

The Impact of Food Prices Inflation on the Economic Growth of Pakistan: A Time Series Analysis (1990 – 2022)

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Abstract: This paper aims to analyzing the impact of food price inflation on the economic growth in Pakistan over the period 1990–2022. Food price inflation remained as a main challenge in the economy of Pakistan from the few years. Increasing cost of food items directly affect the poor households, reducing consumer purchasing power as they spend more than 70% of their income on just food items. The purpose of this paper is to prove the relationship between food price inflation and the economic growth in Pakistan. The present research makes Gross Domestic Product as the dependent variable and, Food Price Inflation, Imports, Exports, and Money Supply, as the independent variables of the research. Augmented Dickey Fuller test has been used in this research to determine the unit root of the time series. The long-run and short-run relationship have been examined by the use of the ARDL method over the period of 1990–2022. The empirical examination indeed provides an evidence that food price inflation has negative impact on economic growth in Pakistan in long-run. The short run dynamic error correction equation also showed that the coefficient of adjustment for the estimated food price equation is statistically significant at 5 percent level and negative.

Keywords: Gross Domestic Product, Food Price Inflation, Imports, Exports, Money Supply

Introduction

The relationship between food price inflation (FPI) and economic growth (EG) has attracted attention from policymakers, economists, and researchers worldwide. Over the decades, food prices in Pakistan have experienced fluctuations due to various factors such as climate change, extreme weather conditions, market inefficiencies, and government interventions. These changes can significantly impact economic growth, influencing consumer purchasing power, household budgets, and investment decisions. The inflation of food prices primarily affects households' well-being, those with low incomes who spend a significant portion of their earnings on food consumption. The increase in the cost of food limits people's ability to buy, leading to reduced consumption and higher poverty rates.

The rise in food prices deserves attention as it adversely affects the welfare of lowincome families and impacting the cost of living for citizens, which are a crucial part of daily expenditure for the population. As a result, overall economic growth may be hindered by a reduction in domestic demand and opportunities for investment (Quentin Wodon et al., 2008; World Bank, 2008).

Second, rising food costs have an impact on the agricultural industry in Pakistan. It plays a role in job creation, export revenues, and rural development. However, fluctuations in food prices can disrupt

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farmers' income, impacting their production decisions, input utilization, and agricultural investments. This can have cascading effects on the entire supply chain, including agribusinesses, food processing industries, and related sectors. A weak agricultural sector may impede economic growth because it is important for employment and rural development.

Food cost inflation and economic expansion are connected by a very broad and intricate set of relationships that policymakers have a tough time navigating through. They must strike a delicate balance: managing food prices by reducing their externality effects on general inflation, macroeconomic stability, and social welfare while keeping the agriculture sector productive and sustainable. The food price inflation is a very complicated phenomenon, it can only be addressed in its entirety, which this research thesis will explore by looking at historical patterns, economic factors, and economic impacts of this process in Pakistan specifically.

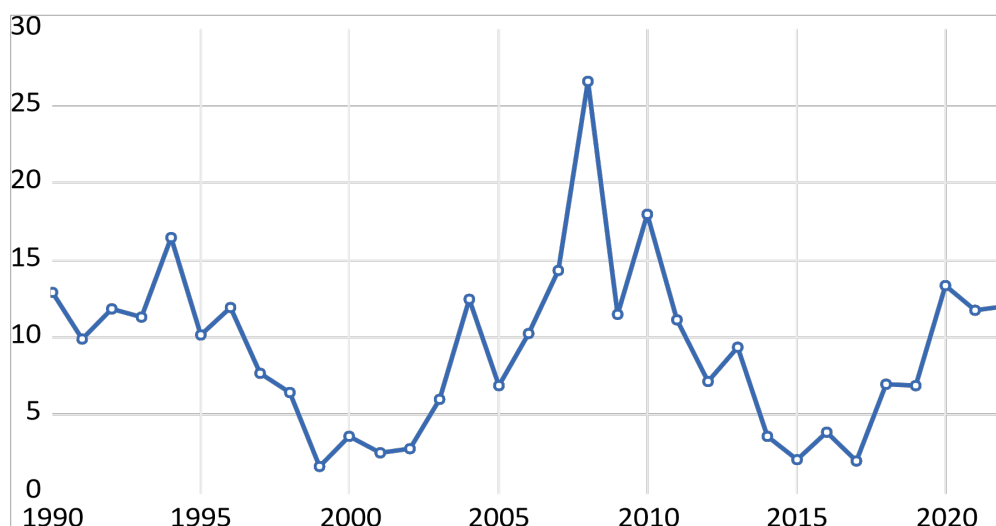
An Overview of Food Price Inflation in Pakistan

According to the United Nations (2008), the poorest households in Pakistan currently have to spend more than 70% of their income on food, severely compromising their ability to afford the most important health and education costs. This will lead to increased school dropout rates, one of the consequences of which will be a reduced likelihood of achieving the Millennium Development Goal (MDG) of 100% primary school completion.

Pakistan's food inflation problem, just as other economic difficulties challenging the country, becoming a symbol of a whole set of complex issues. They can mostly be explained by a variety of internal problems such as lack of economic management, and international economic problems. As a consequence, it becomes very challenging for the Pakistani government and international players to decide on a suitable plan of action and implement the measures to tackle the emerging inflationary forces. The historical trend of food price inflation remained during study period from 1990–2022 in Pakistan.

