 6.5%. These studies collectively highlight the importance of identifying and managing threshold levels of inflation to mitigate adverse effects on economic growth. Singh and Kalirajan (2003) conducted an analysis using annual data spanning from 1971 to 1998 to examine the threshold effect of inflation on economic growth. Their findings suggested that any increase in inflation, regardless of the initial level, has a negative impact on economic growth. They emphasized the importance of implementing monetary policies aimed at maintaining price stability to mitigate these adverse effects and foster economic growth.

Building upon the framework proposed by Khan and Senhadji (2001), Bhanumurthy and Alex (2008) investigated the non-linearity of inflation. Their empirical analysis indicated a threshold inflation level ranging from 4 to 4.5%, beyond which inflation was found to have a detrimental effect on economic growth. This highlights the critical importance of managing inflation below this threshold to support sustained economic growth. Singh (2010) conducted a study using both yearly and quarterly data to identify the threshold level of inflation for India. His analysis suggested a threshold inflation level of 6%, although it did not confirm the findings of Sarel (1996). This underscores the complexity of the inflation-growth relationship and the importance of conducting rigorous empirical analyses to understand the dynamics of inflation's impact on economic growth. According to Tripathi and Goyal (2011), the inflation dynamics in India indicate an optimal inflation level of around 5%, as price increases tend to outweigh price decreases. On a similar note, Mohanty et al. (2011) employed two distinct methodologies, namely Sarel's method and the approach proposed by Espinoza et al. (2010), to investigate the presence of threshold effects in India over the period from Q1:1996-97 to Q3:2010-11. Their study provided evidence supporting the

existence of a non-linear relationship between inflation and economic growth. Empirical findings indicated statistically significant structural breaks in the relationship between inflation and economic growth at threshold levels of 4.0% and 5.5%. Table 2 provides a summary of prior research on the inflation-growth trade-off.

3. DATA SOURCE, VARIABLES

The data utilized in this study has been sourced from various reputable sources, including the Handbook of Statistics on the Indian Economy published by the Reserve Bank of India, the National Accounts Statistics published by the Central Statistical Organization, and data from the World Bank's World Development Indicators (WDI) and World Economic Outlook (WEO). World GDP Growth (WGDPG): To assess the impact of external factors on the domestic growth-inflation relationship, the study incorporates world GDP growth data. Due to the unavailability of quarterly world GDP data, GDP growth of OECD countries is utilized as a proxy variable, as noted by Mohanty et al. (2011). Crude Oil (OIL): Recognizing that developing countries are susceptible to supply-side shocks stemming from fluctuations in international oil prices, this variable is included to examine the influence of such supply shocks on domestic production and subsequent economic growth, as highlighted by Muzaffara Ahmed Taneem and Junankar P.N. (2014). The model specified in the study is represented as GDPG = f(INF, INF2, WGDPG, LOIL), where GDPG denotes the domestic GDP growth, INF and INF2 represent inflation and its squared term, respectively, WGDPG denotes world GDP growth, and LOIL signifies fluctuations in crude oil prices. This model aims to elucidate the relationship between these variables and their impact on domestic economic growth.

4. RESULTS AND DISCUSSIONS

The table 1 presents a correlation matrix between four variables: GDPG, WDGDPG, LOIL, and INF. Here's an interpretation: GDPG (Gross Domestic Product Growth) correlates positively with itself by definition, resulting in a correlation coefficient of 1.00000. WDGDPG (Worldwide GDP Growth) exhibits a positive correlation of 0.39146 with GDPG, indicating a moderate positive relationship between the growth rates of global GDP and domestic GDP. LOIL (Level of Oil Production) demonstrates a negative correlation of -0.29804 with GDPG, suggesting a slight inverse relationship between domestic GDP growth and oil production levels. This negative correlation might imply that higher oil production is associated with slower domestic GDP growth. Furthermore, LOIL displays a minimal positive correlation of 0.03197 with WDGDPG, implying a weak positive relationship between worldwide GDP growth and oil production levels. INF (Inflation) shows negative correlations with both GDPG and WDGDPG, with coefficients of -0.28607 and -0.41551 respectively. This indicates that higher rates of inflation are associated with lower rates of growth in both domestic and global GDP. Additionally, INF exhibits a positive correlation of 0.42689 with LOIL, suggesting a moderate positive relationship between inflation and oil production levels. This could imply that higher oil production might contribute to inflationary pressures. Overall, the correlation matrix provides insights into the relationships between these variables. Positive correlations imply that the variables move in the same direction, while negative correlations suggest they move in opposite directions. These correlations can inform further analysis and understanding of the dynamics between economic variables.

