# Dynamics of Food Inflation in Pakistan: Role of Trade Liberalization and Oil Prices

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# Dynamics of Food Inflation in Pakistan: Role of Trade Liberalization and Oil Prices

BY

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# Abstract

Since 2008, food price has been a major topic of debate around the world. Food prices spiked dramatically in 2008, prompting a considerable investigation into the responses and dynamics of this particular incidence of food prices. An increase in fuel prices and speculative behavior in agricultural commodity financial markets were all attributed in the international literature to food prices. This study looks into the causes of food inflation in Pakistan. Food prices in Pakistan seem to be a source of concern for policymakers, and the country's high food prices have necessitated an investigation of the fundamental factors that determine food prices. The current study investigates the effects of trade liberalization and higher fuel prices on food inflation in Pakistan, and also anotherindicator, the presence of middlemen, which restricts supply and increases food prices. The standard implication is to work with single equation model (econometric model) in which food inflation is dependent determinant while trade openness, crude oil price, and some other determinants are taken as explanatory variables. The purpose of the research is to look at the cost-push variables (crude oil prices and price wedge) and demand-pull (money supply, trade liberalization) determinants that influence food price. Data over the period spanning 1980 to 2020 were used in this investigation. Data is compiled from a variety of sources, including the World Development Indicators, and Pakistan Economic Survey. The other determinants used in the study include exchange rate, price wedge and money supply. The coefficient of trade openness is negative -0.18 which shows a negative relationship between trade openness and food inflation and variable is significant at 5%. On the other hand, the coefficient of crude oil prices is positive 0.11 and the variable is significant at 5%.The ECM term of -0.54 means that the speed of adjustment towards long run equilibrium, which is 54% between the variables and the error correction model is also statistically significant. The study's outcomes show that trade openness significantly reduces food inflation, reflecting Romer's hypothesis in Pakistan. Second, crude oil priceshave a significant influence on food inflation. The research reveals that food inflation is determined by the money supply. According to this analysis, the government should enhance price caps on oil prices to prevent spillover effects on food supply and productioncosts.



**Key Words:** Food Inflation, Oil Prices, Trade Openness, ARDL

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# List of Abbreviations

ARDL - Autoregressive distributive lag

CPI- consumer price index

ECM- Error Correctional Term

MENA - North Africa and the Middle East Countries

IEA - International Energy Agency

IRRI - International Rice Research Institute

LIFDC - Slow-income food-deficit countriesABL – Arable Land

PW- Price Wedge

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# DEDICATION

This thesis is dedicated to my Parents for their love, endless support and encouragement.

# Chapter 1

# INTRODUCTION

Food inflation is a universal challenge. It is not simply a problem in underdeveloped countries, but it is also causing problems in global markets. According to the Food and Agriculture Organization (FAO) Food Price Index (FFPI), averaged 116.0 points in February 2021, up 2.8 points (2.4 percent) from January. This was the highest level since July 2014 and the ninth straight month of increases. Global prices of vegetable oil, food grain, wheat, and sugar are increasing day by day and these items are considered as important food commodities utilized in every household. The low-income groups and poor people are mostly affected. Pakistan's agriculture sector is likewise affected by price issues. According to Asian Development Bank (2019), “food inflation in Pakistan is about 23.70% and tends to be high and volatile”. This food inflation in Pakistan has become a point of concern for the policy makers. In addition to the instability in macroeconomic policies, change in food prices is caused by numerous factors, including increases in oil prices both at domestic and global level, trade liberalization, and availability of arable land and role of agricultural intermediaries.

Significant inflationary pressure, primarily on food prices, has been a key matter of concern in many developing nations over the last decade, so according Ambachew et al. (2012), because it has hampered socioeconomic progress. However, inflation, especially food inflation, is a global issue with varying degrees of intensity, not limited to any one country. The Asian Development Bank identified three sets of variables as the primary reasons for rising food inflation in Asia's developing nations, including Pakistan.

One of the most important goals of the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) is the elimination of hunger and poverty. Balitskiy et al (2014), observed that food price has displayed hyperinflation since the 2000s, as the fuel prices give on to an increase in energy and raw material prices which - started to change the price of wheat, rice, corn, and other crops which have amplified at tall records. Because of the relative importance of the repercussions of oil price swings, there is a vast literature on the causes of unpredictable food prices. As a result, it's not surprising that fuel price fluctuations have been investigated as a possible cause

of the rise in food prices. Energy-intensive resources like fuel and fertilizers, as according Nagyová et al (2016), have a substantial impact on shipping costs, which in turn influences food cost of production and, as a result, food prices.