Figure 1

Trend of Food Price Inflation



The trend between 1990 and 2022, Pakistan has experienced fluctuation in food prices of 12.91% in 1990, according to report of (PBS) average of food prices between 1990–97 is 10.1%, and from 1998–2000 5.3%. However, the rate reaching 6.4% average in the 2000–2007 period. Strict fiscal management, less monetization of the budget deficit, increased output, decreased tariffs and taxes, and an appreciation of the exchange rate all contributed to this low level of inflation. In 2008, peaking at 26.61%, the matter became more serious when the percentage increased to 26.61 percent, the highest level in 33 years. It happened due to fluctuations in the demand and supply of some essential food items according to the Economic Survey (PBS 2008–09). Although, the trend of food inflation from the period 2013–19 was very low averagely 5.3%. The federal and provincial governments' efficient price monitoring and continuous

provision of commodities ensured that food costs stayed unchanged. COVID-19 has had an impact on several products' supply and demand, which has also had an impact on their prices. 16.0 percent compared to a 12.4 percent growth in the same time frame the previous year. The increase in the food prices due to viral disease which caused supply side risks.

In 2022, according to data from the Pakistan Bureau of Statistics, as reported by Trading Economics, the cost of food in Pakistan increased, indicating a trend of rising food prices that impacted 2022 as well. The headline inflation rate based on the CPI is currently 24.5%, an increase of 24.47% in 2022 compared to 2021. Food prices, especially in flood-affected areas, remained high for 12 consecutive months in 2022. Domestic and international drivers expect prices to remain high in the coming months.

These steep rising food prices are part of the bigger inflationary phenomenon which is increasing the country. This has led to an immense load on the general population, especially the impoverished population. The situation has worsened lately by the insufficient money available that has made the food high too much to afford. The Asian Development Bank (ADB) has highlighted the dire impact of food inflation on poverty, indicating that a 10% surge in food prices can result in a 2% increase in the poverty ratio. Despite various monetary and fiscal interventions to curb food inflation, rates remained in the double digits.

Contribution of Imports

This relationship is very complicated as it depends on the volume or type of imported goods, the exchange rate policy, government policies, among other factors. While imports could boost consumption, support production, and enhance consumer welfare, relying very heavily on them without corresponding rise in exports may lead to trade deficits which may affect sustainability of GDP growth. Therefore, these factors need to be balanced for stable and sustainable economic growth.

Contribution of Exports

Overall, the relationship between exports and GDP growth is multi-faced. Exports can be one of the important engines of growth through the inducement of production, generation of foreign exchange earnings, promotion of competitiveness, and attracting investment. However, the extent to which exports contribute to GDP growth depends upon a number of other factors such as foreign demand, exchange rates, domestic policies and the sectoral mix in the export market.

Contribution of Money Supply

Summarily, the relationship between M2 and GDP is complicated and multifaced. Though an increase in money supply may provide a temporary push to economic growth, the long-term sustainability of GDP growth relies of other factors such as productivity, technological advancements, as well as economic stability. Policymakers and central banks have to take care of money supply carefully to ensure that economic growth is consistent with moderate inflation pressures and sustainable macro economy environment.

Significance of the Study

The important of the study is that food price inflation is a big issue in Pakistan and people feel its impact in their daily life such as income, purchase power, literacy rate, money supply etc all of them also effect EG of Pakistan and further affect the development of the country. It is thus imperative that we determine how food price inflation affects the growth of the economy and at what threshold food price inflation affects the Pakistan economy.

Justification of the Study

This study will be very useful to macroeconomists, financial analyst, academicians, policy makers and central banker officials to understand societal GDP's sensitivity to the general price level change and therefore, make necessary policy recommendations to ensure that the prices are kept at a rate that

encourages production and economic activities. It is important for policy makers to clamp down doubt as many empirical research now available on the relationship between FPI and EG are still in doubt, several empirical evidence available in the literature establish the existence of either negative or positive relationship between the two macroeconomic variables.

The specific purpose of this research study is to assess the extent of the effect of FPI on the economic growth of Pakistan.

Problem Statement

Increase food price inflation has macroeconomic problem in Pakistan that appear to be chronic over the years; Pakistan Government has put some efforts deliberately (monetary and fiscal) to stop or decrease food price inflation growth to certain level but all seems to have no impact. In this research, the relationship between FPI and EG is tested. Thus at the end of this study the following questions will be answered. To what extent does food price inflation seem to have an impact with EG? If so, what kind of relation is it; positive or negative?

Objectives

The following are the objectives of study:

- To evaluate the association between FPI and EG.
- To provide recommendations for policymakers to manage and control food price inflation in order to promote sustainable economic growth of Pakistan.

Hypothesis

H₀: There is negative relationship between FPI and EG.

Alternative Hypothesis (H_A): There is a positive relationship between food price inflation and EG.

Review of Literature

There are so many studies have been conducted in the literature by focusing the influence of food price inflation on economic growth in the context of Pakistan as well as global level. This literature review aims to provide an overview of the key findings and theories related to the relationship between food prices inflation and EG, with a particular focus on the case of Pakistan.

The literature offers many theoretical justifications for the impact of food prices inflation on economic growth. One of the most commonly discussed theory is the "quantity theory of money." According to this theory, an increase in the money supply leads to inflationary, including FPI. Higher food prices reduce consumers' purchasing power, leading to decreased consumption, which can hinder economic growth.

