Examining the Impact of Inflation on GDP: A Comparative Analysis Between Pakistan and Bangladesh

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Abstract

This study discusses the impact of inflation on the economic growth of Pakistan and Bangladesh using time series data from 1993 to 2023. High inflation and low GDP growth are the primary economic challenges in Pakistan. Conversely, in Bangladesh, both inflation and GDP increase concurrently. Analyzing Bangladesh's economic strategies reveals critical steps that have bolstered their economy. According to Granger Causality test used on Bangladesh's statistics that there is no significant predictive causality between Inflation and GDP in either direction based on the data and the lag length of 2 periods. According to Granger Causality test used on Pakistan's statistics, it does not imply true causality but rather a predictive relationship based on lagged values. These impulse response functions of Pakistan provide insights into the dynamic interactions between GDP and inflation. The results indicate that shocks to inflation have significant immediate impacts on both variables, whereas shocks to GDP influence inflation more gradually. Policymakers can use this information to understand the potential impacts of economic policies or external shocks on these key economic indicators.

Keywords: GDP, Pakistan, Inflation, Bangladesh, Economic Challenges.

Introduction

Background of the Study

A persistent increase in the overall trajectory of prices during specified time period, usually a year, is referred to as inflation. As a result of an excessive amount of currency in circulation compared to the supply of products and services, it is also known as "an excessive amount of cash pursuing a few things." The concept includes a general state of affairs in the economy as well as a particular monetary perspective marked by rising prices. The percentage of increase in price measures the variation in the percentage in different indexes that represent the overall level of prices, which captures the whole range of products and services in an economy. This notion is an essential instrument for assessing the course of price increases over particular time periods, usually characterized by yearly cycles (Raza,2013). This comprehensive metric encompasses the entirety of economic activities undertaken by both individuals and entities within the nation, encapsulating the output generated by both human labor and physical capital assets (Afzal, 2007).

Rationale of the study

In 1971 and 2023 Economic Comparison between Pakistan and Bangladesh

Before we start our research, we should know the antiquity of Bangladesh. Bangladesh gained autonomy in 1971, whereas Pakistan achieved sovereignty in 1947. Prior to its secession,

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Bangladesh was a region of Pakistan and called out East Pakistan. Both nations share a largely similar heritage, with Muslims constituting the majority of the population in both countries.

Table 1:Pakistan and Bangladesh economic comparison (1971)

Indicators	Bangladesh	Pakistan
Population	66 million	60 million
Education rate	18 percent	22 percent
Economic growth	-6 percent	0.50 percent
Currency	23 taka=1usd	12 RS=1usd

Source: "World Bank" [https://www.worldbank.org/en/country/pakistan]

Both nations' economies were in dire straits following 1971. In terms of GDP growth in 1973, Pakistan experienced a higher growth rate compared to Bangladesh, which had minimal expansion.

Table 2:Pakistan and Bangladesh economic comparison (2023)

Indicators	Pakistan	Bangladesh
Population	241.5 MILLION	169 MILLION
Inflation	29.5%	9.8%
GDO growth%	4.0%	6.0%
Education rate	58.9%	73.9%
Currency	1 USD = 279.38 RS	USD=109.63 BDT

Source: "World Bank" [https://www.worldbank.org/en/country/pakistan]

This comparative analysis highlights key economic and social differences between Pakistan and Bangladesh, providing a context for understanding their respective economic performances and challenges. In this comparison we can assess that prior to 2000, Bangladesh's economy was not as robust as Pakistan's. However, post-2000, Bangladesh's economy began to expand, while Pakistan's economy started to contract gradually.
Let's compare to see if there are any noticeable differences.

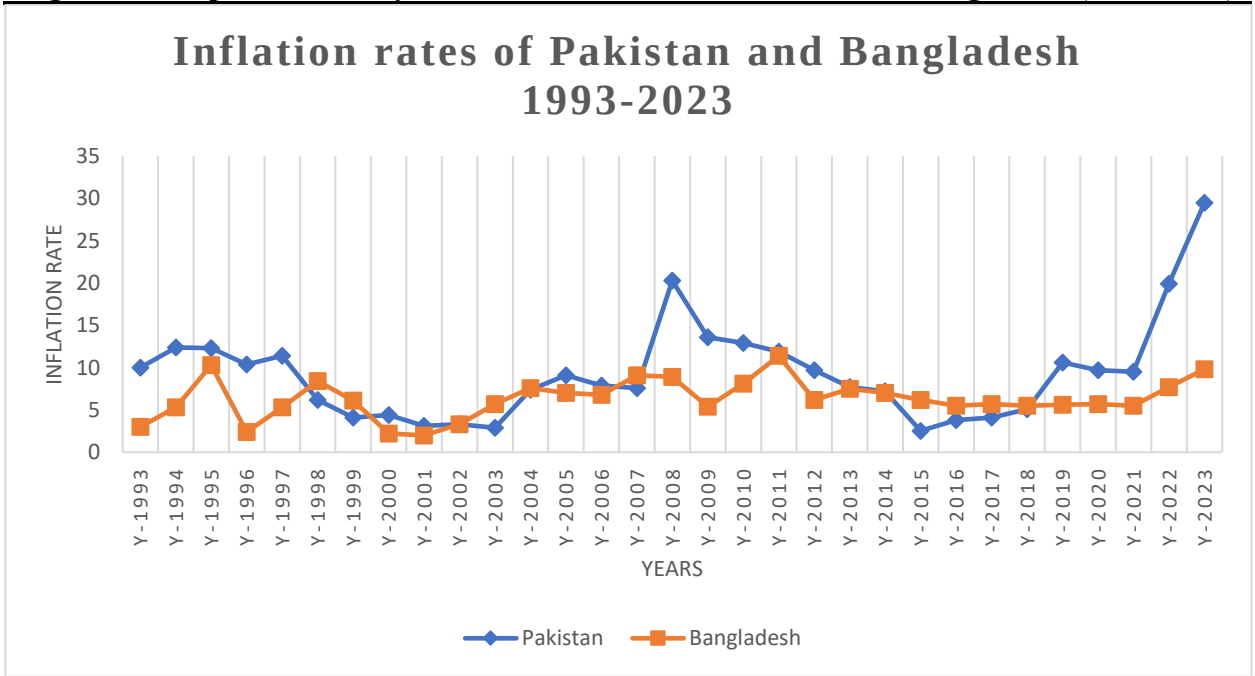
Table 3:Inflation rates and GDP growth rates of Pakistan and Bangladesh 1993 till 2023