Furthermore, according to Pakistan's excess co-movement theory which determines, food prices are boosted by a number of factors, including expansionary fiscal and monetary policies, fuel prices, supply uncertainty, and support prices. According to Awan and Imran (2015), the Government of Pakistan's Economic Survey (2007, 2009, and 2013) indicated that food inflation in Pakistan was 9.9% from 1972 to 2019. It began to rise after 2003, reaching a peak of 12.5 percent in 2004-05. In 2007, it was 17.5 percent, while in 2008, it was 26.6 percent. The intensity of the issue increased when it rose to 26.6 % in 2008-09, which is the highest in 23 years, and according to research by the Asian Development Bank, a 10% increase in food prices is due to a 2% increase in poverty ratio. This sharp rise in food prices was because of the inadequacy of wheat, supply which generate a huge rise in prices of vegetables, meat, oil and milk. Food inflation in Pakistan was exacerbated by the rise in worldwide food expenses, which coincided with the rise in oil prices. Food inflation is a reasonable possibility for governments to consider. Food prices have risen due to a 2% increase in the poverty rate.

According to Timmer (2010) however, one of the most marked propositions in trade liberalization is linked up with the decline in prices, where protectionism is inflationary supported by Romer Hypothesis. In today's time, no one can confine himself from the universally rising markets and countries do not isolate themselves by the world market. Developing Countries like Pakistan, have trade liberalization allowed imports of agricultural machinery, which enhanced energy demand thereby increasing the energy prices. Furthermore, liberalization will be hampered if there is an insufficient energy supply. Crude oil is a critical component in the manufacturing process since machines and equipment require energy to operate, and processing demands fuel for transportation.

Food inflation, according to Ashra (2002), has a negative impact on an economic condition, such as changing the price mechanism's function. The price mechanism is unable to work correctly when the average price rises. Inflation noise will arise if the overall price level keeps going up and boosts equal declines. Given Pakistan's dependence on imported energy, oil price volatility has substantial implications for the country's economy, according to Pesnani et al. (2008) that oil is the second most

extensively used energy source after natural gas (30 percent). Energy prices are a major factor in determining inflation rates in Pakistan. The consumer price index (CPI) and international fuel prices have a tight association (around 0.87 percent). Headline inflation has been continuously rising since 2004-2005.

Pakistan began its trade liberalization journey in the 1980s, according to Tahir (2010). The economy has undergone a number of trade-related reforms over time, including quantitative trade restriction and tariff reductions, as well as the removal of the system of fixed exchange rates. This is reflected in the country's trade-to-GDP ratio, demonstrating that it has become much more intertwined with the international economy. High prices did not become a severe issue until the mid-1960s, when it persisted in the single digits and peaked at 9% in 1966-7 as a result of delayed commodities transportation across the country following the clash with India. A decline in the productive sectors' growth performance was caused by plenty of external and domestic, along with the independence of Bangladesh, now Bangladesh, in 1971 and the new administration's sharp reversal of policies, including the nationalization of large production and small-scale agricultural, the financial sector, and the social sectors in 1972. On the contrary, the country's exports are down, while imports are up. This, combined with a more than 100 percent devaluation of the currency in 1972, and a major increase in oil prices in the global market, notably between 1974 and 1979, led it a sharp increase in the total price level.

Pakistan attempted four IMF Standby or one-year non-conditional adjustment programs to overhaul the external sector, improve growth, and manage inflation in the 1970s, but none of them were successful. In the early 1980s, Pakistan devalued its currency again, and the military government's slow reversal of its nationalization policy, combined with sour reactions from the private industry, continued to harm exports and imports, resulting in a dramatic increase in overall fiscal deficit and an account deficit of 8.7% of GDP in fiscal year 1988-88.

Pakistan approved the Extended Fund Facility (EFF) or the three-year highly conditional Structural Adjustment Program (SAP) of the International Monetary Fund (IMF) in 1988, following the utter failure of the Standby programs in the 1970s, according to Zaidi (2015). Conditional initiatives, which lasted throughout the 1990s and beyond, ushered in substantial reforms in Pakistan's manufacturing, banking, financial, and foreign sectors. Due to a variety of causes, a journey towards trade liberalization has also resulted in changing inflationary behavior in the country. The

liberalization process, for example, increased the demand for goods and services. Loose monetary policy was implemented to encourage exports, and a slew of other fiscal policies aimed at promoting trade liberalization added to rising prices in the post-liberalization phase.