Food Price Inflation and Economic Growth

Many studies of researchers on impact of FPI on EG in the context of Pakistan have been investigated. As study conducted by Khan et al. (2014) using time series data from 1971 to 2011 to examine the relationship between FPI and EG. No significant relationship between FPI and EG found in the long term, and suggested that constant increases in food prices can impede EG in Pakistan. While Malik and Sarwar (2017) were spotting the price inflation of foods impacting poverty levels of Pakistan in their study. It was demonstrated that even a 5% growth in food prices can push about 10 million people into poverty, implying the deleterious effects of the FPI on poverty rates.

In addition, in the study by Azid et al. (2019) the FPI effect on the investment in Pakistan is investigated. The findings showed that investment is strongly impacted by rising food prices, hinting at how inflationary activity caused by food prices inflation could lead to a decline in investments and thus diminish the economic development.

There are numerous studies had been conducted in different countries throughout the world and discovered the relationship between FPI and EG. Although, the results of these studies have been found mixed. For example, a study conducted by Ghosh and Roy (2016) of 120 countries by using the panel dataset and their study found that FPI has a negative impact on EG. In the same way, a study conducted by Cakir and Kabundi (2017) by using a panel data type of 23 developed and developing countries and their research found that food price shocks have a negative effect on economic activity.

Another example on the impact of FPI on EG in South Asian countries, mostly in Pakistan, India, and Bangladesh that has been studied by Ahmed and Rashid (2019). While the FPI would negatively affect the existing EG found in these countries, the impact is extremely significant. The study results reiterate the role of comprehensive and integrated approach in overcoming the FPI to realize South Asia's sustainable growth in economy. The principal idea of the research on the effect of FDI on the economy of subSaharan Africa which was carried out by Babula et al 2018. Where the study of the food prices between the economic growth, the consumption of products, the investment and the government spending were investigated. The study provided the agenda for the policies that are beneficiary-based to ameliorate the effects of food price inflation and ensure the accessibility of EG in the region.

Imports and Economic Growth

'Importing' generally refers to the act of bringing goods and services into one's own country from other countries, which includes a wide variety of products, including machinery, pharmaceuticals, and technological equipment. It involves the acquisition of goods and services produced by a foreign country, thereby facilitating an interaction between two distinct economies.

The demand for imports is influenced by both economic and non-economic factors, including political stability, economic conditions, production costs, and labor costs.

Shah (2020) research was about analyzing the correlation of capital formation, EG, exports, and imports in a context of Pakistan and employed time series data between 1976 and 2015. In the study, different analytical methods from ARDL, ADF test, VAR GARCH, and Granger Causality were applied to estimate the relationship between growth, exports, and imports. Among the findings of the study are that exports, goods and services that are imported, real GDP, and gross fixed investment all have a long run relationship and are cointegrated. The study, which analyzes Pakistan's data, concludes that GDP does not Granger cause exports and imports, whereas exports and imports do

Granger cause GDP in the long run. Additionally, the results suggest that physical capital formation does not significantly impact GDP. While previous research has highlighted a positive correlation between exports, imports, capital formation, and EG, Shah's study reveals that, in the long term, capital formation does not significantly influence economic growth. The study also notes that government policies, such as export subsidies and increased import duties, play a role in enhancing domestic industries by encouraging the production of high-quality goods.

Hunjra's research from 2014 highlights that between 2010 and 2012, Pakistan earned 75% of its total foreign exchange from just five key commodities: cotton, rice, garments, sports goods, and carpets. Pakistan's economy is characterized by a high consumption rate, with the majority of its goods and services being utilized domestically, leaving a minimal surplus for exports. Another significant aspect is the country's substantial demand for unrestricted imports, driven by the needs of its rapidly growing population and developing economy. This demand encompasses a wide array of goods, including those required by import-dependent industries and consumer preferences. Many Pakistani industries rely on imported raw materials, with the Pakistan Steel Mill serving as a prime example, sourcing its raw materials internationally. Furthermore, Pakistan's economy benefits from the services of foreign entities such as banks, airlines, shipping companies, and internet providers, which account for significant 'invisible' imports. Additionally, a considerable portion of Pakistan's foreign exchange is expended on various services abroad, including education, healthcare, and business travel, among others.

Exports and Economic Growth

Zaheer and his accomplices (2014) studied the effect of the trade balances on the Gross domestic product growth rate of Pakistan by using the time series data from 2000 to 2010 and applying the Johansen Cointegration test for empirical analysis. Exports, according to the study, both significantly and also positively impact on the EG, while imports decrease the EG. The study concludes that for the countries to realize economic expansion, the government should take up more liberal exchange rate policies that lead to the EG. In a similar line, Mohsen, (2015) explored the effect of trade openness on the EG of Syria. The study used the data from 1980 to 2010 and applied the Augmented Dickey–Fuller unit root test, Johansen Cointegration test, and the Granger Causality test for the empirical estimation. The results underpin the fact that the concentration has to be made on the quality and the diversity of the exports, as well as on the improvements of the import and export procedures for the purpose of EG.

In the study of 2017 realized by Dilshad Ahmad, the role of exports on the EG in Pakistan was researched using the annual time series data going back to the year 1972 and ending in 2014. The research's findings showed that the exports contribute to the EG, while imports, the CPI and terms of trade are rather harmful regarding the economic growth.

