ISSN Online: 3006-4708
SOCIAL SCIENCE REVIEW ARCHIVES ISSN Print: 3006-4694
https://policyjournalofms.com

Inflation and Economic Growth in Pakistan: Threshold Effects and Policy Implications

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DOI: https://doi.org/10.70670/sra.v3i3.951

Abstract

The core aim of the study is to reconsider the existence and nature of the inflation economic growth relationship within the setting of the Pakistani economy by specifically deliberating the aspect of whether or not inflation affects economic growth positively or negatively through the income measured in GDP. The other issue examined in this research is whether the relationship works at the same level in various levels of inflation or whether it alters when a threshold is attained. Official national and international statistics were used to collect annual time series data that covered the time period between 1970 and 2019. Analysis of the data was done through Ordinary Least Squares (OLS) estimation process with descriptive statistical analysis being used to provide a profile of past trends. The empirical findings show a positive yet insignificant relationship between the inflation and growth in GDP in Pakistan indicating that low inflation might not be necessarily disastrous to the economy. Nevertheless, there exists a negative impact of inflation on GDP growth at a threshold level of about 7.5%. This implies that non-linear relationship exists. These results are consistent with the economic principles that moderate inflation may be used to boost production within an economy, yet continued high inflation reduces purchasing power, which deters investment and long term growth. On the basis of analysis, the study suggests that policymakers and the State Bank of Pakistan should keep the inflation rate lower and constant at the determined threshold level of 7.5 percent to improve the possible positive effect to the economic growth. This optimal range of price stability would be an effective macroeconomic tool to ensure that sustainable development is boosted in Pakistan.

Keywords: Economic Growth , Ordinary Least Squares Method (OLS), Inflation, GDP, Pakistan Economy, Inflation Threshold, Monetary Policy, Time Series Analysis.

Introduction

The primary goal of macroeconomic policymakers is to achieve high and sustained economic growth while maintaining low inflation. As a result, because inflation has major implications for growth and income distribution, it has been one of the most investigated problems in

macroeconomics for many years. What variables influence inflation rates has also been hotly disputed around the world. Inflation caused by a rise in aggregate demand is referred to as “demand-pull inflation,' whereas supply shocks are thought to create” cost-push inflation.' This is thought to have a strong positive relationship with the production gap.