Moreover, the depreciation of the Pakistani rupee and variations in fuel prices have both contributed significantly to Pakistan's inflationary pressures. Exchange rate fluctuations are also linked to terms of trade. A significant drop in the exchange rate's value (depreciation) would result in lower export prices and higher import costs. The terms of the trade index are worsened as a result of this. On the contrary, a lower exchange rate improves a country's competitiveness since the demand for exports increases while demand for imports from domestic consumer's decreases. So, all these factors are linked and cause high food prices.

World leaders are extremely concerned about the recent food crisis. The United Nations (UN) World Food Summit, which took place in Rome in June 2008, highlighted many questions concerning the origins of the food crisis as well as how to address it. Despite a large body of study on the factors that contribute to high and fluctuating food costs, the relative contribution of oil prices to food price increases has remained a point of contention. With the current surge in food prices, it's not unexpected that the price of oil has been looked into as a possible cause. It's thought that rising oil costs contribute to rising food prices and that the two prices rising together lowers food security. Intuitively, changes in oil prices affect food production costs and, as a result, food prices, through affecting energy-intensive inputs including such fertilizers and fuel, as well as transportation costs.

This research will assist in determining what are the major factors of food inflation, whether it is a local or foreign influence, and what characteristics play in the food inflation phenomena. This study also focuses on the role of agricultural intermediaries, which is although to facilitate agri-business, actually constraints food supply in Pakistan by hoarding and leads to higher food inflation. The function of intermediaries in determining food prices is of particular relevance due to the creation of a discrepancy between retail and wholesale pricing as a response of these intermediaries. Food inflation is influenced by both cost-push and demand-pull factors. To completely comprehend and study the reasons for rising costs, which is a key problem for the economy, it is critical to first study and identifies the factors of food inflation. As a result, the goal of this study is to investigate the effects of numerous factors on food

prices in Pakistan. The study explored the effect of macroeconomic indicators on food inflation in Pakistan by providing the trend and statistical features of food prices and selected factors in Pakistan.

## 1.1 Problem Statement

Inflation and trade opening have a negative association in various types of economies, including developing countries, according to Romer (1993). There was no evidence that the theory's prediction holds true in economically advanced economies, according to the research. Kim (2005) looked further into it and established a link between trade liberalization and relative prices in industrialized economies such as the Belgium, Ireland and United States, whereas the Romer hypothesis applied to all other nations, developed and emerging. Mukhtar (2010) backs up Romer's (1993) results by demonstrating that trade openness and prices are mutually exclusive. The body of studies that have attempted to establish this link between trade openness and inflationary impact have relied on data from a variety of regions. As a result, based on the facts, the Romer hypothesis varies from country to country.

In spite of the number of explore the link between trade liberalization and inflation, the consequences of trade openness on inflation continues an empirical subject in the economic literature. It's difficult to generalize the effect because the theory varies each country. As a result, the purpose of this study is to look at Romer's (1993) theory of openness and inflation. The goal of this study is to add to the existing study on the trade openness-food inflation association utilizing the Romer Supposition and the price of oil pass-through impact on the Pakistani economy by doing an analytical analysis of the connections. To test Romer's claim, investigators will need to look into the impact of fuel price volatility on food inflation in Pakistan, and also the impact of globalization and price wedge on food inflation.

## 1.2 The objectives of the Study

The following are the objectives of this research:

1. To identify the major determinants that influence food prices in Pakistan's economy.

2. To examine the role of trade openness, crude oil prices and price wedge on food inflation in Pakistan’s economy.

## 1.3 Hypothesis of Study

1. Null Hypothesis
   - There is no pass-through effect between food inflation and oil prices.

     Alternative Hypothesis
   - There is the pass-through effect between food inflation and oil prices.
2. Null Hypothesis
   - Trade liberalization is insignificantly associated to food prices.

     Alternative Hypothesis
   - Trade liberalization is significantly associated to food prices.
3. Null Hypothesis
   - Money Supply has insignificantly impact to food prices.

     Alternative Hypothesis
   - Money Supply has significantly impact to food prices.
4. Null Hypothesis
   - Price wedge has insignificantly impact to food prices.

     Alternative Hypothesis
   - Price wedge has significantly impact to food prices.

## 1.4 Research Questions

The research discovers the following question to be answered.

1) What are the determinants which affect the food prices in Pakistan?
2) What are the effects of trade liberalization, crude oil prices and price wedge on food inflation in Pakistan?