Shah (2015) conducted an examination on the link between the agricultural exports and EG, by using data ranging from 1972 to the year 2008. This research employs cointegration and Granger Causality tests to analyze the outcome. The outcome emphasizing that the agricultural exports, mainly based on the raw materials instead of manufacturing, have a very small influence on the economic growth. On the other hand, Yaqub (2016) studied the effects of exports and FDI on the growth of the economy in Pakistan using data from 1990 to 2010. The analysis was conducted through the use of unit root tests and the ordinary least squares (OLS) for estimation. The evidence shows that importing and exports promote the EG.

Money Supply (M2) and Economic Growth

In their study, Aslam and Awan (2018) sought to assess the influence of Pakistan's monetary policy on its Gross Domestic Product (GDP) through an examination of a time series data set that lasted 31 years beginning from 1972 to 2013. The study used correlation analysis for macroeconomic variables and multiple regression statistics for results interpretation. They assessed real GDP as the dependent variable (DV), while gross capital formation, FDI, labor force employment, broad money (M2), exports and GDP deflator were considered independent variables (IVs). Moreover, they have reported that the level of the money supply; short-term credit rate and inflation rate alongside unemployment rate affect longer EG such as savings, foreign direct investment and other macroeconomic factors.

Ayodeji and Oluwole (2018) holds in a sense that Nigeria's path to the development has been affected by her monetary policy with time series data being collected from 1981 to 2016. They employed a significantly many analytical tools including the test ADF, VECM, Johansen Co-Integration test and Engle-Granger Co-Integration to establish the relationship. On the contrary, the variables of exchange rate, the interest rate, money supply and liquidity ratio have been considered as major indicators of economic growth. Research results show that there is weak, but obvious impact of inflation on the country GDP caused by rate of exchange and money supply, however, interest rate and liquidity ratio affect GDP and in a more significant manner. For this study, it can be deduced that there is really a connection between the GDP and monetary policy of Nigeria.

Material And Methods

Model Specification

To analyze the relationship between GDP, food price inflation, exports, imports and money supply (M2) by using an appropriate statistical model. The general form of the model can be represented as follows:

$$GDPT = \beta_0 + \beta_1 FPI_t + \beta_2 EX_t + \beta_3 IM_t + \beta_4 M2_t + \mu_t$$

In the above model GDP is dependent variable and others variables FPI, EX, IM & M2 are independent variables. While $\beta_1, \beta_2, \beta_3$ & β_4 are co-efficient which show the slopes of dependent variable, β_0 is intercept and μ is error terms.

Methodology

The study obtained annual time series data from 1990 to 2022 for the study variables. The first step of analyzing time series data implies assessing the extensiveness of dependency between the variables in the data set. So we will apply the Augmented Dickey-Fuller (ADF) unit root test, which was brought about by Dickey and Fuller at the end of the 1970s and at the beginning of 1980s. In simple words, the test help to determine whether a time series is stationary or non-stationary.

The potential forms of the ADF test which are collapse by the following equation.

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^m \beta_i \Delta Y_{t-1} + \mu_t \dots \dots \dots (1)$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^m \beta_i \Delta Y_{t-1} + \mu_t \dots \dots \dots (2)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \gamma Y_{t-1} + \sum_{i=1}^m \beta_i \Delta Y_{t-1} + \mu_t \dots \dots \dots (3)$$

Where α_0 is intercept term, α_1 is co-efficient of trend variable, μ_t is error term and $\sum_{i=1}^m$ shows the number of lags included in the model. Vector Autoregressive Lag order selection criteria utilized to determine lag duration utilizing the residuary's lag length requirement or the Schwartz Bayesian criteria (SBC), Akaike Information Criterion (AIC), or both.

An efficient econometric technique for figuring out how variables relate to one another over time is Autoregressive Distribute Lag (ARDL) model, which will be used. ARDL is a more effective, simple method than other methods for checking co-integration among the study variables, which was introduced by Pesaran et al., (2001). So, in this investigation to assess the long-term correlations between the relevant variables we will apply ARDL Bound Test. The ARDL frameworks' error correction design with respect to the variables included in this investigation are as follows:

$$\begin{aligned} \Delta GDP_t = & \alpha_0 + \sum_{j=1}^n \beta_{1j} \Delta GDP_{t-1} + \sum_{j=1}^n \beta_{2j} \Delta FPI_{t-1} + \sum_{j=1}^n \beta_{3j} \Delta IMP_{t-1} + \\ & \sum_{j=1}^n \beta_{4j} \Delta EXP_{t-1} + \sum_{j=1}^n \beta_{5j} \Delta M2_{t-1} + \varphi_1 \Delta GDP_{t-1} + \varphi_2 \Delta FPI_{t-1} + \varphi_3 \Delta IMP_{t-1} + \\ & \varphi_4 \Delta EXP_{t-1} + \varphi_5 \Delta M2_{t-1} + \mu_t \dots \dots \dots (4) \end{aligned}$$

Where, $\varphi_1, \varphi_2, \varphi_3, \varphi_4, \varphi_5$ are the parameters corresponding to long-run multipliers, whereas, the coefficients of short-run dynamic of our ARDL model are represented by the parameters $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and ε , which stands for serially independent disturbance utilizing the Δ first difference manipulator which has a zero mean and constant variance, which is. The bound testing approach will be used to estimate the longrun connection between the variables in the ARDL.