Year	Inflation rate in Pakistan %	Inflation rate in Bangladesh %	GDP growth rate of Pakistan %	GDP growth rate of Bangladesh %
1993	10.0	3.0	1.8	4.6
1994	12.4	5.3	3.7	3.9
1995	12.3	10.3	5.0	5.1
1996	10.4	2.4	4.8	4.5
1997	11.4	5.3	1.0	4.5
1998	6.2	8.4	2.6	5.2
1999	4.1	6.1	3.7	4.7
2000	4.4	2.2	4.3	5.3
2001	3.1	2.0	3.7	5.1
2002	3.3	3.3	2.6	3.8

2003	2.9	5.7	5.4	4.7
2004	7.4	7.6	7.8	5.2
2005	9.1	7.0	7.3	6.5
2006	7.9	6.8	6.1	6.7
2007	7.6	9.1	4.4	7.1
2008	20.3	8.9	2.1	6.0
2009	13.6	5.4	3.5	5.0
2010	12.9	8.1	1.5	5.6
2011	11.9	11.4	2.7	6.5
2012	9.7	6.2	3.0	6.5
2013	7.7	7.5	4.4	6.0
2014	7.2	7.0	4.1	6.1
2015	2.5	6.2	4.2	6.6
2016	3.8	5.5	6.6	7.1
2017	4.1	5.7	4.4	6.6
2018	5.1	5.5	6.2	7.3
2019	10.6	5.6	2.5	7.9
2020	9.7	5.7	-1.3	3.4
2021	9.5	5.5	6.5	6.9
2022	19.9	7.7	4.7	7.1
2023	29.5	9.8	4.0	6.0

Source: "World Bank" [https://www.worldbank.org/en/country/pakistan]

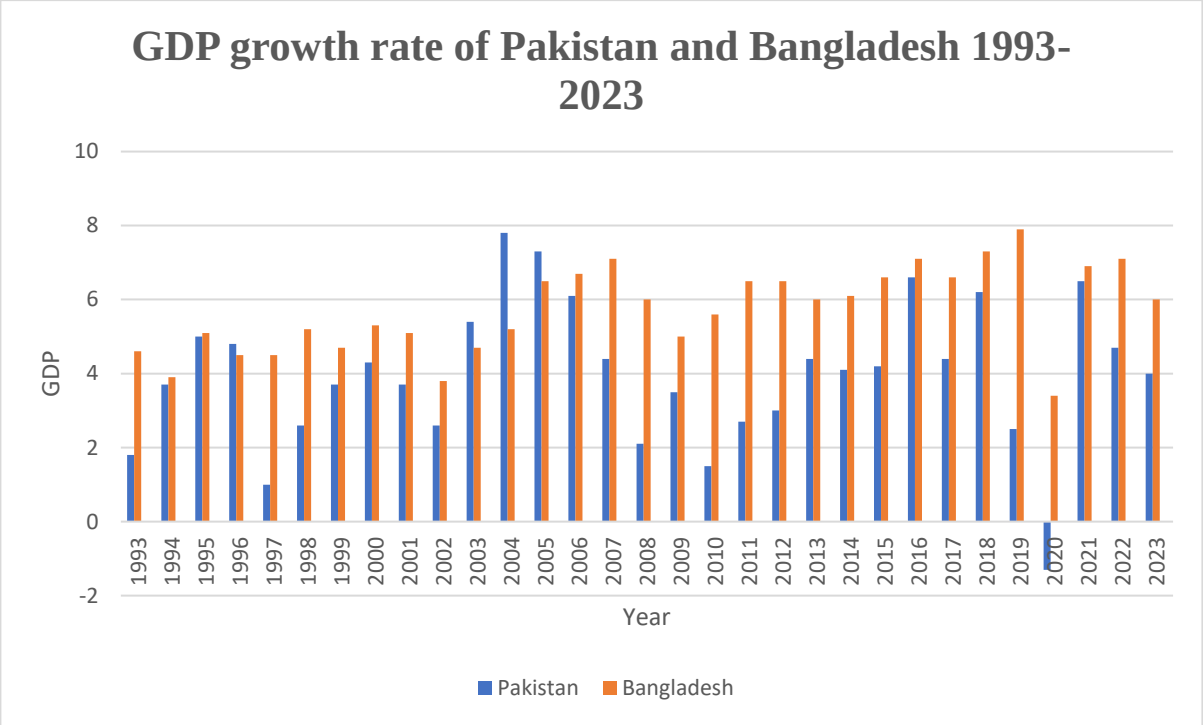
Figure 1:Comparative Analysis of Inflation Rates in Pakistan and Bangladesh (1993-2023)



The inflation rates of Pakistan and Bangladesh from 1993 to 2023 reveal distinct economic trajectories and policy impacts within each country. This period offers an extensive dataset to

analyze the differential effects of inflation on the economic stability and growth of these two South Asian nations. Below is an academic interpretation of the inflation rate trends in both countries over the specified period.

Figure 2:Comparative Analysis of GDP Growth Rates in Pakistan and Bangladesh (1993-2023)



Pakistan's GDP growth rates during this period were generally moderate, with fluctuations reflecting economic reforms and political instability. The growth rate ranged from a low of 1.8% in 1993 to a high of 4.3% in 2000. The late 1990s saw a dip due to political turmoil and economic sanctions.

Bangladesh: GDP Growth Rate Analysis (1993-2023)

1993-2002

Bangladesh exhibited steady economic growth, with rates consistently above 4%. The growth was driven by the textile industry, remittances, and agricultural productivity. The GDP growth rate peaked at 5.3% in 2000.

2003-2012

Bangladesh's economy continued to grow robustly, with growth rates consistently above 5%, peaking at 6.7% in 2006. Economic policies focusing on industrialization and export diversification significantly contributed to this growth.

2013-2023

The country maintained strong growth, with rates consistently above 6%. The growth rate peaked at 7.9% in 2019, reflecting continued industrialization, infrastructure development, and favorable demographic trends.

Comparative Interpretation

The comparative analysis reveals several key insights into the economic performances of Pakistan and Bangladesh from 1993 to 2023:

Bangladesh consistently outperformed Pakistan in terms of GDP growth rates, demonstrating greater economic stability and resilience. Bangladesh's growth was driven by consistent industrialization, export diversification, and effective economic policies. Bangladesh's proactive economic policies, focusing on industrialization and export-led growth, yielded positive results. Structural reforms and investments in key sectors such as textiles and infrastructure played a crucial role.

