Journal of Policy Research, 10(1), 113-119
https://jprpk.com
https://doi.org/10.61506/02.00171

Exploring the Causal Relationships Between Inflation, Savings, and Economic Growth in Pakistan

Nayla Ibrar[1], Sidra Ilyas[2], Asad Abbas[3], Sana Sultan[4], Muhammad Ramzan Sheikh[5*]

Abstract
This study investigates the causal relationships between inflation, economic growth, and savings in Pakistan using time series data spanning from 1971 to 2016. The Johansen cointegration test, using the trace test, identifies a single significant cointegrating relationship. The VAR model analysis determines the optimal lag length to be 2. The findings of the Granger causality show that bidirectional causality found between the following pairs: capital formation and GDP growth; gross domestic saving and GDP growth; inflation and GDP growth; and saving and capital formation. While inflation cause capital formation and saving while capital formation and saving do not cause inflation.
Keywords: Gross Domestic Saving, Consumer Price Index, GDP Growth, VAR Model, Gross Fixed Capital Formation

1. Introduction

Achieving economic growth and well-being is fundamental to all economic activities in nearly all countries. Numerous factors, such as inflation, influence the path to economic growth. According to various growth theories, savings are crucial for facilitating investment, which can enhance economic growth if managed properly. High inflation leads to increased savings as it creates uncertainty about future income, prompting individuals to save more as a hedge against risks. Moderate economic growth can be achieved with moderate inflation levels. However, inflation is a complex global phenomenon that reduces purchasing power, induces uncertainty, and decreases investment, leading to increased individual savings. Additionally, inflation can affect the balance of payments by making exports more expensive and can influence borrowing and lending decisions. Generally, households reduce borrowing and spending when prices rise, making inflation a critical issue for monetary policy (Adaramola and Dada, 2020).

Many researchers have explored inflation, its causes, and its effects on individual saving behavior. Stable growth with low inflation is a core objective for macroeconomists, central bankers, and policymakers. A key policy challenge is controlling inflation to promote sustained economic growth and investment. High and stable economic growth can be achieved by expanding output to meet new demand (Nosheen et al., 2021). Growing inflation can be controlled if there is sufficient output to meet excessive demand. Central banks are responsible for maintaining price stability to prevent deep-rooted inflation. Tight monetary policy is often perceived as a way to combat inflation. Theories such as demand-pull and cost-push inflation explain the phenomenon. A significant gap between demand and potential output can drive prices up, causing inflation. Supply shocks, such as increased costs of wages, exchange rates, imported inflation, and resource scarcity, also contribute to rising prices (Iqbal and Nawaz, 2009)

Taxation systems can also influence inflation, as lower taxes increase individuals' purchasing power, raising demand for goods and, consequently, inflation. In recent years, Pakistan has experienced rapid increases in food and fuel prices. The well-known association between savings and inflation is largely statistical. During inflation, measured savings and income, even when adjusted by the appropriate price index, tend to overestimate real income and savings. Interest payments on financial assets are included in national accounts, and greater inflation rates increase these payments, which are viewed as income but serve as compensation for the inflation-related drop in the real value of assets. Consequently, measured savings tend to rise with inflation (Koskela and Virén, 1991)

The State Bank of Pakistan (SBP) is responsible for maintaining moderate inflation to support sustained growth. The SBP uses instruments to control the money supply and keep inflation at government-set levels. Historical data shows that from 2002 to 2005, money supply growth exceeded targets due to an easy monetary policy to support growth, leading to double-digit inflation by 2005. Inflation is seen as a tax on money holdings. The estimate for inflation in 2005 was Rs 61,928 million, or 0.98 percent of GDP. Before 2005, low inflation meant that monetary policy supported growth; but, when inflation increased, the emphasis changed to managing it.

Contrary to traditional views, inflation is a persistent phenomenon, though its rate varies over time. The primary concern of macroeconomic policymakers is to control inflation and maintain it at an optimal level, which depends on fiscal and monetary policies and the availability of natural economic resources.