The error correction model used in this study to ascertain short-term relationships is as follows:

$$\begin{aligned} \Delta GDP_t = & \alpha_0 + \sum_{j=1}^n \beta_{1j} \Delta GDP_{t-1} + \sum_{j=1}^n \beta_{2j} \Delta FPI_{t-1} + \sum_{j=1}^n \beta_{3j} \Delta IMP_{t-1} + \\ & \sum_{j=1}^n \beta_{4j} \Delta EXP_{t-1} + \sum_{j=1}^n \beta_{5j} \Delta M2_{t-1} + ECT_{t-1} + \mu_t \dots \dots \dots (5) \end{aligned}$$

Where $\beta_j, \beta = 1, 2, 3, 4, 5$ shows the short-run parameters. The long-run error correction relationship is represented by the word ECT. It displays the coefficient's recovery with a negative sign and a value less than one, indicating statistical significance and confirming the presence of co-integration.

Subsequently, after verifying the relationship of long-term between the variables, the estimated model for economic growth is provided as follows:

$$\Delta GDP_t = \alpha_0 + \varphi_1 \Delta GDP_{t-1} + \varphi_2 \Delta FPI_{t-1} + \varphi_3 \Delta IMP_{t-1} + \varphi_4 \Delta EXP_{t-1} + \varphi_5 \Delta M2_{t-1} + \mu_t \dots (6)$$

Data Sources

This study incorporates yearly data spanning from 1990 to 2022 for the relevant variables. Secondary data sources play a crucial role in obtaining reliable information that has already been researched, evaluated, and validated. In this study, secondary data will be utilized to examine the impact of food price inflation on EG. The data will be collected from various databases for theoretical purposes i.e. Eco. Surveys and Annual Reports, SBP (State Bank of Pakistan), WDI (World Development Indicator), United Nations Development Program (UNDP), Pak. Bureau of Statistics, International Monetary Fund (IMF), World Bank and Annual reports of various National and International Institutes.

Empirical Results

Introduction

In order to examine the impact of FPI on EG of Pakistan as discussed in previous chapter time series data of study period from 1990–2022 is being used. This chapter gives the findings that have arisen from estimation of eqn. (4). This has been estimated using Autoregressive Distributed Lag (ARDL) cointegration technique. The initial criterion is to determine the number of lagged values of the endogenous variables, which should be optimal. Optimal lag length has been identified using Sharwtz Baysien Criterion (SBC). From this criterion, it is preferable to choose 4 lags as optimal. Due to the fact that in our analysis the frequency of data is annually, this lag seems quite reasonable. Having identified the final form of the model, we have applied the bound F test to check for the long run relationship among the variables (Cointegration). In light of this, we have estimated the final model with both long and short run ECM terms after confirming the existence of the longrun relationship. Various diagnosistic tests which included Serial correlation, Normality test, Heteroscedascity, Cumulative Sum (CUSUM) and Cumulative Sum of square (CUSUM Square) have been carried out. Results are explained below.

Augmented Dicky-Fuller (ADF) Unit Root Test Results

The Augmented Dickey-Fuller (ADF) unit root test, which was brought by Dickey and Fuller at the end of the 1970s and at the beginning of 1980s, Dickey and Fuller extend the tests procedure by introducing an enhanced testing version that includes an additional dependent variable lag for autocorrelation removal. In order to establish stationary characteristics, it is imperative that the mean and variance of the data remain consistent for the same period.

In simple words, Reject the null hypothesis ($p < 0.05$ or test statistic $<$ critical value) = Stationary time series. Fail to reject the null hypothesis ($p > 0.05$ or test statistic $>$ critical value) = Non-stationary time series.

Table 1

Variable	At level With Constant			At 1 st difference With Constant		
	t-St Value	Prob. Values	5% level	t-St Value	Prob. Values	5% level
GDP	-4.3168	0.0018	-2.9571	-6.1435	0.0000	-2.9639
FPI	-3.0194	0.0437	-2.9571	-8.7066	0.0000	-2.9604
IM	1.3726	0.9984	-2.9639	-5.1276	0.0002	-2.9639
EX	0.4400	0.9816	-2.9571	-3.8336	0.0058	-2.9604
M2	-4.2141	0.0024	-2.9571	-7.3325	0.0000	-2.9639

According to the results of ADF test has shown in above (Table 4.1) that the GDP which is dependent variable is stationary at level, it means that our data has no unit root problem. Also the independent variables as FPI and money supply are stationary at level as shown in (Table 1). However, imports and exports our independent variables are not stationary at level, but are stationary at first difference as shown

in (Table 2). The ADF test results indicate that certain variables are stationary at the first difference and some stationary at the level. The variables' integration level is the same, according to the findings of the ADF test.

Lag length Selection

The initial criterion is to determine the number of lagged values of the endogenous variables, which should be optimal. Optimal lag length has been identified using Sharwtz Baysien Criterion (SBC). From this criterion, it is preferable to choose 4 lags as optimal. Due to the fact that in our analysis the frequency of data is annually, this lag seems quite reasonable. We have employed an optimal lag duration of one, as suggested by lag selection criteria. Table 2 reports on the criteria's results.

Table 2

VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-440.4370	NA	15105134	30.71979	30.95553	30.79362
1	-366.5218	117.2449	533517.0	27.34633	28.76077	27.78931
2	-330.3580	44.89291	292571.7	26.57642	29.16956	27.38856
3	-287.2125	38.68220*	136890.7	25.32500	29.09685	26.50630
4	-219.3819	37.42377	24423.67*	22.37117*	27.32172*	23.92162*

*indicates lag order selected by the criterion

Table 2 makes it evident that each endogenous variable in the ARDL lag structures of the estimable VAR model has LR, FPE, AIC, SC, and HQ statistics selected at lag 4, with the exception of LR. As a result, lag of 4 is employed in the estimating process.