Problem Statement

The key aim of the research is to examine the effect of increase of prices on different product, treated as a variable which is independent, on 'Gross Domestic Product (GDP)' within the contexts of Pakistan and Bangladesh. The study seeks to undertake a comparative analysis to ascertain the relative economic standing of both nations. By contrasting the research findings from these two countries, the study makes every effort to differentiate which country exhibits a more favorable economic position and why?

Study Objectives

Transparent and attainable goals are crucial for the accomplishment of any research endeavor. This examination predicts what concerns on inflation are providing in respect of economic progress. In view of the above-mentioned detailed conversation resulting precise purposes were framed.

- *To examine:* Effect of inflation on economic growth of these two countries (Pakistan and Bangladesh) during the years 1993- 2023.
- *Measure Inflation Rate and GDP Relationship:* To analyze, correlation between inflation and GDP growth in Pakistan and Bangladesh.
- *Identify Key Problems:* To determine the factors leading to a contraction in a nation's Gross Domestic Product.
- *Propose Solutions:* To propose strategies for country with lower GDP to mitigate the negative impact of inflation and foster GDP growth

Research Questions

This research seeks to answer the following questions, which will contribute to achieving the research objective:

- What has been the effect of price rise of any commodity or services on progress of economy in Pakistan and Bangladesh from 1993 to 2023?
- How does inflation correlate with GDP growth in Pakistan and Bangladesh?
- What are the factors leading to a contraction in a nation's Gross Domestic Product?
- What strategies can be proposed for a country with a lower GDP to mitigate the negative impact of inflation and foster GDP growth?

Research Gap

There is a need for detailed comparative studies on how specific economic policies in both countries have influenced GDP growth and inflation rates. Understanding the effectiveness of various policy measures can provide insights into best practices and areas for improvement. To resolve the deficiencies of the gaps highlighted in the research paper, upcoming research be able to deliver more detailed thoughtful of the economic dynamics in Pakistan and Bangladesh, informing more effective and context-specific economic policies. This can help in designing inclusive economic policies that address broader development goals.

Limitations of the Research Paper

Historical Data Gaps: There might be gaps or inconsistencies in the historical data for GDP and inflation rates for both countries. This can affect the accuracy of the analysis and the reliability of the conclusions drawn.

Causality Issues: Establishing causality between 'inflation' and 'GDP growth' is inherently challenging due to the potential bidirectional connection. The study may not fully address endogeneity issues.

Scope of the Research

This study employs a comprehensive methodology to measure the inflation rate and its relationship with GDP. Additionally, it explores potential problems associated with GDP decline and proposes solutions to address these issues.

Literature Review

Ijaz (2021) (Pakistan) The researcher conducted an empirical study to investigate the connection between inflation and progress of economy in Pakistan, focusing specifically on the period from 2000 to 2023. Bibi (2014) (Pakistan) focuses on statistically analyzing the contributions of trade facilitation, price increases, trade in goods and services, the actual exchange rate, and foreign external capital to Pakistan's economic prosperity. Junejo (2021) (Pakistan) quantitatively investigates the impacts of purchasing, tax revenues, and inflation on the progress of economy in Pakistan. He utilizes time series data from 1990 to 2020 for supplementary analysis. After conducting root cause tests and generating the OLS (Ordinary Least Squares) regression he establish that inflation have a significantly bad effect on the progress of the economy in Pakistan. Hussain (2011) (Pakistan) empirically discovers the connection between rise in price and the progress on economy in the context of Pakistan economy. Annual data for the period of 1960-2006 has been used. According to the outcome of the research, there is a positive link between the rise in price (Inflation) and the progress of the economy in Pakistan. He used Error Correction Model (ECM) test is essential to see equilibrium. According to the outcome of the research he recommended that Pakistan must need inflation but in single digit for the progress because too fast a growth rate may also accelerate the inflation rate. This research paper reviews several empirical studies on growth and inflation rates. The reviewed research highlights the necessity for a new study to conclusively determine whether inflation positively or negatively affects economic growth. Muhammad Azam Khan and Saleem Khan (2018) (Pakistan) The objective of this study is to investigate the impact of inflation on the economic growth rates of five major Asian countries: Bangladesh, Iran, Indonesia, Malaysia, and Pakistan, spanning from 1973 to 2016.

Hypothesis 1: Inflation effect on GDP in Pakistan

One aspect of the topic under discussion is determining whether the connection between rise in prices and progress on economy is positive, negative, or nonexistent. This study represents an updated advancement of earlier research on this subject.

Table 4:Prior Empirical Study on the Effects of Inflation on Economic Growth

Author	Empirical Approach	Dependent Variable	Independent Variable	Sample Period and Country	Findings
Ijaz 2021	ADF, Engel Granger Co-integration test	GDP	Inflation	1990-2015 Pakistan	strong positive relationship
Bibi 2014	ADF, PP, DF-GLS tests Co-integration, DOLS	GDP	Trade Openness, FDI, Real Exports, Real Imports, Inflation and Real Effective Exchange Rate	1980-2011 Pakistan	Inflation has negative relationship with the GDP
Chaudhry 2013	Ordinary Least Squares (OLS),	GDP	Inflation	1972-2010 Pakistan	Inflation has negative relationship with the GDP
Junejo 2021	ADF, OLS regression	GDP	Tax Revenue, Imports	1990-2020 Pakistan	Inflation has negative impact on GDP
Hussain 2011	ADF, PP test, Granger Causality test, ECM, OLS	GDP	Inflation	1960-2006 Pakistan	Inflation has positive impact on GDP
Mwakane mela 2013	Unit root, co-integration test	GDP	Inflation	1990-2011 Tanzania	Inflation has the negative impact on GDP
Hossin 2015	ADF, Cointegration Test, Granger-Causality Test,	GDP	Inflation	1961-2013 Bangladesh	Inflation positively. effects on GDP
QadirPatol i 2012	secondary data source, OLX test	Direct Taxes	Inflation (Consumer Price Index)	2000-2010 Pakistan	Inflation positively correlated with direct Taxes
Chani 2011	ADF, ARDL, Ng-Perron Test	GDP	Inflation, Poverty	1972-2008 Pakistan	Inflation caused an increase in poverty.

Gautam Kumar Biswas (2023) (Bangladesh) examined the determinants of inflation in Bangladesh from 1986 to 2021. He uses Johansen cointegration test was employed to assess the relationship

between variables and also use Vector Auto Regression (VAR). Additionally, current GDP was positively influenced by the GDP, money supply, and inflation from the preceding year. Fariea Nazim Jui (2024) (Bangladesh) examines the impact of remittances, foreign direct investment (FDI), and inflation growth rate on GDP in three highly susceptible Asian countries: Bangladesh, Pakistan, and Sri Lanka 1987-2021. conditional Pakistan has lagged due to persistent political and economic instability, driven by erratic political administrations and fiscal policies. The results indicate that Pakistan performed better in terms of GDP, GDP annual growth rate, and trade balance during the 1st phase of the economy (1971–2000) compared to the 2nd phase of the economy phase (2000–2020).