[1] MPhil Scholar, National College of Business Administration and Economics, Rahim Yar Khan Campus, Lahore
[2] Assistant Professor, School of Economics, Bahauddin Zakariya University Multan
[3] Lecturer in Economics, Department of Economics, COMSATS University Islamabad Vehari Campus
[4] Research Scholar, School of Economics, Bahauddin Zakariya University Multan
[5*] Professor of Economics, School of Economics, Bahauddin Zakariya University Multan, ramzansheikh@bzu.edu.pk

1.1. Inflation, Economic Growth and Saving in Pakistan

Historically, inflation, saving, and economic growth in Pakistan have been closely intertwined, reflecting broader economic trends and policy shifts. Inflation has frequently been driven by factors such as fluctuations in global oil prices, supply shocks, and structural inefficiencies within the economy (Hasan et al., 1995). These inflationary pressures have often eroded purchasing power and impacted saving behaviors, as individuals and households adjust their savings strategies to hedge against future uncertainties (Hussain and Malik, 2011). During periods of high inflation, the real value of savings tends to diminish, influencing economic growth adversely (Khan and Schimmelpfennig, 2006). Conversely, moderate inflation, paired with effective monetary policies, has the potential to stimulate investment and foster economic growth (State Bank of Pakistan, 2006). The interplay between these variables underscores the complex dynamics that have shaped Pakistan's economic trajectory over time, where both inflationary and deflationary forces have played significant roles in influencing savings rates and growth outcomes. Figures 1-4 show the trend of consumer price index, gross fixed capital formation, gross domestic saving, and economic growth in Pakistan respectively.

Figure 1: Consumer Price Index

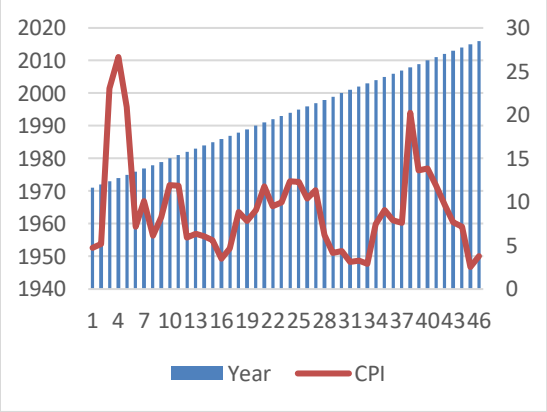


Figure 2: Gross Fixed Capital Formation

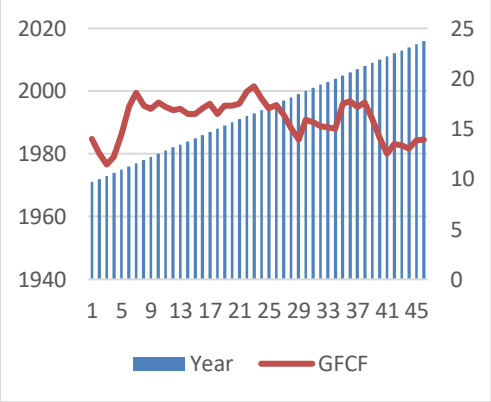
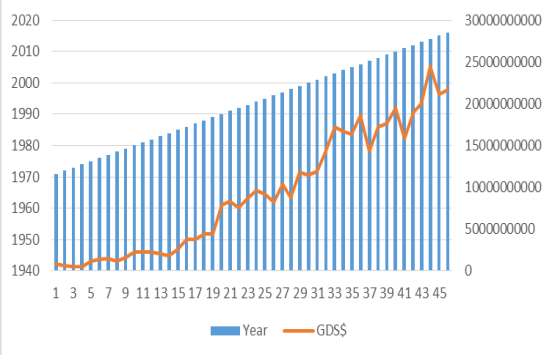
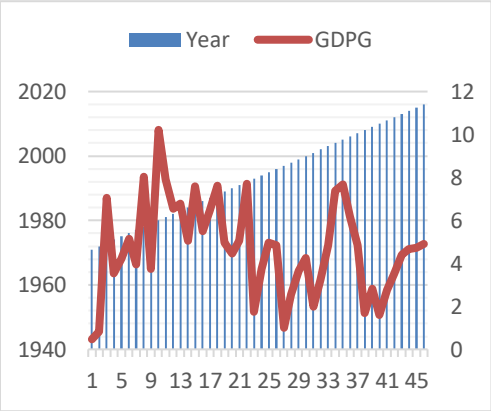


Figure 3: Gross Domestic Savings



Source: World Bank Indicators

Figure 4: GDP Growth



2. Literature Review

This section presents the literature review of the previous studies. Utilizing data from the 1985 Family Income and Expenditure Survey, Bautista and Lamberte (1990) examined the differences in saving practices between rural and urban families in the Philippines. A total of 16,971 participants were chosen from 12 different areas within the Philippines. Income was found to have a positive correlation with savings in the Current Income model, however, the dependence ratio showed a negative correlation with savings across all areas. There was a range of 0.334 to 0.775 for the marginal propensity to save (MPS). Both permanent and transitory income had an impact on saving behavior in the Permanent Income model for all of the Philippines. It was determined that the MPS for transitory income varied from 0.388 to 0.803, while the MPS for permanent income ranged from 0.218 to 0.548.