Autoregressive Distributed Lag (ARDL) Test Results

Autoregressive Distributed Lag (ARDL) models was invented by Pesaran, Shin & Smith (2001). The ARDL model can estimate both short-run dynamics and long-run relationships between variables. In simple terms, the ARDL test helps understand how current and past values of variables influence the outcome over time.

After conducting the ADF test our second step is to find the co-integration exist among the variable with help of Bound test.

The bound test is used to determine whether or not there is a long-term relationship. The null hypothesis states that: if the value of the F-statistics indicates that there is no longterm relationship, then the first case; if this value is lower than $I(0)$, we do not reject the null hypothesis and the long-term relationship is present, then the second case; if this value is greater than $I(1)$, we reject the null hypothesis and we can indicate that a longterm relationship exists, then the last case; if this value falls between two bounds, we are unable to make a determination. We are in the second scenario in this instance because the F-stat value is higher than the upper bound, indicating the presence of a long-term association at all significance levels—1%, 5%, and 10%.

Results of ARDL Bound test for Co-integration

Table 3

Test Statistic	Value	Sig.	I(0)	I(1)
F-Statistic	13.15592	10%	2.45	3.52
		5%	2.58	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Sample: 1995 2022 Included observations: 28

The results shows that F-Stat value (13.15592) which is greater than the upper bound I(1) at 5% significance level. Therefore, in this case we reject the H_0 because there is a cointegration among the study variables means there is existence of long-run relationship.

ARDL Co-integrating and Long Run Form

Table 4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FPI	-0.196413	0.044170	-4.446712	0.0067
EX	0.465115	0.177391	-2.621980	0.0470
IM	0.420017	0.038771	10.83334	0.0001
MS	0.267685	0.020703	12.92982	0.0000
C	1.172568	0.202838	5.780821	0.0022

Dependent Variable: GDP

Selected Model: ARDL(4, 3, 4, 3, 4)

Sample: 1990 2022

Included observations: 28

The long-run coefficients of all variables have predicted theoretical signs that are either positive or negative, as indicated in table 4. As demonstrated by the results there is negative relationship between FPI and EG, however, other variables like exports, imports, and money supply have positive relationship with EG in Pakistan. Results shows that the coefficient of FPI if 1% increases it leads -0.196% decrease in EG. This relationship is significant at 5 percent based on p-value. There is positive relationship between exports and EG. If 1% increases in exports cause 0.465% increase in EG. This relationship is significant at 5 percent based on p-value. The results show that relationship among imports and EG is positive. If 1% increases in imports cause 0.42% increase in EG. This relationship is significant at 5 percent based on p-value. The results show that positive relationship exists between money supply and EG. The coefficient of money supply state that if 1% rise caused 0.267% increase in EG. This relationship is significant at 5 percent based on p-value. The findings show that FPI has negative impact on EG whereas, imports, exports & money supply are an important factors, this promotes Pakistan growth. It has a more significant and appropriate impact on GDP growth. Findings are relevant to the study of Dilshad et al. (2017) and Saleem and Sial (2015).

ARDL Short Run Error Correction Model (ECM-ARDL)

Table 5

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FPI)	-0.26706	0.081431	-3.27954	0.022
D(FPI(-1))	-0.02835	0.087792	-0.3229	0.7598
D(FPI(-2))	0.324949	0.065614	4.952472	0.0043
D(EX)	-0.32782	0.187014	-1.75292	0.1400
D(EX(-1))	0.197182	0.251923	0.782706	0.4692
D(EX(-2))	0.373515	0.213451	1.749891	0.1405
D(EX(-3))	0.848983	0.211727	4.009809	0.0102
D(IM)	0.482145	0.0745	6.471758	0.0013
D(IM(-1))	-0.06956	0.094346	-0.73733	0.4940
D(IM(-2))	-0.8559	0.162339	-5.27229	0.0033
D(MS)	0.075822	0.053775	1.409991	0.2176
D(MS(-1))	-0.064	0.043958	-1.45583	0.2052
D(MS(-2))	-0.31653	0.055065	-5.74838	0.0022
D(MS(-3))	-0.13001	0.064983	-2.0006	0.1019
CointEq(-1)	-0.33751	0.67086	-5.72029	0.0023

$$\text{Cointeq} = \text{GDP} - (-0.1964 * \text{FPI} + 0.4651 * \text{EX} + 0.4200 * \text{IM} + 0.2677 * \text{MS} + 1.1726)$$

The short-term effects of the FPI lag coefficient $D(\text{FPI}(-1))$, export lags $D(\text{EX})$, $D(\text{EX}(1))$, $D(\text{EX}(-2))$, export change $D(\text{LEXP})$, import change $D(\text{IM}(-1))$, and money supply change $D(\text{MS})$, $D(\text{MS}(-1))$, $D(\text{MS}(-3))$ are all negligible. According to the $D(\text{FPI})$ coefficient, a 1% increase in average FPI led to a short-term drop in EG of 0.27%. The ECT value is (-0.33), which is statistically significant and has a negative sign. It shows that, over time, around 27% of converges to the long-run equilibrium annually.