Hypothesis 2: Inflation effect on GDP in Bangladesh

Research Methodology

Conceptual Framework

A review of the literature indicates a there is negative relationship between economic growth and inflation (Bibi, 2014), (Mwakanemela, 2013), (Gautam 2023), (Biru Paksha, 2014) and positive relationship between economic growth and inflation (Ijaz, 2021; Hussain, 2011; Hossain, 2015; Raza, 2013; Farid, 2013).

Table 5:Data Description

S No	Variable	Time Period	Data Type	Source of Data
1	GDP	1993-2023	Time Series	WDI
2	Inflation	1993-2023	Time Series	WDI

The following methodologies are employed:

Data Collection

Historical data on GDP growth rates and inflation rates are collected from reliable source such as the World Bank. In this research paper 30 years data is collected from the period of 1993- 2023. E-Views 10 software is used for this analysis.

Variable Explanation

GDP: In this study, the dependent variable is the gross domestic product (GDP). The aggregate selling price of all completed commodities and amenities produced in a nation in that particular year is the definition of GDP in accountancy. It is computed by adding up the aggregate market price of every finished item and service produced nationally in a given year.

Inflation: Particularly, the rate at which banks lend money makes up one of the growth-related variables. Great or lower variations have an effect on the economy's efficiency, which in turn affects the GDP and, ultimately, the rate of development in the economy. The degree constant increases in the average price, or the cost of products and services, that outcomes in a reduction of purchasing power, is referred to as inflation. Elevated price volatility is correlated with rising inflation. In this regression equation, GDP growth will be the dependent variable, while inflation will be the independent variable.

Here's a simplified version of the regression equation:

$GDP\_Growth_i = \beta o + \beta 1 * INF_i + \varepsilon_i$

Where:

GDP_Growth_i = GDP growth rate for either Pakistan or Bangladesh in a given year $_i$.

INF = Inflation rate for either Pakistan or Bangladesh in a given year $_i$.
βo = The base line of GDP growth when the inflation is zero.
$\beta 1$ = The changed in GDP growth for a one-unit change in inflation.
ε_i = is the error term. It represents the difference between the actual and predicted values of GDP growth.

Econometric Analysis

Unit Root Tests: Use with Augmented Dickey-Fuller (ADF) tests, Phillips-Perron (PP) tests are used to assess the stationarity and long-term relationships between the variables.
Vector Auto Regression (VAR) Model: This model is employed to capture the short-run dynamics and direct connections between inflation and GDP growth.
Diagnostic Tests: Use Residual Tests` for autocorrelation and normality tests. This method is used to ensure the suitability of the model.
Comparative Analysis: Compare the estimated models and causality results between Pakistan and Bangladesh to draw comparative conclusions about the effect of increased prices on GDP in both countries.

Theoretical Framework

Comparative analysis of the impact of inflation on the gross domestic product (GDP) between Pakistan and Bangladesh from 1993 to 2023 using EViews, the following methodology could be employed. First Collect annual data on GDP and inflation rates for both Pakistan and Bangladesh from 1993 to 2023. Obtain data from reliable sources such as World Bank. Ensure the data is clean, complete, and properly configured for study in EViews. Calculate mean, median, standard deviation, and other descriptive statistics for GDP and inflation rates for both countries and plot time series graphs for GDP and inflation rates to visualize trends over the period

Empirical Results

Summary of Descriptive Statistics

Descriptive results for inflation and GDP are mentioned in the given below table, which includes of mean, median and standard deviation for inflation and growth rate variables.

Table 6: Summary of Descriptive Statistics (1993-2023)

	Pakistan		Bangladesh	
Statistics	GDP	INF	GDP	INF
Mean	3.977419	9.370968	5.725806	6.329032
Median	4.100000	9.100000	6.000000	6.100000
Std. Dev	1.944687	5.827875	1.151511	2.306251

Bangladesh has a higher average GDP growth rate 5.73% as compared to Pakistan 3.98% over the period 1993-2023. The median GDP growth rate is also higher for Bangladesh, indicating that Bangladesh's GDP growth rates are consistently higher than Pakistan's. Pakistan has a greater standard deviation in the growth of GDP, suggesting higher inconsistency in the growth of economy as compared to Bangladesh. Pakistan has a higher average inflation rate 9.37% as compared to Bangladesh 6,32% over the same period.

Results and Discussion

Unit Root Analysis

To measure stationarity, the unit root test has been working to ascertain whether the variables display stationary properties. Initially, this research examines the presence of a unit root by applying both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Confirming the data is stationary is crucial for the validity of the analysis results. If the data is not stationary, the outcomes of the tests will be extracted invalid.

Table 7:Augmented Dickey-Fuller (ADF) and Phillips Perron test statistics of Pakistan and Bangladesh

		Pakistan		Bangladesh	
	Variable	**t-stat**	**P value**	**t-stat**	**P value**
ADF test	**GDP**	-4.188705	0.0028	-5.071244	0.0015
	INF	-0.521790	0.8733	-4.006812	0.0044
	dINF	-4.572757	0.0011		
Phillips Perron	**GDP**	-4.098466	0.0003	-5.071990	0.0015
	INF	-0.934530	0.7629	-3.977977	0.0047
	dINF	-5.012372	0.0019		

The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test statistics are used to check for the existence of unit roots in time series data, Pakistan's (ADF) Test GDP is stationary. Inflation is non-stationary. Thus, first-differenced Inflation (dINF) is stationary. But Bangladesh's (ADF) Test GDP is stationery and Inflation is stationary.

Lag Length Criteria

A Vector Error Correction Model (VECM) or VAR model was projected after I determined the proper lag(s) for my models utilizing various information criteria.
I must choose the ideal lag 1 for the VAR model's estimation based on the Hannan-Quinn Criterion (HQ) and Akaike Information Criterion (AIC).