Chete (1999) investigated the determinants of saving using the Error Correction Methodology (ECM) in Nigeria, analyzing data from 1973 to 1993. He observed that external debt and financial development had a significant negative relationship with saving, while terms of trade (TOT) variations and income level had a significant positive effect on the level of saving. However, the real rate of interest, rate of inflation, and dependency ratio were all found to be insignificant in the regression models.

Adebiyi (2001) examined the empirical evidence concerning the relationship between gross domestic savings and economic growth in Nigeria, employing quarterly data from 1971 to 1998. The study investigated the unconventional correlation between saving and growth using the Granger causality test within a vector autoregressive (VAR) model. The final empirical analysis showed that, in Nigeria, the saving-GDP ratio Granger causes per capita income.

Hallaq (2003) investigated the determinants of savings in Jordan during the period from 1976 to 2000 by applying the Instrumental Variables Method (IVM) and the Ordinary Least Squares (OLS) technique. The study found that the growth rate of Gross Domestic Product (GDP) and GDP per capita had significant impacts on the return on savings, whereas the real rate of interest, rate of inflation, and terms of trade (TOT) had insignificant effects on the return on savings.

Using a VECM model and cointegration analysis, Ekinci (2007) investigated the link between domestic reserves and economic progress in Turkey using data spanning from 1960 to 2004. A long-term correlation between the saving rate and economic growth was found by the investigation. Contrary to conventional wisdom, the Granger causality analysis's findings revealed a unidirectional causal relationship between Turkey's domestic savings rates and financial development.

An empirical study on the connection between China's money supply, economic expansion, and inflation was carried out by Xie et al. (2009) and covered the years 1998 to 2007. The money supply, inflation, and economic growth did not cointegrate, but there was a cointegration relationship between the money supply and inflation; however, there was no long-term relationship between the money supply and economic growth, according to cointegration and Granger causality test approaches. They concluded that China's objectives of price stability and economic expansion were at odds with one another. Their results suggest that, even if a loose monetary policy could be implemented simultaneously, other strategies that go beyond monetary policy are still needed to promote economic development over the long term.

Research was carried out by Foul (2010) to examine the relationship between real GDP and real GDP savings (GDS). The long-term link between real GDP and real GDS for Tunisia (1961–2007) and Morocco (1965–2007) was investigated in this study. The study's findings showed that the factors in Morocco had a long-term link, whereas Tunisia showed no signs of such a correlation. The Granger causality test confirmed Morocco's bidirectional causal relationship between GDP growth and gross domestic savings growth. On the other hand, the findings indicated that real GDP and real GDS in Tunisia had a unidirectional Granger causal relationship that extended from the country's gross domestic savings rate to economic growth.

Igbatayo and Agbada (2012) researched the relationship between inflation, savings, and growth in Nigeria using a VAR approach, with data from the period 1970 to 2010. Additionally, they employed the method of least squares and Granger causality analysis. The analysis results indicated that while inflation tended to reduce growth, savings promoted growth. According to the results of the Granger causality test, no causality relationship was identified between inflation and economic growth in Nigeria during the period considered. The saving rate and economic growth did, however, have a bidirectional link. As per the findings of the VAR study, variations in savings had a greater impact on economic growth than variations in inflation. Consequently, it was proposed that private savings may be used as leverage to improve the Nigerian economy's growth performance.

Khan and Hanif (2020) analyzed the institutional quality and its relationship with inflation and economic growth in developing economies using panel data from 113 nations spanning 1981 to 2015. They applied the GMM technique to estimate the results. The findings indicated that above a minimum level of institutional quality, inflation and economic growth were negatively related. However, below that threshold, no relationship existed.

The literature review highlights several key findings on the relationship between savings, economic growth, and other economic variables. It demonstrates that income positively influences savings, while dependency ratios often have a negative impact. In various studies, savings consistently show a significant role in promoting economic growth, whereas factors like inflation and interest rates tend to have less impact on the return of savings. Additionally, different regions reveal a range of relationships between savings and economic growth, with some showing bidirectional causality and others indicating a unidirectional influence from savings to growth. Based on the literature review, the most commonly used techniques are the Granger causality test and Vector Autoregressive (VAR) models. These methods have been applied in various countries to analyze the relationship between savings, economic growth, and other economic factors.