## 1.5 Significance of the Study

Hanif and Nadim (2012) noted that inflation and specifically food inflation, is something that is very important and close to most of the individuals as it affects their livelihood. Therefore, this empirical study is adjusted towards exploring the influence of oil prices and trade liberalization on food inflation with reference to Pakistan. In addition to these factors, role of intermediates can have a significant role in shaping the magnitude of food inflation, which has not been quantified directly in empirical investigations.

In the previous studies, the involvement of intermediaries, which generates a discrepancy between market pricing and agricultural pricing given to end consumers, was overlooked. The role of intermediaries in affecting inflationary pressures is critical because the production process for the Pakistani agricultural market involves a number of intermediary phases covering initial development to the final phase of selling products to the end consumers.

Lahiri (2012) explored the influence of middlemen in driving food inflation in a completely competitive setting with exogenous expectations and no government intervention. The model illustrated how large retailers act, along with how they determine the amount of inventory to store based on future forecasts and how they reach at the final cost to charge customers. The current investigation adds to the existing empirical literature on the subject by including a variable called, the discrepancy among retail and wholesale prices, which influences food price rises. The disparity in wholesale and retail prices, expressed as a percentage of wholesale prices, was used as a proxy for accounting for the role of intermediaries.

The rise in food inflation in Pakistan became a source of concern for policymakers in the last decade. As a result of the high amount of food inflation faced by the Pakistani economy, policymakers must study the critical elements that influence food prices inside the country. As a result, the current study will be useful to policymakers since it will help them understand the impact of demand and supply-side factors on food inflation. Policymakers can devise effective strategies that will finally bring the food level of inflation under control.

## 1.6 Organization of the study

The second chapter looked at some of the existing literature on the subject. The methodology for the study was provided in chapter 3, and the results and discussions were presented in chapter 4. This study was summarized and finished in chapter 5.

# Chapter 2

## LITERATURE REVIEW

### 2.1 Introduction

The research presents a broad assessment of the findings on the role between food inflation and other factors in this chapter. In this section, we look at earlier theoretical work on inflation and trade openness, and also a concrete analysis of previous research, the research problem, and the conceptual framework. In both developed and emerging economies, research has been conducted on the factors that influence food inflation. These studies have identified many causes of food price inflation and reached differing conclusions about the significance of some of the determinant variables. The most significant demand drivers in recent food price hikes are long-term in origin, which supports the notion that fundamental rather than cyclical factors are at play. Growing world population, increased money supply, and significant income growth in rising economies around the world are all demand-side causes. On the supply side, urbanization and the opposing demand for commercial land instead of agricultural land has a significant impact. Various schools of economics have developed various theories on the factors that influence high food prices (food inflation). The elements that lead to high food prices in the economy have been explored using international and national literature.

Gilbert et al. (2010) since the 2008 food price inflation crisis, food price inflation has gotten a lot of attention. Despite the fact that food is a basic necessity, managing inflation has become a key macroeconomic goal in many countries in recent years. Due to the volatile nature of the pricing of these products, and their being subject to transitory effects or being influenced by government policy, the measure of core inflation in developing countries does not include the measures of some food items (among other things). Vink and Kirsten (2002) food inflation is regularly higher than core inflation, according to the Consumer Price Index-Food (CPIF).

Inflation has long been a major concern for policymakers because it creates an uncertain environment in the economy, which can stifle economic growth. As a result, the major goal of macroeconomic policies is to achieve high and stable economic growth as well as low inflation. Price stability appears to have been supported by strict

monetary policy and fiscal consolidation. Concerns about inflation stem not only from the need to balance the overall macroeconomic circumstances, but also from the reality that rising inflation rates disproportionately affect the poor, as their spending basket shrinks. Various schools of economics have developed various theories on the factors that influence high food prices (food inflation). The elements that lead to high food prices in the economy have been explored using international and national literature.