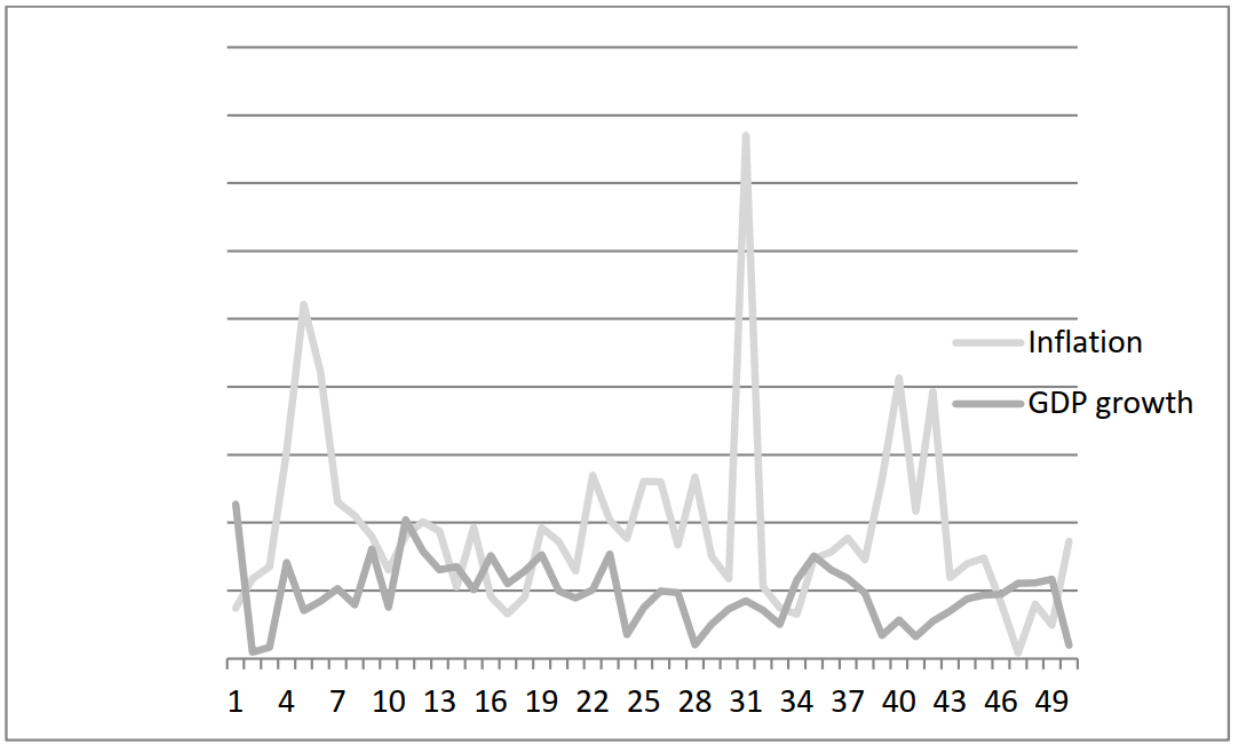
The relationship between growth and inflation is conditional depends on the state of the economy. High growth without an increase in inflation is feasible if the economy's potential output grows fast enough to keep up with demand. It is also feasible if the actual output is less than the potential output (i.e., there is a negative output gap) and there is enough spare capacity to accommodate the demand pressures. When actual output equals potential output, there is no spare capacity, and the economy is operating at full employment, any additional increase comes at the expense of growing inflation. If demand continues to rise at this rate while productive capacity remains stagnant, there is a risk of a significant rise in general prices in the long run with no additional growth in output. This period of growing inflation may have serious economic effects. Inflationary pressures are always associated with higher price volatility, which might raise concerns about the future profitability of investment projects. As a result, more conservative investment selections are made than would otherwise be the case. It will eventually result in decreased levels of investment and economic growth. Inflation can also effect on an economy's balance of payments by making exports more expensive. Furthermore, inflation can interact with the tax system, causing borrowing and lending decisions to be disrupted. Firms may need to devote additional resources to combat the consequences of inflation. This research seeks to examine these issues in the context of Pakistan's economy. Its purpose is to re-examine the relationship between inflation and growth using data from the last 50 years of the economy.

Inflation and economic growth trends in the Case of Pakistan

Food price increases account for a large portion of Pakistan's inflation. It might be owing to lower agricultural production or a 'so-called' lack of goods and services in the economy generated by the "giants" of the manufacturing sector. Several supply and demand- side issues could also be to blame for Pakistan's rising inflation. Inflation could be caused by disruptions in the supply of specific food commodities as well as disruptions in global oil markets. Furthermore, fluctuating oil prices in the global market could be another source of rise in the general price level of practically all other commodities due to strict wage and pricing structures.

Rising import prices are also regarded as a significant element influencing inflation. In this case, a depreciating currency might also put upward pressure on the price level. Similarly, some identified indirect taxes as the primary source of inflation. Wheat support price has also been identified as a key predictor of inflation in Pakistan. Inflation, regardless of cause, impacts the poor the most because food accounts for more than half of the low-income person's budget. It also redistributes income from fixed income earners to asset owners and large and variable income earners, such as profits (Hasan et al. 1995 and, Khan and Qassim, 1996). In the long run, the excess money supply is the primary cause of inflation; however, other factors, such as structural difficulties, also influence the rate of inflation (Khan and Schimmel pfennig, 2006). This discussion demonstrates that inflation and many areas of Pakistan's economy are intertwined. Inflation may cause an increase in economic productivity, while hyperinflation harms the growth of all sectors of the economy.

In this section, we will look at the historical trends of inflation and GDP growth rate across the study period. Several dramatic swings in inflation and GDP growth rate have been witnessed in Pakistan's economy from 1970 to 2019. A negative GDP growth rate has not been observed in any fiscal year, yet we are unable to define it as a consistent growth rate for the economy.



The following figure shows that the GDP growth rate and CPI inflation are adversely connected with each other. The GDP growth rate has slowed as the economy's inflation rate has risen into the double digits. The maximum GDP growth rate of 8.7 percent was observed in the fiscal year 1984-85, when the equivalent CPI inflation rate was 5.7 percent. It is also demonstrated that the minimum GDP growth rate maintained 1.2 percent throughout fiscal years 2008-2009, despite a considerably high inflation rate of 20.8 percent. This circumstance shows that inflation and GDP growth rates have a negative relationship.