3. Model Specification, Data and Methodology

The study used the time series data from 1971 to 2016 by applying Granger Causality Analysis to explore the causal relationship between inflation, saving, and growth. The study collected data on GDP growth, gross fixed capital formation, gross domestic saving, and consumer price index from World Development Indicators (WDI). This study used the VAR model to determine the causality between variables.

These models can be represented as:

$$X_t = \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{n} \beta_j Y_{t-j} + \varepsilon_{1t}$$

$$Y_t = \sum_{i=1}^{n} \varphi_i Y_{t-i} + \sum_{j=1}^{n} \varphi_j X_{t-j} + \varepsilon_{2t}$$

4. Results and Discussions

4.1. Summary Statistics and Correlation Analysis

For GDPG, the mean value is approximately 4.65%, indicating that, on average, the economy grows at this rate. The median, at 4.45%, is close to the mean, suggesting that the data is relatively symmetric around this central value. The highest recorded GDP growth is 10.22%, while the lowest is -1.27%, showing a range of economic performance from growth to contraction. The standard deviation of 2.26% indicates moderate variability in GDP growth. The distribution is slightly left-skewed with a skewness of -0.125, which suggests a minor tendency for lower growth rates. The kurtosis is close to 3, reflecting a normal distribution with a moderate peak and tails. The JB statistic of 0.1361, with a high probability of 0.9341, suggests that GDP growth data is likely normally distributed.

For GFCF, the mean is around 15.36%, reflecting the average level of capital formation. The median value is 15.59%, indicating that the data is relatively symmetrical. The highest observed GFCF is 19.11%, and the lowest is 11.33%, which highlights some variation in capital investment. The standard deviation of 1.86% shows moderate variability. The distribution is slightly left-skewed, with a skewness of -0.111, implying a minor tendency for lower values. The kurtosis is 1.9881, suggesting a flatter distribution compared to a normal distribution. The JB statistic of 2.3252, combined with a p-value of 0.3126, indicates that the GFCF distribution does not significantly deviate from normality.

Table 1: Summary Statistics

Variables	GDPG	GFCF	GDS	CPI
Mean	4.6544	15.3635	10.6459	60.4451
Median	4.4517	15.5921	9.8067	35.6789
Maximum	10.2157	19.1122	17.3992	262.6183
Minimum	-1.2740	11.3302	3.7636	3.0536
Std. Dev.	2.2600	1.8620	3.4865	65.3953
Skewness	-0.1250	-0.1110	0.2082	1.3160
Kurtosis	3.0182	1.9881	1.9813	3.7949
Jarque-Bera	0.1361	2.3252	2.6238	16.3807
Probability	0.9341	0.3126	0.2693	0.0002

For GDS, the average savings rate is 10.65%, with the median being slightly lower at 9.81%, indicating a right-skewed distribution with a tendency towards higher savings rates. The maximum value of GDS is 17.40%, and the minimum is 3.76%, demonstrating substantial variability. The standard deviation of 3.49% suggests high variability in savings rates. The skewness of 0.2082 indicates a slight right skew, pointing to a tendency for higher values. The kurtosis of 1.9813 reflects a distribution that is flatter than normal, with lighter tails. The JB statistic of 2.6238, with a p-value of 0.2693, implies that the GDS distribution is not significantly different from normality.

For CPI, the mean value is 60.45, representing the average level of prices. The median is significantly lower at 35.68, suggesting a right-skewed distribution with a few high CPI values. The CPI ranges from a minimum of 3.05 to a maximum of 262.62, indicating considerable variability in inflation levels. The standard deviation is 65.40, showing high variability. The distribution is strongly right-skewed with a skewness of 1.3160, reflecting a tendency for higher CPI values. The kurtosis of 3.7949 indicates a leptokurtic distribution with a higher peak and heavier tails than a normal distribution. The JB statistic of 16.3807, along with a very low p-value of 0.0002, suggests that the CPI distribution deviates significantly from normality.

Table 2 provides the correlation analysis. The variables GFCF and GDS show a weak positive correlation with GDPG and CPI has a weak negative correlation with GDPG.

Table 2: Correlation Analysis

Variables	GDPG	GFCF	GDS	CPI
GDPG	1.000			
GFCF	0.287	1.000		
GDS	0.176	0.234	1.000	
CPI	-0.133	-0.073	-0.234	1.000

The variable GDS shows a weak positive correlation and CPI has a weak negative correlation with GFCF. CPI shows a weak negative correlation with GDS.