Table 8:Lag Selection Criterion

Pakistan			Bangladesh		
Lags	AIC	HQ	Lags	AIC	HQ
0	10.75978	10.78832	0	7.30700	7.389242
1	10.08219*	10.16782*	1	7.280872*	7.366499*
2	10.29083	10.43354	2	7.508503	7.651214
3	10.52911	10.72890	3	7.606122	7.805917
4	10.59531	10.85219	4	7.751034	8.007914

Estimation of VAR model

The subject model is used to forecast the relationship that affects each other. The value in the square bracket provides the result in T statistics. The value for the 5% level of significance is 1.96 in T statistics. The variable at lag 1, 2, 3 and 4 is insignificant if the value is less than 1.96 and if the variable at lag 1, 2, 3 and 4 is significant at that lag length if this value is greater than 1.96.

Table 9:Pakistan and Bangladesh VAR model estimated results

Pakistan			**Bangladesh**		
	GDP	INF		GDP	INF
GDP (-1)	0.179687	0.835782	GDP (-1)	0.323619	0.128388
	(0.18198)	(0.39841)		(0.18138)	(0.38139)
	[0.98738]	[2.09777]		[1.78425]	[0.33663]
INF (-1)	0.115374	1.006595	INF (-1)	0.102883	0.244534
	(0.07912)	(0.17321)		(0.09422)	(0.19813)
	[-1.45823]	[5.81130]		[1.09192]	[1.23422]
C	4.339197	-2.731002	C	3.274064	4.186673
	(1.17651)	(2.57571)		(1.01636)	(2.13718)
	[3.68819]	[-1.06029]		[3.22137]	[1.95897]

Pakistan VAR Model Summary

In GDP Equation: GDP (-1) coefficient is 0.179687 with a standard error of 0.18198. The t-statistic is 0.98738, which suggests that the lagged GDP value is not statistically significant in predicting current GDP at conventional significance levels. Inflation (-1) coefficient is -0.115374 with a standard error of 0.07912. The t-statistic is -1.45823, indicating that lagged inflation is not a statistically significant predictor of current GDP.

In Inflation Equation: GDP (-1) coefficient is 0.835782 with a standard error of 0.39841. The t-statistic is 2.09777, suggesting that lagged GDP is statistically significant in predicting current inflation at the 5% level. Inflation (-1) coefficient is 1.006595 with a standard error of 0.17321. The t-statistic is 5.81130, indicating strong statistical significance, meaning that lagged inflation is a very strong predictor of current inflation.

In Constant Terms: GDP Equation the constant term is 4.339197 with a standard error of 1.17651. The t-statistic is 3.68819, suggesting it is statistically significant. Inflation Equation the constant term is -2.731002 with a standard error of 2.57571. The t-statistic is -1.06029, indicating it is not statistically significant.

Bangladesh VAR Model Summary

In GDP Equation: The t-statistic indicates this relationship is not statistically significant. The average GDP growth rate when the lagged values of GDP and inflation are zero. The constant term is statistically significant.

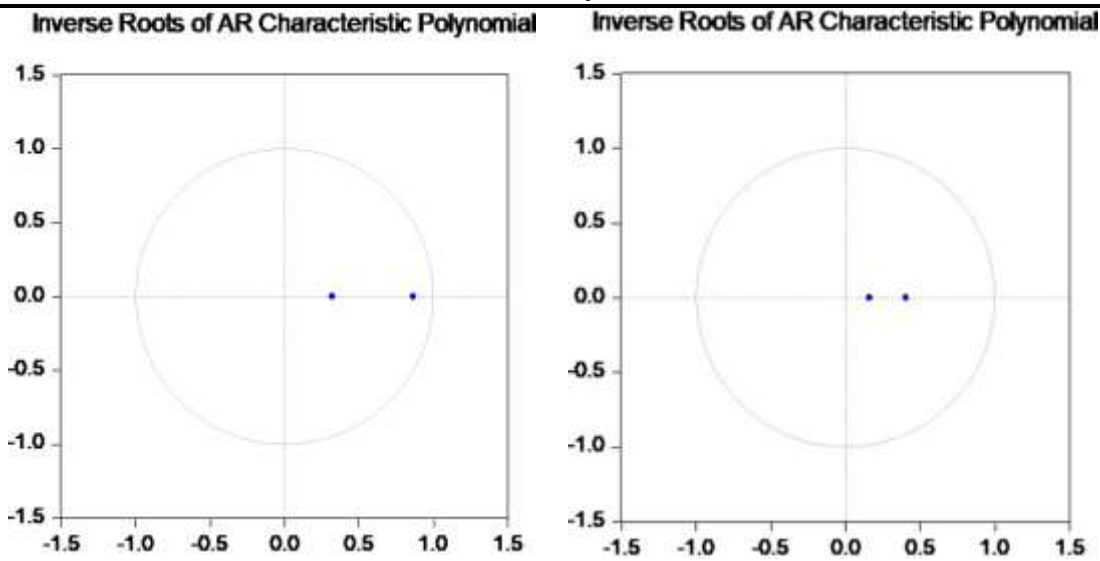
In Inflation Equation: One percent growth in GDP during the preceding period is related to a 0.13 percent growth in inflation in the current period. T-Statistics displays this connection is not statistically significant. However, one percent growth in inflation during the preceding period is related to a 0.24 percent growth in inflation in the current period. The t-statistic suggests this relationship is not statistically significant.

In constant term: the average inflation rate when the lagged values of GDP and inflation are zero. The constant term is marginally significant. Inflation equation 4.556 The model indicates that past values of GDP and inflation have some predictive power on current values, but the relationships are not strong, especially for inflation.

Auto Regression Root Pakistan and Bangladesh

Stability is achieved when all the roots of the characteristic AR polynomial lie within the unit circle, meaning their moduli are less than one. For a VAR system to be stable, it must be stationary. Conversely, if any of the estimated roots fall outside the unit circle, with moduli greater than one, the estimated VAR is deemed unstable.

Figure 3:Inverse Roots of AR characteristic Polynomial



Pakistan Bangladesh

VAR satisfies the stability condition therefore no root lies outside the unit circle (in Fig.3 Bangladesh and Pakistan).

Table 10: Granger causality tests of Pakistan and Bangladesh

Granger Cointegration causality test			
	Pakistan		
Null Hypotheses	**Direction of causality**	**F-statistics**	**Probability**
Inflation does not granger cause GDP	**INF → GDP**	1.49194	0.2451
GDP does not Granger cause Inflation	**GDP → INF**	2.3775	0.1143
	Bangladesh		

Null Hypotheses	Direction of causality	F-statistics	Probability
Inflation does not granger cause GDP	**INF → GDP**	0.38734	0.6830
GDP does not Granger cause Inflation	**GDP → INF**	0.16316	0.8504

The Granger causality tests of Pakistan: Indicate that Inflation does not Granger cause GDP. This implies that historical values of inflation do not provide significant predictive power for future values of GDP in the sample period. GDP does not Granger cause inflation. This implies that historical values of GDP do not provide significant predictive power for future values of inflation in the sample period The probability value (p-value) for this test is 0.2451, which is greater than the common significance level of 0.05.