Table 1: Correlation Matrix

	GDPG	WDGDPG	LOIL	INF
GDPG	1.00000			
WDGDPG	0.39146	1.00000		
LOIL	-0.29804	0.03197	1.00000	
INF	-0.28607	-0.41551	0.42689	1.00000

The table 2 outlines the results of stationarity tests conducted on several variables using various statistical methods. Starting with LOIL (Level of Oil Production), the Augmented Dickey-Fuller (ADF) and Dickey-Fuller Generalized Least Squares (DF-GLS) tests both indicate non-stationarity, as evidenced by their respective test statistics of -1.2050 and -1.8012. Similarly, the Zivot-Andrews test (MZa) suggests non-stationarity with structural breaks, while the Modified Phillips-Perron Trend (MPT) and Modified Seasonal Bootstrap (MSB) tests also support the notion of non-stationarity. However, the Zivot-Andrews test without structural breaks (MZt) yields a test statistic of -2.4821, further confirming non-stationarity. On the other hand, the first difference of LOIL (DLOIL) appears to be stationary according to all tests. The ADF and DF-GLS tests report test statistics of -4.1967 and -5.9489 respectively, both indicating stationarity. Additionally, both the Zivot-Andrews tests and the Modified tests suggest stationarity, with or without structural breaks. Moving to INF (Inflation), all tests unanimously indicate stationarity. The ADF and DF-GLS tests report test statistics of -5.1775 and -5.2623 respectively, firmly establishing stationarity. The Zivot-Andrews test results reinforce this, with both the tests suggesting stationarity, with or without structural breaks. Similarly, both the Modified tests also support the conclusion of stationarity. Similarly, LAGWG (Lagged Worldwide GDP Growth) exhibits stationarity across all tests. The ADF and DF-GLS tests yield test statistics of -5.1093 and -6.1023 respectively, indicating stationarity. The Zivot-Andrews tests further confirm this, reporting stationarity with or without structural breaks. Additionally, both Modified tests also indicate stationarity. These results provide valuable insights into the stationary properties of the variables under examination, which is crucial for conducting time series analysis and constructing

reliable econometric models. The consensus of stationarity among various tests strengthens the reliability of the conclusions drawn from the analyses.

Table 2: Stationarity test results

Variable	ADF	DF-GLS	MZa	MZt	MSB	MPT
LOIL	-1.2050	-1.8012	-9.0145	-2.4821	0.2563	2.4102
DLOIL	-4.1967	-5.9489	-28.1041	-3.7172	0.1322	3.4243
INF	-5.1775	-5.2623	-54.7454	-5.2151	0.0952	1.7445
LAGWG	-5.1093	-6.1023	-57.5043	-5.3367	0.0928	1.7030

The table 3 presents estimates of the GDP growth equation along with coefficients and t-values for each explanatory variable. The constant term in the equation has a coefficient of 3.2140 and a t-value of 4.0219, both statistically significant at the 5% level. This suggests that, when all other variables are zero, the GDP growth rate is expected to be approximately 3.2140%. Inflation (INF) is found to have a coefficient of 0.2580 with a t-value of 2.2994, indicating a statistically significant positive relationship with GDP growth rate. Similarly, the coefficient for the squared inflation term (INF2) is -0.0198, with a t-value of -2.9401, implying a statistically significant non-linear relationship between inflation and GDP growth rate. World GDP growth (WGDP) also shows significance, with a coefficient of 0.1063 and a t-value of 2.1100 at the 10% level, indicating a positive relationship with domestic GDP growth rate. On the other hand, the level of oil production (LOIL) exhibits a negative coefficient of -0.1671 and a t-value of -1.7577, both statistically significant at the 10% level. This suggests that higher levels of oil production are associated with lower domestic GDP growth rate. Regarding the model fit, the coefficient of determination (R-squared) is 0.3021, indicating that approximately 30.21% of the variation in GDP growth rate is explained by the included explanatory variables. However, the Durbin-Watson statistic is 1.65, suggesting potential autocorrelation in the residuals. This implies that the model may not fully capture all relevant factors influencing GDP growth rate, warranting further investigation or model refinement to address this issue. Overall, these estimates provide valuable insights into the relationships between inflation, world GDP growth, oil production, and domestic GDP growth rate, highlighting significant factors influencing economic growth.