The Motivation of the study

The motivation behind this study is the Pakistan is abounded with natural endowments, having geographic advantage , a large number of the labor force and accumulated high capital and technology but still unable to join the group the developed nations. Is there any other factor that affect economic growth of Pakistan? A different study has been conducted on the affect of inflation on economic growth. But there is still a need to study the effect of inflation in Pakistan on economic growth and determine a threshold level.

Objectives

1. To investigate that evidence the support null hypothesis or alternative hypothesis.

Ho = Increase in inflation will enhance economic growth H1 = Increase in inflation will adverse economic growth.

H2 = To determine and investigate the feasible level of inflation for GDP growth.
H3 = It is not possible to determine and investigate the feasible level of inflation for GDP growth.

Literature Review

Several kinds‟ researches on the topic of inflation and growth have been presented. The majority of this study has been conducted on a global scale. We thoroughly analyzed some of these major empirical studies to set objectives in the context of Pakistan and then analyze them in to derive some crucial conclusions and policy recommendations.

Barro (1995) investigates the problem and discovers a strong negative association between inflation and economic growth when controlling for variables such as fertility rate, education, and so on. The study uses a large sample data set of more than 100 economies from 1960 to 1990 to examine the effects of inflation on growth. A system of regression equations is utilized to assess the effects of inflation on growth, while many other factors of growth are held constant. This paradigm is based on Barro and Sala-i-Martin's (1995) extended understanding of the neoclassical growth model. According to the findings, there is a statistically significant negative association between inflation and economic growth. More specifically, a 10% increase in average annual inflation per year reduces real GDP growth by 0.2 to 0.3 percentage points per year.

Bruno and Easterly (1995) investigate the relationship between inflation and growth and find no indication of a persistent association between these variables up to a particular degree of inflation. They believe that growth declines strongly during discrete high inflation crises (over 40%) and then returns after inflation falls. Their empirical study reveals a temporal negative association between these two variables above the 40% threshold level. They believe that the discrete high inflation problem has done no enduring harm to economic growth.

Sarel (1996) investigates the possibility of non-linear effects of inflation on economic development and discovers a major structural break in the function that connects economic growth to inflation at an annual average inflation rate of 8%. His findings reveal that inflation has a little favorable influence on growth below that structural break but has a powerfully negative effect on growth above the 8% inflation rate. These results were discovered using the OLS technique after establishing a joint panel database by gathering annual data from 87 nations from 1970 to 1990.

Khan and Qasim (1996) analyze the primary causes of inflation in Pakistan using annual time series data from 1971 to 1995. They divide inflation into food and non-food inflation and argue that the money supply plays a significant influence in increasing inflation in Pakistan. Currency depreciation, value addition in agriculture, wheat support prices, import costs, and electricity prices are among the other issues evaluated by the researchers.

Ghosh and Phillips (1998) investigate the short-run repercussions of rapid deflation and discover that, starting with lower inflation rates, rapid deflation is associated with a reduction in GDP growth. They use a large panel data set spanning IMF member countries from 1960 to 1996. In the inflation-growth relationship, they discover two significant nonlinearities. Inflation and growth are positively associated at very low inflation rates (about 2–3 percent per year or less). Otherwise, inflation and growth are inversely correlated, but the connection is convex, so the drop in growth associated with increasing inflation from 10% to 20% is significantly bigger than the decline in growth associated with increasing inflation from 40% to 50%.

Nell (2000) investigates whether inflation is always detrimental to growth. Using the Vector Auto- Regressive (VAR) technique on data from the South African economy from 1960 to 1999, he found that inflation in the single- digit zone may be helpful to growth, whereas inflation in the double digit zone appears to impose costs in the form of slower growth.

Faria and Carneiro (2001) study the relationship between inflation and output in the Brazilian economy, where a constant inflationary shock has been recorded for many years. To test the hypothesis that inflation has a long-run impact on output, they utilize a bivariate vector auto-regression composed of output growth and the change in inflation. They also assess the short term link between inflation and real output using data from the same period, 1980-1995. Their findings support Sidrauski's theory of money super neutrality, which states that inflation has no long-run influence on output and productivity. Their findings imply that inflation has a real impact on output in the short run.