Breusch–Godfrey Serial Correlation LM Test

Table 6

F-statistic	Prob. F(2,3)	Obs*R-squared	Prob. Chi-Square(2)
0.845581	0.5114	10.09399	0.0064

In the above table, the Breusch–Godfrey Co-relation LM Test applied the value of F-stat is 0.845581 and p-value is 0.5114 which is insignificance at 5% level, so in this case we do not have any sufficient evidences to reject the null hypothesis, it means there is no serial correlation.

Results of Heteroscedasticity Test Breusch–Pagan–Godfrey

Table 7

F-statistic	Prob. F(22,5)	Obs*R-squared	Prob. Chi-Square(22)	Prob. Chi-Square(22)	Scaled explained SS
0.315169	0.9737	16.26853	0.8023	1.0000	0.44188

In this table, the heteroscedasticity test applied value of F-statistics is 0.315169 and pvalue is 0.9737, so in this case we do not have any sufficient evidences to reject the null hypothesis, it means there is no heteroscedasticity.

Normality Test

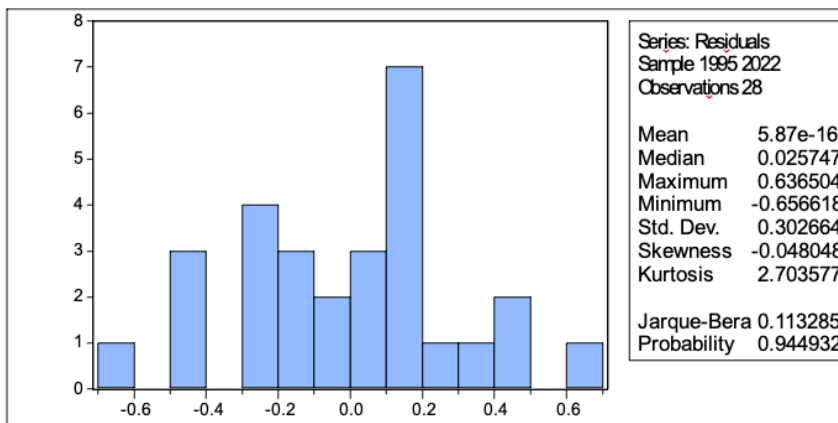
Descriptive statistics of Jarque–Bera test that shows the goodness-of-fit of model. Skewness and kurtosis are basic parameters employed on the basis of frequency distributions to characterize the shape of the distribution. These two are normally used in descriptive statistics to give information on how a given data set is skewed from normality.

Kurtosis is a measure of peakedness of the distribution and all peakedness of the distribution is compared to that of normalized distribution. This is because it measures the extent of the peak at zero and the density at the tails. While, the Skewness measures one more characteristic of the distribution which shows that distribution is skewed or not. Skewness is a measure of the departure of the distribution from symmetry with reference to the mean.

Null hypothesis: The normally distributed

Figure 1

Descriptive Statistics of JB



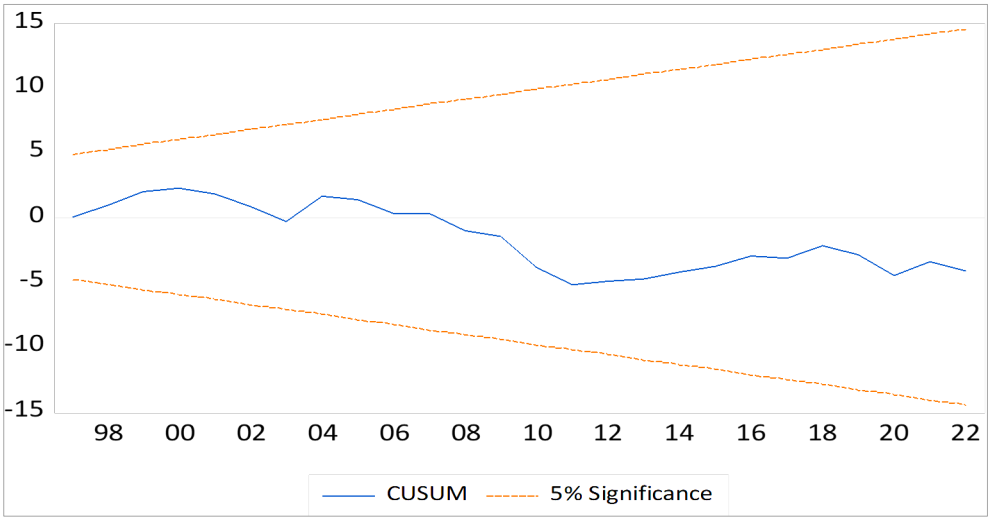
The aforementioned statistic shows that the normalcy test employed was the Jargue–Bera test. The kurtosis value is less than three, at about 2.70, so that shows the curve is platycurtic. However, the skewness value is -0.048 which is quite well. The normalcy of p-value on the test screen, which is shown at the bottom, should be more than 5%. Because we accept the H_0 , as the p-value is 0.94 that is greater than 0.05, fails to reject the presence of normalcy at the 5% level.

Stability Test

The CUSUM and CUSUM of Squares tests are two of the stability tests for the ARDL estimation. The cumulative sum of the recursive residuals serves as the foundation for the CUSUM test. It assesses the instability of the parameter within a 5 percent range. The estimation is steady if it stays inside the red line range; if not, it is not stable. Graph 4 displays the CUSUM measure results. This demonstrates the stability of the estimation.