The Granger causality tests of Bangladesh: The p-value is 0.8504, which is also significantly greater than 0.05. This indicates that we fail to reject the null hypothesis. Therefore, we do not have enough evidence to say that past values of GDP help predict Inflation.

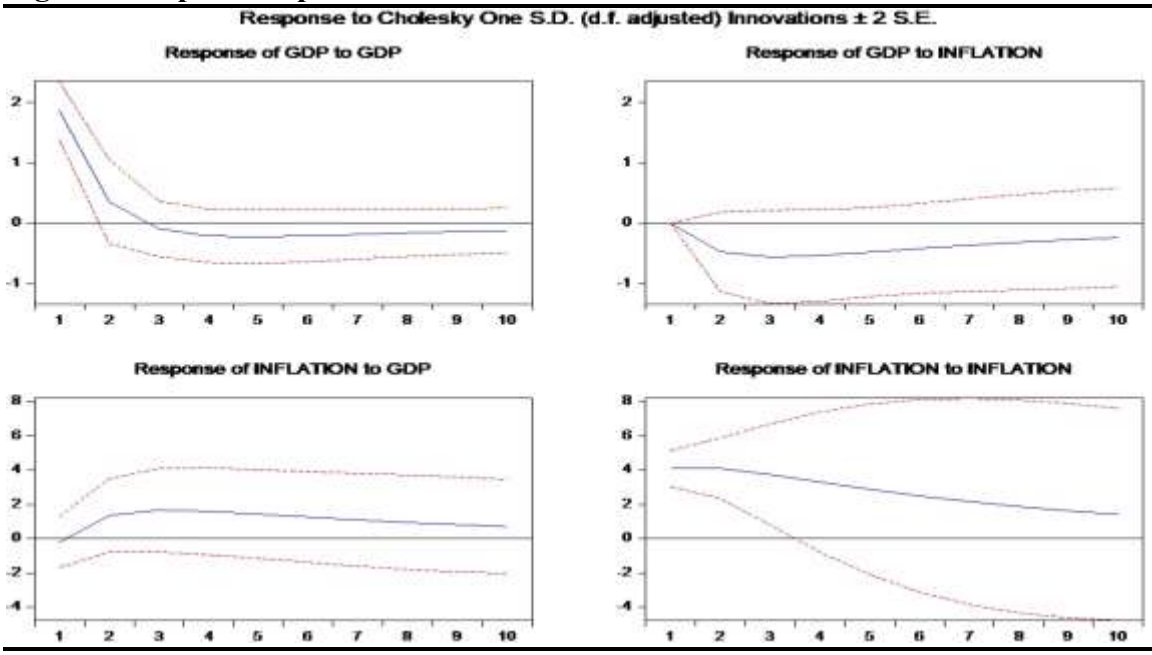
Impulse Function's Response

A shock's impact on a series' behavior is tracked over time using an impulse response function.

Impulse Response of Pakistan

The image shows the impulse response functions (IRFs) from a Vector Autoregression (VAR) model. The IRFs illustrate the dynamic effects of a one-standard-deviation shock to each variable on all variables in the system over a ten-period horizon. The graphs show the responses of GDP and inflation to shocks in GDP and inflation, with the blue lines representing the impulse responses and the red dashed lines representing the confidence intervals (±2 standard errors). Over time, the response of GDP becomes less negative and moves towards zero, suggesting that the negative impact of an inflation shock on GDP reduces over time. The response of inflation to a shock in GDP is initially positive, indicating that an increase in GDP leads to an increase in inflation. It remains positive for several periods, suggesting a persistent effect of GDP shocks on inflation before eventually stabilizing. The response of inflation to its own shock is initially very strong and positive, indicating that a positive shock to inflation leads to a significant increase in inflation. Over time, the response declines, eventually becoming negative, indicating that the initial increase in inflation is followed by a reduction.

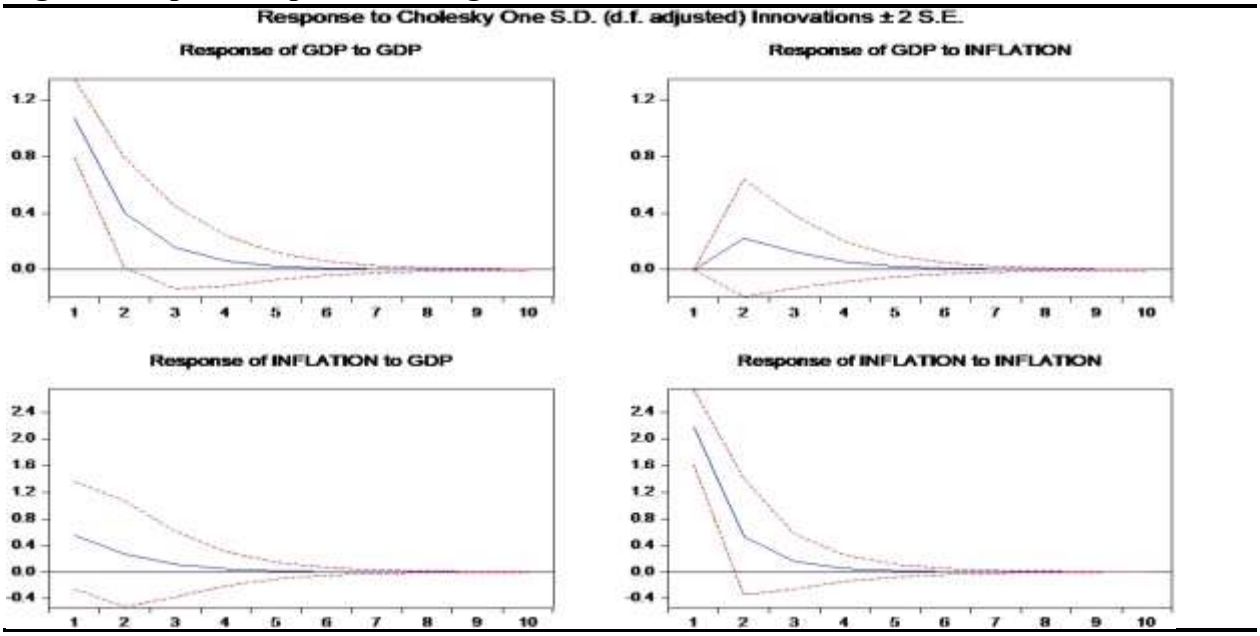
Figure 4: Impulse response of Pakistan



Impulse Response of Bangladesh

GDP to GDP shows an immediate positive effect, peaking at around 1.2 units in the first period and then gradually declining over the subsequent periods. The effect diminishes and becomes statistically insignificant (within the confidence bands) after about 5 periods. A positive shock to GDP has a strong initial impact, but this impact diminishes over time, indicating that GDP growth tends to revert to its mean after a shock. Response of GDP to Inflation is initially slightly positive, peaking around the second period before gradually declining and becoming statistically insignificant. An inflation shock has a strong short-term effect on future inflation, suggesting that inflation tends to persist in the short run but the effect diminishes over time.