Malik and Chowdhury (2001) find a long-run positive link between GDP growth rate and inflation for four South Asian nations using co-integration and error correction models. Thei findings support the Structuralists' point of view, indicating that moderate inflation is beneficial to the growth and that quicker economic growth feeds back into inflation. As a result, the authors advocate moderate inflation for the economies of Bangladesh, India, Pakistan, and Sri Lanka.

Khan and Senhadji (2001) investigate the effects of inflation thresholds on growth in both developed and developing countries. The data set includes 140 countries from both categories, and non-linear least squares (NLLS) and conditional least squares (CLS) methods are employed to analyze it. The empirical findings support the existence of a threshold at which inflation has a detrimental impact on growth. Significant thresholds of 1-3 percent and 11-12 percent inflation have been discovered for both industrialized and underdeveloped countries. This study clearly supports the concept that low inflation is necessary for long-term growth.

Gillman et al.(2002) use two samples of OECD and APEC member nations from 1961 to 1997 to propose an econometric model with the feature of the inflation rate lowering the return on capital. The central variable is the inflation rate, and the theory is related to the concept of equilibrium along the balanced growth route, which implicitly incorporates transitional approaches to the balanced growth rate. Consistent with Khan and Senhadji (2000), the data reveal that the effectiveness is negative and significant for the OECD at low inflation rates. When the inflation rate falls from 0-10% to 0-50%, the negative co-efficient roughly doubles in magnitude and stays highly significant.

Gokal and Hanif (2004) examine many economic theories in order to reach an agreement on the inflation-growth link in the Fijian economy. Their findings demonstrate that there is a slight negative link between inflation and growth, whereas changes in the output gap have a considerable impact. From GDP growth to inflation, the causality between the two variables was one-way.

Sweidan (2004) investigates the relationship between inflation and economic growth in Jordan and discovers a structural break point at 2% inflation. Another topic addressed by the study is the impact of inflation uncertainty on economic growth and development. As a result, the effects of inflation on growth are larger than the effects of inflation uncertainty and fluctuation.

Ahmed and Mortaza (2005) investigate the relationship between real GDP and CPI and discover a 6 percent inflation threshold for Bangladesh's economy. The empirical evidence shows that these two variables have a statistically significant long-run negative association.

Mubarik (2005) calculates the inflation threshold in Pakistan using annual data from 1973 to 2000. His study's empirical findings show a 9 percent threshold level of inflation for Pakistan's economy, above which inflation is very unfriendly to economic growth. The study builds on the work of Khan and Senhadji (2001), who calculated threshold levels for both emerging and developed countries, including Pakistan. They analyze panel data from 140 developing and developed economies from 1960 to 1998 to propose threshold levels of 1-3 percent and 7-11 percent for each group of countries.

Hussain (2005) finds no definitive threshold level of inflation for Pakistan and only advises that inflation in the 4-6 percent range is tolerable for the Pakistani economy. According to the researcher, Mubarik's (2005) 9 percent threshold level for Pakistan appears to be on the high side. He also employs the methods of Khan and Senhadji (2001) and Singh (2003) in advising central bank officials to keep inflation low and stable, regardless of any threshold level.

Khan and Schimmelpfenning (2006) develop a simple inflation model using data from Pakistan's economy from January 1998 to June 2005 and discover that monetary factors determine inflation in Pakistan. They investigate the long-term link between the CPI and private- sector lending, and their findings indicate that, while there may be no trade-off between inflation and growth in the short run, it does exist in the medium and long run. Their estimated results point to a 5% inflation objective for the economy's long-term growth and macroeconomic stability.

Kemal (2006) discovers that an increase in money supply becomes the source of inflation in long run, hence validating the quantity theory of money. The findings of Khan and Schimmelpfenning (2006) have also been confirmed, indicating that the long- run excess money supply is the primary cause of inflation in Pakistan.

Munir et al. (2009) investigate the nonlinear relationship between inflation level and economic development rate in Malaysia economy from 1970 to 2005. Using annual data and Hansen's (2000) new endogenous threshold autoregressive (TAR) models, they estimate an inflation threshold value for Malaysia and confirm the idea that the link between inflation rate and economic growth is nonlinear. According to the estimated threshold regression model, 3.89 percent is the structural breakpoint of inflation above which inflation has a considerable negative impact on real GDP growth. Furthermore, there is a statistically significant positive association between the inflation rate and growth below the threshold level.