4.2. Unit Root Analysis

Table 4 presents the results of the Augmented Dickey-Fuller (ADF) unit root test, which is used to determine whether a time series variable has a unit root and thus is non-stationary. The test is conducted at both the level and the first difference, with and without an intercept and trend.

Table 3: Unit Root Analysis

Augmented Dickey-Fuller Unit Root Test				
Variables	**Level**		**1st Difference**	
	Intercept	**Int. & Trend**	**Intercept**	**Int. & Trend**
GDPG	-5.571***	-5.923***	-7.944***	-7.787***
GFCF	-1.943	-3.789**	-5.245***	-5.298***
GDS	-1.256	-0.866	-7.433***	-6.733***
CPI	5.143	6.562	6.300*	3.183*

Where ***, **, * indicate the ratio is significant at 1%, 5%, and at 10% respectively.

The unit root test results show that GDPG, GFCF, and GDS become stationary after first differencing, as their test statistics are significant at the 1% level post-differencing. CPI, however, shows clear stationarity at first difference at a 10% significance level.

4.3. Johansen Juselius Cointegration Test

Table 4 shows the result of the cointegration test. The Trace Test for Cointegration results indicate that there is at least one cointegrating relationship among the variables, as the null hypothesis of no cointegration is rejected.

Table 4: Trace Tests for Cointegration

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.486071	59.57358	47.85613	0.0000
At most 1	0.328899	26.29009	29.79707	0.1254
At most 2	0.082431	6.348294	15.49471	0.6575
At most 3	0.040111	2.046903	3.841465	0.1565

However, the hypotheses for the presence of more than one cointegrating equation are not rejected, suggesting that there is only one significant cointegrating relationship. This implies that while the variables share a long-term equilibrium, additional cointegrating relationships are not supported by the data.

4.4. Lag Selection Criteria

Table 5 presents the results of various lag selection criteria used to identify the optimal lag length for a time series model. The criteria considered include LogL (log-likelihood), LR (Likelihood Ratio), FPE (Final Prediction Error), AIC (Akaike Information Criterion), SC (Schwarz Criterion), and HQ (Hannan-Quinn Criterion).

Table 5: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-181.5063	NA	0.085074	6.049388	6.153201	6.090073
1	-34.29838	275.1099	0.000916	1.517980	2.185349	1.743453
2	-23.48897	19.13798*	0.000866*	1.458655*	1.933234*	1.680722*
3	-18.95063	7.588688	0.001008	1.604939	2.643073	2.011794

The lag selection criteria suggest that the optimal lag length is 2, as indicated by the LR, FPE, AIC, SC, and HQ criteria. The lag 2 is identified as the optimal lag.

4.5. Granger Causality Analysis

Table 6 shows the Granger Causality Analysis at lag 2 between variables. The Granger Causality Analysis at lag 2 reveals significant bidirectional causality between Gross Fixed Capital Formation (GFCF) and GDP growth (GDPG),

as both null hypotheses are rejected. GDS (Gross Domestic Savings) is found to Granger cause GDPG, and GDPG also Granger causes GDS, indicating bidirectional causality.

Table 6: Granger Causality Analysis at lag 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GFCF ↛ GDPG	50	4.13499	0.0041
GDPG ↛ GFCF		4.67284	0.0143
GDS ↛ GDPG	50	2.30984	0.0800
GDPG ↛ GDS		2.16605	0.0264
CPI ↛ GDPG	50	3.04036	0.0577
GDPG ↛ CPI		4.30909	0.0194
GDS ↛ GFCF	50	3.26263	0.0027
GFCF ↛ GDS		2.32175	0.0097
CPI ↛ GFCF	50	5.13149	0.0005
GFCF ↛ CPI		0.15399	0.8577
CPI ↛ GDS	50	2.55853	0.0016
GDS ↛ CPI		0.01479	0.9853

The Consumer Price Index (CPI) is shown to Granger cause GDPG, with marginal significance, and GDPG also Granger causes CPI, indicating bidirectional causality. Additionally, GDS Granger causes GFCF, and GFCF Granger causes GDS, suggesting mutual causality. CPI Granger causes GFCF and GDS, but GFCF does not Granger cause CPI, nor does GDS Granger cause CPI, indicating unidirectional causality from CPI to both GFCF and GDS.