Figure 5:Impulse response of Bangladesh



Variance Decomposition Analysis

A way for determining the proportion of a time series' prediction error variance that can be assigned to the shock wave from each variable is entitled variance decomposition.

Table 11:Variance Analysis of Pakistan

Variance Decomposition of GDP

Period	S. E	GDP	Inflation
1	1.865503	100.0000	0.00000
5	2.179946	78.06270	21.93730
10	2.328340	70.89553	29.10447

Variance Decomposition of Inflation

Period	S. E	GDP	Inflation
1	4.084113	0.253064	99.74694
5	8.709124	12.16682	87.83318
10	9.987523	14.12214	85.87786

GDP Variance Due to GDP Initially, nearly 100% of the variance in GDP is due to its own shocks. Over time, this percentage gradually decreases but remains high, stabilizing around 80%. This indicates that while other factors (such as inflation) start to play a role, GDP's own shocks remain the predominant source of variance. This indicates that inflation shocks start to have a noticeable impact on GDP variance over a longer horizon. Initially, GDP contributes very little to the variance in inflation. Over time, the contribution increases and stabilizes around 20% by the tenth period. This suggests that GDP shocks begin to play a role in explaining the variance in inflation over time, though not as dominant as inflation's own shocks.

Table 12:Variance Analysis of Bangladesh: *Variance Decomposition of GDP*			
Period	S. E	Inflation	GDP
1	2.252474	100.0000	0.00000
5	2.340678	99.54542	0.454579
10	2.340713	99.54466	0.455344
Variance Decomposition of Inflation			
Period	S. E	Inflation	GDP
1	1.071189	5.982187	94.01781
5	1.187713	14.26743	85.73257
10	1.187818	14.27770	85.72230

In Inflation Initially (Period 1), 100% of the forecast error variance in Inflation is due to its own shocks. Over time, the proportion decreases slightly but remains very high, with about 99.54% of the variance in Period 10 still being attributed to Inflation itself. The contribution of GDP's own shocks decreases but still remains predominant at 85.72% by Period 10.

Diagnostic Test

To assessed the stability of model, I used numerous diagnostic tests. Initially, I engaged the Auto Correlation test then normality test.

Auto Correlation LM Test

The VAR Residual Serial Correlation LM Tests provide information about the presence of serial correlation in the residuals of the VAR model.

Table 13:Auto Correlation LM test of Pakistan						
No hypothesis: No serial correlation at lag h						
Lag	LRE stat	df	Prob	Rao-F stat	df	prob
1	2.802459	4	0.5914	0.706322	(4,48.0)	0.5916
6	4.692485	4	0.3203	1.206005	(4,48.0)	0.3250
11	9.703725	4	0.0457	2.628064	(4,48.0)	0.0458
No hypothesis: No serial correlation at lag 1 to h						
Lag	LRE Stat	df	Prob	Rao-F stat	df	Prob
1	2.802459	4	0.5914	0.706322	(4,48.0)	0.5916
6	32.13090	24	0.1238	1.492519	(24,28.0)	0.1538
11	72.13491	44	0.0047	2.005470	(44,8.0)	0.1495

For individual lags, most p-values are well above conventional significance levels (e.g., 0.05), indicating no significant serial correlation at those lags.

Table 14:Auto Correlation LM test of Bangladesh

No hypothesis: No serial correlation at lag h						
Lag	LRE Stat	df	Prob	Rao-F stat	df	Prob
1	2.323905	4	0.6764	0.582831	(4,48.0)	0.6765
6	3.727599	4	0.4441	0.948502	(4,48.0)	0.4443
11	5.376792	4	0.2508	1.391727	(4,48.0)	0.2510
No hypothesis: No serial correlation at lag 1 to h						
Lag	LRE Stat	df	Prob	Rao-F stat	df	Prob
1	2.323905	4	0.6764	0.582831	(4,48.0)	0.6765
6	11.68075	24	0.9833	0.407391	(24,28.0)	0.9858
11	40.65074	44	0.6160	0.556782	(44,8.0)	0.8964

The results of the VAR Residual Serial Correlation LM Tests indicate that there is no significant serial correlation in the residuals of the VAR model at any individual lag or for any joint test up to lag 11. This suggests that the VAR model is well-specified in terms of handling autocorrelation, and the residuals are behaving as expected, enhancing the reliability of the model estimates.

Normality Test

The VAR Residual Normality Tests evaluate whether the residuals from a Vector Autoregression (VAR) model are multivariate normal. The test uses several metrics to check the normality of the residuals for each component as well as jointly.

Normality Test of Pakistan

Skewness: The p-values for both components are greater than 0.05, indicating that there is no significant skewness in the residuals. Joint test: The p-value is also greater than 0.05, suggesting that the residuals jointly do not exhibit significant skewness.

In Kurtosis component 1 and component 2 show significant kurtosis individually. The joint kurtosis test is also not significant, indicating that the residuals do not exhibit significant excess kurtosis overall.

Jarque-Bera Test: The p-values for both components are greater than 0.05, indicating that the residuals are normally distributed. Joint test: The p-value is greater than 0.05, suggesting that the residuals jointly are normally distributed.

Table 15:Normality Test of Pakistan

Component	Skewness	Chi-sq	df	Prob
1	-0.491380	1.207269	1	0.27190
2	1.213786	0.366381	1	0.8366
Joint		0.573651	2	0.4137
Component	Kurtosis	Chi-sq	df	Prob
1	3.419593	0.220073	1	0.6390
2	2.319000	0.174703	1	0.1403
Joint		0.394775	2	0.3020
Component	Jarque-Bera	df		Prob
1	1.427342	2		0.4898
2	0.541084	2		0.2285
Joint	1.96843	4		0.5269

Null hypotheses: Residual are multivariate normal
Normality Test of Bangladesh

Skewness: The p-values for both components are greater than 0.05, indicating that there is no significant skewness in the residuals. Joint test: The p-value is also greater than 0.05, suggesting that the residuals jointly do not exhibit significant skewness.