Theoretical framework

From the advent of classical economic theory to the advent of modern economic theory, economists have been investigating inflation and its impact on economic growth. This section discusses growth theories' perspectives on the relationship between inflation and economic growth (classical, Keynesian, monetarist, neoclassical, and endogenous).

Classical growth theory

Adam Smith established classical theory. He identified three production factors: land, labor, and capital. His production function is written as:

$$Y= f (L, K,T)$$

Where Y represents output, L represents labor, K represents capital, and T represents the land. Smith regarded saving as the most essential factor influencing the rate of growth. There is no direct explanation in traditional theories for the relationship between inflation and its tax effect

on profit level and output. However, the link between the two variables is implicitly negative due to the decrease in company profit level and savings through rising wage costs (Gokal and Harfi, 2004).

Keynesian theory

In 1936, John Maynard Keynes published "The General Theory of Employment, Interest, and Money," which laid the groundwork for Keynesianism. Keynesians think that government intervention is required to achieve full production. They think that government intervention in the economy through expansionary economic policies will stimulate investment and demand, allowing the economy to reach full production. The Aggregate Demand (AD) and Aggregate

Supply (AS) curves serve as the foundation of the Keynesian model. In this model, the AS curve is upward sloping in the near run, so changes in the economy's demand- side effect both price and output (Dornbusch, et al, 1996).

Dornbusch et al. (1996) contend that AD and AS provide an adjustment route. It first demonstrates a positive association between inflation and economic growth, but gradually turns negative near the end of the adjustment path. The early positive association between inflation and economic growth is due to an issue with time consistency. Producers believe that only their product prices have increased, while the prices of other producers have remained constant. In actuality, though, general prices have risen. As a result, the producer continues to produce more and more output. Furthermore, Blanchard and Kiyotaki (1987) stated that inflation and economic growth are positively associated because enterprises agree to supply at agreed-upon prices. As a result, the company must produce even at a higher cost. Later on, the relationship deteriorates. This term refers to the phenomenon of stagflation, which occurs when output drops or remains constant as prices rise (Gokal and Hanif, 2004).

Monetarism

Milton Friedman suggested monetarism. According to this school, the sole factor that influences price levels in an economy is the money supply. They contended that government involvement regulates the pace of expansion of the money supply to align it with the rate of growth of output in the long run. Monetarists think that inflation occurs when the money supply grows faster than the rate of national income growth. However, the effect of money supply differs in the long and short run. In the near run,the money supply has the most influence on real variables (such as real GDP and employment) and the price level. However, in the long run, change in the money supply has the greatest impact on the price level and other nominal variables, but not on real variables such as real production and employment (Richard Froyen,1998). Monetarism incorporates the element of anticipation into the Phillips curve and divides it into two parts: short run and long run. According to this idea, the Phillips curve holds in the short term but not in the long run. In the long run, expected inflation will correspond to real inflation. As a result, inflation will not effect on unemployment, output, or other real economic factors. This is known as monetary neutrality. Gokal and Hanif (2004) defined neutrality and super neutrality as follows: neutrality holds if the equilibrium values of real variables, including GDP, are independent of the level of the money supply in the long run, and super neutrality holds when real variables, including GDP growth rate, are independent of the rate of growth in the money supply in the long run. In the scenario of neutrality and extreme neutrality, inflation will

be harmless. However, this may not be the case in practice. Inflation is harmful to the economy because it reduces capital accumulation, investment, and exports, hence reducing production.

Neo classical growth theory

Solow and Swan developed the neo-classical growth model. They devised a growth model in which scientific innovation or technology change replaced investment (capital growth) as the key component explaining long-term growth, and the level of technical change is decided exogenously, i.e. independently of all other factors, including inflation. According to Gokal and Hanif (2004), the theory of growth in neoclassical economics is based on the premise of declining returns to labor and capital separately and constant returns to both variables combined. According to neoclassical growth theory, the factors of output growth are technology, labor, and capital. Neoclassical growth economists provided their explanation for the relationship between inflation and economic growth. Mudell (1963) explained how inflation affects economic growth. According to him, inflation may permanently enhance the pace of production growth through promoting capital accumulation, because, in response to inflation, consumers will keep less cash and more other assets. Mundell's thesis that inflation is positively related to economic growth was also backed by Tobin (1965). His theory is that inflation motivates people to invest their money in other assets, which increases the capital intensity and supports economic growth.