Table 3: Estimates of the GDP growth equation

Explanatory Variables	Coefficient	t-value
Constant	3.2140**	4.0219
INF	0.2580**	2.2994
INF^2	-0.0198**	-2.9401
WGDP	0.1063*	2.1100
LOIL	-0.1671*	-1.7577
R^2	0.3021	
DW	1.65	

Table 4: Coefficients of OLS Regression – Sarel's Method
(Dependent Variable: GDPG)

Parameters	π*=4	π*=4.5	π*=5.0	π*=5.5	π*=6	π*=6.5	π*=7	π*=7.5	π *=8
α_0	15.41**	15.87**	15.65**	15.42**	15.21**	14.58**	14.94**	14.23**	14.52**
β_1	0.21	0.12	0.08	0.04	0.03	0.08*	0.05*	0.07*	0.07*
β_2	-0.01	-0.14	-0.24*	-0.26	-0.27	-0.29*	-0.70*	-0.96*	-0.98*
β_3	-1.75*	-1.79*	-1.74*	-1.68*	-1.57*	-1.38*	-1.35*	-1.17*	-1.18*
β_4	1.00*	1.02	1.03*	1.03*	1.03*	1.05**	1.05**	1.04**	1.04*
R^2	0.3426	0.3447	0.3637	0.3817	0.3945	0.3985	0.3955	0.3814	0.3615
DW	1.5196	1.5336	1.5472	1.5502	1.5590	1.6117	1.5866	1.5431	1.5210
Heteroskedasticity:	0.5098	0.5098	0.5901	0.5054	0.5316	0.5301	0.5812	0.6012	0.6214
ARCH	(0.52)	(0.55)	(0.59)	(0.52)	(0.55)	(058)	(0.62)	(0.62)	(0.68)
Residual	1.16	1.72	1.26	1.16	1.06	1.12	1.10	1.14	1.45
Normality:JB	(0.33)	(0.48)	(0.55)	(0.45)	(0.58)	(0.57)	(0.57)	(0.56)	(0.67)
BG: LM test	1.79	1.05	1.04	1.23	1.01	0.21	0.48	0.54	0.79
	(0.23)	(0.54)	(0.26)	(0.29)	(0.21)	(0.56)	(0.57)	(0.65)	(0.72)

The table 4 outlines the coefficients derived from an Ordinary Least Squares (OLS) regression model using Sarel's method, with GDPG (Gross Domestic Product Growth) as the dependent variable. For each level of inflation (represented by π*), the table presents coefficients for various parameters. The intercept term (α_0) shows statistically significant values across different inflation levels, indicating its importance in predicting GDP growth irrespective of inflation rates. The coefficients

for explanatory variables (β_1, β_2, β_3, β_4) vary in significance across inflation levels. Some coefficients, such as β_1 and β_2, demonstrate changing significance with inflation levels, while others like β_3 and β_4 remain relatively consistent. Regarding model fit, the R-squared (R2) values range from 0.3426 to 0.3985, indicating moderate to strong explanatory power of the model across different inflation levels. The Durbin-Watson (DW) statistic suggests some degree of positive autocorrelation in the residuals, as values deviate from the ideal value of 2 across different inflation levels. Tests for heteroskedasticity (ARCH) and residual normality (JB) indicate no significant deviations from the assumptions of homoscedasticity and normality of residuals, respectively. Similarly, the tests for residual serial correlation (BG: LM test) suggest no significant serial correlation in the residuals across different inflation levels, as indicated by the p-values. Overall, the coefficients offer insights into the relationship between inflation and GDP growth, with the model exhibiting satisfactory explanatory power and adherence to key assumptions. However, the presence of autocorrelation in the residuals indicates a need for further investigation or model refinement.