Kurtosis: The p-values for both components are greater than 0.05, indicating that there is no significant excess kurtosis in the residuals. Joint test: The p-value is greater than 0.05, suggesting that the residuals jointly do not exhibit significant excess kurtosis.

Jarque-Bera Test: The p-values for both components are greater than 0.05, indicating that the residuals are normally distributed. Joint test: The p-value is greater than 0.05, suggesting that the residuals jointly are normally distributed.

Table 16:Normality Test of Bangladesh

Null hypotheses: Residual are multivariate normal

Component	Skewness	Chi-sq	df	Prob
1	-0.598227	1.789378	1	0.1810
2	0.066073	0.021828	1	0.8825
Joint		1.811206	2	0.4043
Component	Kurtosis	Chi-sq	df	Prob
1	3.883941	0.976690	1	0.3230
2	2.809060	0.045572	1	0.8310
Joint		1.022263	2	0.5998

Component	Jarque-Bera	df	Prob
1	2.766068	2	0.2508
2	0.067401	2	0.9669
Joint	2.833469	4	0.5861

Concluding Remarks

Bangladesh has achieved higher and more consistent GDP growth rates compared to Pakistan. Bangladesh's lower standard deviation indicates that its economic growth has been more stable and predictable. Pakistan has faced significantly higher inflation rates on average compared to Bangladesh. The high standard deviation in Pakistan's inflation rates indicates that inflation has been highly volatile, with large fluctuations over the period. Bangladesh exhibits both higher economic growth and more stable inflation rates, making its economic environment appear more stable and predictable compared to Pakistan. Overall, the statistics suggest that Bangladesh has managed to sustain higher and more stable economic growth while maintaining lower and less volatile inflation rates compared to Pakistan from 1993 to 2023. Pakistan VAR model provides useful insights into the lagged relationships between GDP and inflation, particularly highlighting the persistence of inflation and its influence on economic output.

Bangladesh VAR model results suggest that while there is some degree of autoregressive behavior in GDP and inflation, the predictive power is limited, and other factors may be influencing these variables significantly. These results suggest that, within the context of this VAR model and sample period of Pakistan there is no strong evidence of a unidirectional or bidirectional predictive relationship between GDP and inflation.

Policy Recommendations

High inflation and low GDP growth are primary economic challenges in Pakistan. Conversely, in Bangladesh, both inflation and GDP increase concurrently. Analyzing Bangladesh's economic strategies reveals critical steps that have bolstered its economy. Bangladesh relies minimally on foreign aid, instead utilizing its own resources to sustain its population. Globally, poverty reduction remains a significant hurdle in economic development, as no nation can progress with high poverty levels. Bangladesh has effectively reduced poverty through its robust export sector, particularly as the world's largest exporter of garments. Youth populations are crucial for national development, with several countries having substantial young demographics. However, many fail to harness this potential, and Pakistan is a notable example. A nation's development is strongly tied to empowering its youth, and Pakistan must create opportunities for young people to innovate and implement new ideas with government support. Despite being one of the countries with the largest youth populations, a significant portion of Pakistani youth is unemployed. To address this, Pakistan must generate jobs and opportunities for its youth. Since 2018, the Pakistani government has introduced a 'youth loan scheme' to support business initiatives. However, this measure alone is insufficient to stimulate substantial economic growth.

References

- Afzal, M. (2007). Exchange rate response of import demand in Pakistan. *Sarhad Journal of Agriculture*, *23*(4), 1181.
- Bibi, S., Ahmad, S. T., & Rashid, H. (2014). Impact of trade openness, FDI, exchange rate and inflation on economic growth: A case study of Pakistan. *International Journal of Accounting and Financial Reporting*, *4*(2), 236.
- Biswas, G. K. (2023). Inflation dynamics of Bangladesh: An empirical analysis. *European Journal of Business and Management Research*, *8*(3), 288-292.
- Hossin, M. S. (2015). The relationship between inflation and economic growth of Bangladesh: An empirical analysis from 1961 to 2013. *International Journal of Economics, Finance and Management Sciences, 3*(5), 426-434.http://www.worldbank.org
- Hussain, S., & Malik, S. (2011). Inflation and economic growth: Evidence from Pakistan. *International Journal of Economics and Finance, 3*(5), 262-276.
- Ijaz, U. (2021). Impact of inflation on economic growth in Pakistan. *Economic Consultant*, *2* (34), 33-41.
- Jui, F. N., Hossain, M. J., Das, A., Sultana, N., & Islam, M. K. (2024). Analyzing the impact of remittance, FDI and inflation rate on GDP: a comparative study of Bangladesh, Pakistan and Sri-Lanka using var and Bekk-Garch approach. *Heliyon*.
- Junejo, I., Faiz, M., Qazi, N., & Tipu, A. A. K. (2021). Impact of inflation, imports and tax revenue on economic growth of Pakistan: An empirical study from 1990-2020. International *Research Journal of Management and Social Sciences, 2*(2), 87-95.
- Muhammad, A. Z. A. M., & Saleem, K. H. A. N. (2018). Inflation and the economic growth: evidence from Five Asian Countries. *Pakistan Journal of Applied Economics*, *28*(2), 235-252.
- Mwakanemela, K. (2013). Impact of inflation on economic growth: A case study of Tanzania.
- Paul, B. P., & Zaman, H. (2015). When and why does Bangladesh's inflation differ from India's?. *Macroeconomics and Finance in Emerging Market Economies*, *8*(1-2), 45-66.

- Raza, S. H., Javed, M. R., & Naqvi, S. M. A. (2013). Economic growth and inflation: A time series analysis of Pakistan. *International Journal of Innovative Research and Development*, *2*(6), 689-703.
- Saymeh, A. A. F., & Orabi, M. M. A. (2013). The effect of interest rate, inflation rate, GDP, on real economic growth rate in Jordan. *Asian Economic and financial review*, *3*(3), 341.
- Shah, S. (2021). Pakistan and Bangladesh: Comparative Economic Analysis (1971-2020). *Available at SSRN 3920349*.
- Uddin, I., & Rahman, K. U. (2023). Impact of corruption, unemployment and inflation on economic growth evidence from developing countries. *Quality & Quantity*, *57*(3), 2759-2779.
- Upreti, P. (2015). Factors affecting economic growth in developing countries. *Major Themes in Economics*, *17*(1), 37-54.