Stockman (1981), in contrast to Mundell and Tobin, created a model that reveals a negative link between inflation and economic growth. According to Stockman's model, an increase in the inflation rate leads to a lower steady-state level of output and a decrease in people's welfare. Money is a complement to capital in Stockman's model, accounting for a negative link between the steady-state level of production and the inflation rate. However, it is an alternative for Mundell and Tobin. There are adherents of this idea who believe that there is no relationship between inflation and economic growth. According to Sidrauskin (1967), an increase in the inflation rate does not effect on the steady capital stock and economic growth. In general, an examination of neoclassical growth theory yields conflicting results in terms of the link between inflation and economic growth.

Endogenous growth theory

Economic growth is generated by elements within the production process, according to endogenous growth theories. The endogenous growth model is based on the assumption that technological progress is endogenous. This assumption is incompatible with neoclassical growth theory. The fundamental distinction between endogenous growth models and neoclassical economies is that in neoclassical growth theory, capital is assumed to shrink on return, but endogenous growth theory believes that capital's marginal product is constant.

The rate of return on capital, i.e. human and physical capital, determines the growth rate in endogenous growth theory. A tax on either type of capital results in a reduced return. According to Macallum and Good friend (1987), the inflation rate (tax) reduces both the return on all capital and the growth rate.

Data and Methodology

A proper data source and variable construction are required not only for empirical analysis but also for the research's validity. Several studies on inflation and growth have been conducted over the last five decades to analyze the influence of inflation on growth. The OLS estimation approach was utilized in the majority of the research to evaluate this association. The methods and variables for the current investigation were chosen with their theoretical and empirical value in mind. It also attempts to include the other/explanatory variables that primarily impact the level and rate of growth in Pakistan's economy. The explanatory variables used are congruent with those chosen by other researchers (Sarel 1996; Bruno and Easterly 1996; Ghosh and Phillips 1998; Khan and Senhadji, 2001;Mubarik 2005; Hussain 2005; Li 2006).

Source of the Data

The data for this study were derived from the Pakistan Economic Survey; issued by the Ministry of Finance, the Fifty Year Economy of Pakistan (SBP), and the World Bank Database. Data range from 1970 to 2019 and include a wide range of critical variables that illustrate their relationship with inflation and how it affects economic growth.

Dependent Variables

Gross domestic product is our dependent variable. It is the total monetary or market worth of all finished products and services produced within the borders of a country in a given period time. The source for that variable is World Bank and the unit is billion dollars.

Independent Variable

In this study, we include total of five independent variables which are Inflation, Gross capital formation, Trade openness, Total population, and Population growth. Inflation is our main variable and others all are explanatory variables.

Inflation rate

Inflation is the persistent increase in the general price level. The percentage change in the price level due to devaluation of the currency in a specified period is known as inflation rate. The most useable indicator for measuring inflation is consumer price index (CPI), Producer price index (PCI) and the GDP deflator. We use GDP deflator of the World Bank as variables for inflation. GDP deflator's yearly growth rate reflects the pace of price change in the economy as a whole. The GDP deflator is defined as the ratio of GDP in current local currency to GDP in constant local currency.

Gross capital formation

Gross capital formation (previously gross domestic investment) is the sum of expenditures on additions to the economy's fixed assets plus net changes in the stock of inventories. Land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, trains, and the like, as well as schools, offices, hospitals, private residential residences, and commercial and industrial buildings, are examples of fixed assets. Stocks of items retained by enterprises to satisfy temporary or unforeseen swings in production or sales are referred to as inventories, as is "work in progress." Net acquisitions of assets are

also considered capital formation, according to the 1993 SNA. The current data are in current US Million dollars. The source of this variable is World bank.

Trade openness

Trade openness refers to a country's economic orientation in the context of international trade. The actual size of an economy's registered imports and exports is used to determine its degree of openness. It is determined as the ratio of a country's total exports and imports to its national income.

Total population

The total population is calculated using the de facto definition of population, which includes all residents regardless of legal status or citizenship. The figures are taken from World Bank.

Population growth

It is the rate of increase in the number of people in a country in a given period, of time. Positive growth rate shows that the population is increasing and a negative growth rate shows that the population is decreasing. Zero population rate means that there is no change in population, the number of individuals are same in both time periods.