5. Conclusions and Policy Recommendations

In conclusion, this study explores the causal link between inflation, economic growth, and savings in Pakistan. It uses time series data from 1971 to 2016, including the Consumer Price Index (CPI), GDP growth, Gross Domestic Saving (GDS), and Gross Fixed Capital Formation (GFCF) from World Development Indicators (WDI). To determine the Granger causality among these variables, the study first conducts an Augmented Dickey-Fuller (ADF) unit root analysis with intercept and trend at both level and first difference. The results show that all variables are stationary at the first difference, except for GDP growth, which is stationary at the level. The study then applies the Johansen cointegration test using the trace test, which indicates that the hypothesis for the presence of more than one cointegrating equation is not rejected, suggesting only one significant cointegrating relationship. Next, the study uses the VAR model to determine the optimum lag, which is found to be 2. The findings of the Granger causality show that there is bidirectional causality between the following pairs: gross fixed capital formation and GDP growth; gross domestic saving and GDP growth; inflation and GDP growth; and saving and capital formation. While inflation cause capital formation and saving while capital formation and saving do not cause inflation. The findings recommend the following policies:

- Policymakers should promote gross fixed capital formation to boost economic growth and vice versa.
- The government should make such policies that boost economic growth to encourage saving and reduce inflation and vice versa.
- Planners should implement policies that encourage gross domestic savings to promote capital formation and vice versa
- Policymakers must make such policies that stabilize the price to promote saving and capital formation.

References

AbuAl-Foul, B. (2010). The causal relation between savings and economic growth: Some evidence from MENA countries. *Topics in Middle Eastern and North African Economies*, *12*.

Adaramola, A. O., & Dada, O. (2020). Impact of inflation on economic growth: evidence from Nigeria. *Investment Management & Financial Innovations*, *17*(2), 1.

Adebiyi, M. A. (2001). Can high real interest rate promote economic growth without fuelling inflation in Nigeria? *Journal of Economic and Social Studies, Maiden Edition, April*, 86-100.

Bautista, R. M., & Lamberte, M. B. (1990). Comparative saving behavior of rural and urban households in the Philippines.

Chete, L. N. (1999). *Macroeconomic determinants of private savings in Nigeria* (No. 7). Nigerian Institute of Social and Economic Research.

Hallaq, S. (2003). Determinants of private savings: The case of Jordan (1976-2000). *Journal of King Saud University Administrative Sciences*, *15*(2), 83-94.

Hasan, M. A., Khan, A. H., Pasha, H. A., Rasheed, M. A., & Husain, A. M. (1995). What explains the current high rate of inflation in Pakistan?[with Comments]. *The Pakistan Development Review*, *34*(4), 927-943.

Hussain, S., & Malik, S. (2011). Inflation and economic growth: Evidence from Pakistan. *International Journal of Economics and Finance*, *3*(5), 262-276.

Igbatayo, S., & Agbada, A. O. (2012). Inflation, savings and output in Nigeria: A VAR approach. *Journal of emerging trends in economics and management sciences*, *3*(5), 447-453.

Iqbal, N., & Nawaz, S. (2009). Investment, inflation and economic growth nexus. *The Pakistan Development Review*, 863-874.

Kadri Ekinci, N., & Alp Ertürk, K. (2007). Turkish currency crisis of 2000–2001, revisited. *International Review of Applied Economics*, *21*(1), 29-41.

Khan, M. S., & Schimmelpfennig, A. (2006). Inflation in Pakistan. *The Pakistan Development Review*, 185-202.

Khan, M., & Hanif, W. (2020). Institutional quality and the relationship between inflation and economic growth. Empirical Economics, 58, 627-649.

Koskela, E., & Virén, M. (1991). Household saving, interest rates, inflation and taxation: some cross-country evidence. In *Fiscal Policy, Taxation and the Financial System in an Increasingly Integrated Europe* (pp. 139-161). Dordrecht: Springer Netherlands.

Nosheen, F., Nasir, N., Ali, H., & Zahra, F. (2021). Interrelationship Among Inflation And Saving: Empirical Evidence From The Emerging Economy of Pakistan. *Harf-O-Sukhan*, *5*(1), 1-27. Retrieved from https://harf-o-sukhan.com/index.php/Harf-o-sukhan/article/view/22

Xie, C., Tang, H., & Cui, Y. (2009, April). Money supply, economic growth and inflation of China: 1998-2007. In *2009 International Joint Conference on Computational Sciences and Optimization* (Vol. 2, pp. 562-566). IEEE.