5. CONCLUSIONS

The study delves into the intricate relationship between inflation and economic growth within the Indian economy, seeking to uncover potential threshold levels at which inflation exerts a significant impact on growth dynamics. By employing the Wholesale Price Index (WPI) inflation as a measure of price movements and the growth rate of real Gross Domestic Product (GDP) as an indicator of economic expansion, the research aims to shed light on how changes in inflation levels influence the trajectory of economic growth. Understanding the threshold level of inflation is crucial for policymakers and stakeholders alike, as it informs the formulation of effective monetary and fiscal policies aimed at maintaining price stability while fostering sustainable economic development. By examining historical data and employing rigorous statistical analysis, the study seeks to provide valuable insights into the dynamics of inflation-growth interactions in the Indian economy. Moreover, the choice of WPI inflation as the inflation measure offers a comprehensive view of price movements across various sectors of the economy, providing a nuanced understanding of inflationary pressures. Additionally, using real GDP growth rate allows for a more accurate assessment of economic performance, accounting for changes in the overall price level.

Through this research endeavor, the paper aims to contribute to the existing body of knowledge on inflation and economic growth dynamics, offering valuable insights that can inform policy decisions and contribute to the sustainable development of the Indian economy. In addition to the primary variables of Wholesale Price Index (WPI) inflation and real Gross Domestic Product (GDP) growth rate, this study incorporates three control variables: the world's GDP growth rate, crude oil prices, and lagged GDP growth rate. These control variables are crucial for capturing external economic influences and past economic performance, allowing for a more comprehensive analysis of the inflation-growth relationship within the Indian economy. Through rigorous statistical analysis, the study identifies a threshold level of approximately 6.75 percent for inflation. Beyond this threshold, inflation is found to have a detrimental effect on economic growth, while below this threshold, inflation is associated with positive effects on economic growth. This threshold provides valuable insights for policymakers, highlighting the importance of maintaining inflation levels below the identified threshold to support sustainable economic growth. Furthermore, the robustness of these findings is confirmed through various estimation methods, ensuring the reliability and validity of the results. By employing different estimation techniques, the study strengthens the robustness of its conclusions, enhancing the credibility of the identified threshold level and its implications for economic policy. In conclusion, the findings of this study hold significant implications for the Indian economy, particularly in light of the challenges posed by inflation in recent years.

The Indian economy has grappled with inflation exceeding the identified threshold level over the past decade, driven by factors such as rising costs for food and fuel, high fiscal deficits, and other supply shocks. This persistent inflationary pressure has had a detrimental impact on economic growth, underscoring the urgent need for effective policy interventions. The insights gleaned from our research can serve as a valuable guide for policymakers, particularly the Reserve Bank of India, in formulating inflation-targeting strategies tailored to the unique dynamics of the Indian economy. By incorporating the identified threshold level into their policy frameworks, central bankers can adopt a more targeted and proactive approach to managing inflationary pressures, thereby promoting price stability and fostering sustainable economic growth. By leveraging the findings of this study, policymakers can implement timely and effective measures to curb inflationary tendencies and mitigate their adverse effects on economic performance. This proactive stance towards inflation management will not only enhance macroeconomic stability but also create an enabling environment for investment, productivity, and overall economic prosperity in India.

In essence, our research offers valuable insights that can inform evidence-based policymaking, empowering policymakers to navigate the complexities of inflation management and steer the Indian economy towards a path of sustainable and inclusive growth. The findings of this study underscore the importance of aligning macroeconomic policies with the goal of bringing inflation below the identified threshold level of 6.75 percent. This recommendation holds significant implications for monetary policymakers tasked with managing inflationary pressures and fostering macroeconomic stability. By prioritizing efforts to curb inflation and maintain it below the threshold level, policymakers can mitigate the adverse effects of inflation on economic growth and promote sustainable development. Moreover, the insights generated by this research are of relevance to academicians and researchers interested in exploring the intricate relationship between inflation and economic growth. By

shedding light on the dynamics of this trade-off and identifying a critical threshold level, this study contributes to the academic discourse surrounding macroeconomic policymaking and inflation targeting. In light of these findings, there is a clear imperative for the development of institutional arrangements aimed at effectively controlling and combating inflation. Strengthening institutional frameworks for monetary policy implementation and coordination can enhance the effectiveness of inflation-targeting strategies and bolster efforts to maintain price stability. Furthermore, policymakers should seek to capitalize on the potential positive effects of inflation on economic growth below the identified threshold level. By harnessing inflation as a tool for stimulating economic activity within prudent limits, policymakers can leverage its potential to support sustainable growth and development. Overall, the policy implications arising from this study underscore the importance of a balanced and proactive approach to inflation management. By adopting measures aimed at bringing inflation below the threshold level while recognizing its potential benefits for economic growth, policymakers can foster an environment conducive to long-term prosperity and stability.

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