Methodology

We have specified two econometric equations to assess the impact of inflation on GDP growth. These equations were calculated using the Ordinary Least Squares method (OLS). The autocorrelation of these models' equations was assessed using the Durban Watson (DW) test statistic. The stationary issue of the data was handled through a unit root test.

$$GDP = \beta0 + \beta1\ INF + \beta2\ LGCF + \beta3 + \beta4\ LTO + \beta5\ LTP + \beta6\ PG + \varepsilon \quad \text{equation (1)}$$

$$GDP = \beta0 + \beta1\ INF + \beta2\ DINF + \beta3\ LGCF + \beta4 + \beta5\ LTO + \beta6\ LTP + \beta7\ PG + \varepsilon \quad \text{equation (2)}$$

Where;

GDP = Gross Domestic Product INF = Inflation

LTO = Log Trade Openness LTP = Log Total Population Growth LGCF = Log Gross Capital Formation

PG = Population Growth

DINF = Inflation Level > 7.5 Percent as Dummy Variable [1 = Inflation Level > 7.5 Percent, 0= Otherwise]

ε = Error Terms

Descriptive statistics

The study's knowledge is greatly aided by elementary data analysis. It aids the researcher and spectator in preparing their brains for further discussion of the econometric analysis of the study's defined model. The mean value of GDP is 9.43E+10, which is a positive sign for Pakistan's developing economy. The maximum GDP was observed to be 3.15E+11, while the minimum rate stayed at 6.38E+09. The standard deviation is computed at 9.17E+10, indicating that there are fewer variations from the average GDP value.

When we look at inflation values, we see that it produces different results than GDP growth. It has a mean value less than the median value, indicating that the distribution of inflation is positively skewed; it is further supported by positive measures of skewness. These descriptive statistics explain why the inflation distribution is not symmetrical. The standard deviation of

inflation, 6.555514, suggests that there is a lot of dispersion in the data, which is corroborated by the high value of the measure of kurtosis, 9.524538, showing that the distribution of inflation values is leptokurtic. Inflation can reach a high of 38.51199 and a low of 0.400236. This demonstrates that inflation has a considerable dispersion in the data.

Descriptive statistics Table

	GDP	INF	GCF	TO	TP	PG
Mean	9.43E+10	9.537841	1.58E+10	8.92E-11	1.27E+08	2.683832
Median	5.65E+10	8.479329	1.04E+10	4.94E-11	1.22E+08	2.759529
Maximum	3.15E+11	38.51199	5.46E+10	4.32E-10	2.17E+08	3.363941
Minimum	6.38E+09	0.400236	8.18E+08	6.54E-12	58142062	2.029215
Std. Dev.	9.17E+10	6.555514	1.45E+10	9.81E-11	48352886	0.423951
Skewness	1.090215	2.212217	1.043886	1.560166	0.240436	-0.061968
Kurtosis	2.859151	9.524538	2.949297	4.949225	1.802922	1.726788
Jarque-Bera	9.946076	129.4692	9.086175	28.19989	3.467153	3.409227
Probability	0.006922	0.000000	0.010641	0.000001	0.176651	0.181843
Sum	4.72E+12	476.8921	7.90E+11	4.46E-09	6.36E+09	134.1916
Sum Sq. Dev.	4.12E+23	2105.763	1.03E+22	4.71E-19	1.15E+17	8.806979
Observations	50	50	50	50	50	50

Correlation matrix

The correlation matrix is included for the purpose to know the correlation among all variables and to compare these values with the coefficients of our models. The inflation has a negative relationship with GDP. In our OLS model estimation, this relationship is positive. There is a positive association of Gross capital formation and Total with GDP. The relationship of Trade openness and population growth is negative with GDP per Capita.

	GDP	INF	LGCF	LTO	LTP	PG
GDP	1	-0.1816	0.871	-0.922	0.8755	-0.857
INF	-0.181	1	-0.170	0.154	-0.127	0.058
LGCF	0.8712	-0.170	1	-0.986	0.98	-0.728
LTO	-0.9229	0.154	-0.98	1	-0.982	0.82
LTP	0.8755	-0.127	0.980	-0.987	1	-0.795
PG	-0.857	0.058	-0.728	0.82399	-0.7951	1