Figure 2

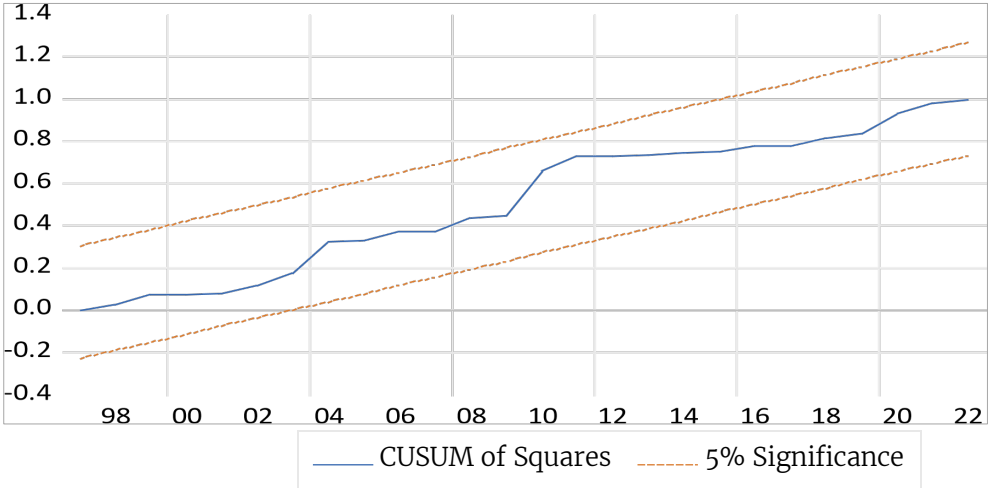
CUSUM



The residuals' squares are used to run the CUSUM test of squares. Like the CUSUM, the residual variance is stable if it estimates the parameter instability within the red line range; if not, it is not. The cumulative sum of squares is within the range of the red lines, as seen in the graph 5 below. It passes the second stability test as a result. This research suggests that food prices need to be set and governed by market forces.

Figure 3

CUSUM Square



Tests are used in this model to verify the economy's stability. The Cumulative Sum (CUSUM Squares) and Cumulative Sum of (CUSUM) approaches are used to achieve this goal. At a 5% significance level, the plotted diagram displays that line in the middle of the critical zone. The blue line should appear between the two red lines when tests are run. The evidence of a steady economy is shown.

Conclusion and Policy Implications

Conclusion

This study aims to investigate the impact of food prices inflation on the EG of Pakistan. The time series data used from 1990 to 2022 for the relevant variables.

Food price inflation remained as a main challenge in the economy of Pakistan from the few years. Increasing cost of food items directly affect the poor households, as they spend more than 70% of their income on just food items.

The ADF test has been utilized and results shows that the certain variables exhibit stationary behavior at the level and others at the first difference. The mixed results has been found.

According to the results of ADF we use the Autoregressive Distributed Lag (ARDL) models to analyze dynamic relationships with time series data.

Results shows that there is a negative relationship between the food price inflation and economic growth, in simple words that the higher food price inflation resulted in lower GDP and on the second side low food price inflation caused higher GDP. However, the imports, exports and money supply have positive impact on EG in the context of Pakistan.

Policy Implications

- Based on the findings, the current study recommended that in order to regulate the unsettling situation of food prices, the government should implement appropriate fiscal and monetary policies.
- Government should take long term measures to implement and checked them properly.
- Government should invest in research to better understand the complexities of food systems and the impact of various factors on food prices and economic stability.
- Develop and maintain strategic food reserves to buffer against supply shocks. Ensure these reserves are sufficient to cover shortages during crises.
- Improve data collection and real-time monitoring of food prices, supply chain status, and economic indicators to enable more informed decision-making.
- Increase transparency in food pricing and supply chain operations to build trust and improve market efficiency.
- Enhance resource management strategies to ensure long-term sustainability of food production and distribution systems.
- Engage with international organizations and support mechanisms to access global expertise, resources, and support during crises.
- Share best practices and lessons learned with other countries facing similar challenges to foster a global learning environment.

Limitations

Data Limitations: The availableness and accuracy of data, especially regarding house hold level consumption patterns and income distribution may be limited. The research will rely on publicly available datasets, and the quality and completeness of these datasets can influence the strength the analysis.

Generalizability: The findings of this study relates to that of Pakistan alone, while it does not transfer directly to other countries with different economic structures, policies and sociocultural characteristics.

Complexity of Factors: Various issues such as political events, international economic trends, and climate-related shocks have an impact on the relationship between food price inflation and EG. Such intricate interactions may, however, not be completely captured in the analysis.

Despite these restrictions, this research thesis seeks to provide valuable information about the complex relationship between food price inflation and EG in Pakistan, adding depth to the understanding of the challenges and opportunities towards the economy of the state.

Future Directions

Therefore, research on the same subject, which is the impact of FPI on EG in Pakistan, can be carried out at the provincial level especially Sindh by making use of the data of FPI at the provincial level. Further, research can also be conducted at the regional level especially Sukkur region level. Although, differences in food price inflation between urban and rural regions can also be conducted. This will be of great assistance to policymakers in formulating appropriate policies concerning the economy. Moreover, these future studies would give better understanding of the factors contributing to the food price inflation, its consequences and possible remedial measures in the context of Pakistan, by using innovative approaches aim to go beyond traditional research, offering fresh perspectives and novel methodologies to design and formulate better suited policies and strategies to counter this sensitive problem.

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