Empirical Results Interpretation

The following table presents the results of our empirical estimation. The first column of the table shows our variables. The second and the fourth column of the table show the results of equation 1 and equation 2 respectively. The probability value for the two equations is presented in columns 3 and 4 of the table. The relationship between inflation and GDP is positive. It shows that increase in inflation by 0.000108 percent will raise the GDP by 1 percent (in log form). The coefficient is significant at a one percent level. Thus we have accepted the null hypothesis that inflation has a positive impact on GDP. The relationship between gross capital formation and GDP is also positive. Increase in gross capital formation by 0.052015 percent (in log form) will raise the GDP by one percent (in log form). This result is significant at zero percent level. As we hypothesized in our analysis, trade openness plays a substantial influence in promoting GDP. The co-efficient of variable trade openness (OPNS) reveals that it has a strong positive impact on GDP. Because the coefficient is significant at the 0% level, we accept the hypothesis that increasing trade openness enhances GDP. The trade openness coefficient is strong, indicating that a 1% improvement in trade openness results in a 0.906333 percent (in log form) increase in GDP. This result agrees with Gosh and Phillips (1998). Another explanatory variable, the log of the population in millions of people, is incorporated in the model to investigate how it affects GDP. According to expectations, this variable produced a highly significant outcome in the model. The log of the population in millions was used in the study just to rescale the variable. The study explains why Pakistan's population level has a very large and sensitive relationship with GDP. A one-percentage-point increase in the population increase GDP by 0.086268 percentage points. At the 0% level, this result is similarly noteworthy. This result is compatible with Sarel (1996) but contradicts Mubarikand Hussain (2005).The relationship between population growth and GDP is also positive. An Increase in population growth by 0.139008 percent will raise the GDP by one percent (in log form). This result is significant at the zero percent level. To examine the impact of inflation on GDP, another explanatory variable (DINF) is incorporated into the model (Equation2). We used this dummy variable of inflation greater than or equal to 7.5% levels of inflation to identify an optimal and achievable threshold level of inflation for GDP growth. This variable is expected to have an adverse impact on GDP growth. DINF is a dummy variable that indicates a condition of „1' when inflation is greater than or equal to 7.5% and a condition of „0'

when inflation in the economy below 7.5%. The threshold level of inflation for the economy is 7.5%. Below that level, inflation is positive associated with GDP while above this level it is negatively associated with GDP. The Table summarizes the results of econometric equation 2, implying that all other explanatory variables respond in the same way as in equation 1.

Regression results

Variables	Equation 1	P-value of eq 1	Equation 2	P-value of eq 2
C	-0.199057	0.0012	-0.194689	0.0015
INF	0.000108	0.0120	0.000142	0.0536
DING			-0.001018	0.0196
LGCF	0.052015	0.0000	0.054551	0.0000
LTO	0.906333	0.0000	0.904228	0.0000
LTP	0.086268	0.0000	0.085386	0.0000
PG	0.139008	0.0000	0.138790	0.0000
R-squared	0.999983		0.999983	
Adjusted R- squared	0.999980		0.999981	

Conclusion and Policy Recommendations

This study attempted to investigate Pakistan's inflationary scenario, with a particular emphasis on its impact on GDP. The second goal is to re-examine the existence of an inflation-GDP relationship in Pakistan's economy. Our first concern is whether the positive inflation-GDP relationship exists in the economy or if the situation is otherwise. The analysis was conducted using annual time series data from 1970 to 2019. To complete the goal, this study employs simple descriptive statistics and regression analysis. The study's findings provide evidence to suggest that a trade-off between inflation and GDP growth has been discovered for the time-series data under consideration. Inflation in Pakistan's economy is detrimental to GDP growth. This statistically significant conclusion shows that a continuous rise in the general price level is detrimental to GDP growth. The study also determines the realistic threshold level of inflation that causes GDP growth to slow. This threshold has been determined to be 7.5% of inflation. Inflation below this level has a favorable effect on economic growth. However, after this threshold, it has a significant negative impact on Pakistan's GDP growth. Based on the findings of this study, it is advised that the economy maintain an inflation rate of less than 7.5%. As a result, policymakers and the State Bank of Pakistan should focus on choices that keep inflation

steady and below the level that has been demonstrated to be beneficial for achieving sustainable economic growth. Moderate and stable inflation is also beneficial in reducing swings and uncertainty in the financial sector of the economy, which boosts capital formation activities in the country. So that it can have a good impact on the economy. As a result, maintaining price stability will eventually be the best policy prescription for the economy's stable and sustained economic growth.

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