The importance of investigating inflation in general is shown in the study of food price inflation. Price level and price inflation rate have been tremendously important economic variables from historical, macroeconomic, and /household perspectives. Inflation, or its more well-known variant, hyperinflation, has been related to several pivotal times in world economic and political history. Hyperinflation has been related to key events in both the twentieth and twenty-first centuries, such as the emergence of Nazi Germany and political crises in Latin American countries, as well as in the twenty-first century, such as in Zimbabwe. The worldwide food price inflation crisis of 2008 fueled a wave of xenophobic violence in Pakistan's economy to some extent (Pakistan Economic Survey, 2008). Mittal (2009) explained the international experiences of various developed and developing countries in the political economics of food price inflation indicate some common themes and significant distinctions. With a particular focus on the 2008 food price inflation crisis, there were both long- and short-term factors for the 2008 food-price inflation crisis, which stood out from earlier times of food price inflation. Rise in oil prices, a fall in agricultural productivity, and growing demand from emerging nations are all factors. There are other structural causes, such as a global fall in agricultural productivity investment, states' diminished regulatory role in agricultural production and trade, and indiscriminate agricultural market liberalization, which has resulted in import surges and a focus on cash crops. Speculation in financial markets and the conversion of food crops to biofuels were two more unique contributing elements that exacerbated the 2008 food price crisis. In 2007/2008, rising food costs had the largest impact on developing countries, particularly low-income food deficit countries (LIFDCS).

Irz et al. (2013) proposed food price inflation is influenced by a variety of factors in different countries. Significant links between pricing in input markets and food markets were discovered in Finland, with a long-term association between the two sectors. Agricultural commodities, labor, and energy were the key marketplaces for inputs utilized by the food markets. Admassie (2013) estimated that international food

and products prices, assessed in Ethiopian currency, had a significant impact on food price inflation. Agricultural supply shocks generated large short-term departures from long-term patterns. Both of these supply-side variables contributed to food price rise in Tanzania. Raihan (2013) measured that government's nature and effectiveness have also played an impact. In the case of Bangladesh, the military's predominance over an undemocratic and unelected 'civil' caretaker administration meant that, while it took action, it was not held accountable for its inaction in the aftermath of the disaster. As a result, food prices have increased significantly. The caretaker administration reduced tariffs and taxes on imported food, increased subsidy allocations, expanded the breadth and coverage of social safety net programs, and improved public procurement and distribution. Depending on how they interacted and integrated with international food markets, different stakeholders were affected in different ways.

Olomola (2013) investigated that fuel and transportation prices also played a role in several countries' food price crises. Imported fuel prices in Nigeria cause dramatic rises in the pricing of agricultural inputs and transportation costs. The government responded by releasing grains from the reserve, ordering the import of half a million tons of rice to be sold at a subsidized rate, and suspending the rice tariff.

In comparison to global food prices, Pakistan's food inflation has been significant and variable. Both market forces approaches were used by Pakistan's government. However, the execution of these regulations was not fully institutionalized and remained on the executive and supporting the institutionalization of this policy-making process, contributes to the management debate in Pakistan.

On the relationship of food pricing, there is a modest collection of literature. The literature looks at the impact of a specific food item's price on overall inflation as well as the impact of food prices on inflation. The majority of previous research have approximated the price of food commodity based on general inflation.

A report published by the Asian Development Bank (ADB) in 2008 identified a number of factors that contribute to high food prices, including: To begin with, there have been a lot of structural shifts, such as a global shortage of cereals and rice.

The higher tendency of wheat, rice and other grains show that stock levels are below family demand pressures; another factor is rising oil prices, as well as a scarcity of oil reserves and supply decisions by oil-producing countries. Food inflation is also

fueled by cyclical causes such as natural disasters, floods, and droughts in the South Asian region, according to this report.

A second key driver of high food costs, according to studies undertaken by (Polaski, 2008), the ADB (2008) study, and Economy Mirror (2010), is a gap between demand and supply. Higher biofuel production/consumption and greater food consumption in emerging nations, as well as global monetary issues such as US dollar exchange rate dynamics, are all key sources of food inflation, according to Anandan et al. (2013) stated that People's eating habits are changing when their per capita income improves, yet rising demand in most emerging countries, along with underinvestment, is generates higher demand while supply cannot keep up with rising need. Underinvestment in agriculture goods, competition in the utilization of lands for industrial or cropping reasons, and shortage of fresh water for farming, among other things, have all contributed to a shortage of supply. It was also claimed that during the late 1980s and early 1990s, the International Monetary Fund (IMF) as well as other lending institutions-imposed limits on low agricultural investment through structural adjustment programs in developing nations.

Other variables contributing to significant food inflation include rising food costs, rapid increases in farm input prices, and long-term structural flaws such as low productivity, fragmented landholdings, and falling public agricultural infrastructure investments (CAP 2012; DEV 2009). Increasing demand for biofuels, as well as the demands of a growing population (World Bank 2008), as well as climate variables, are all contributing to this. High population growth and rising income are both contributing to this. Input expenses have a substantial and dramatic part in the rise in food prices. With the exception of agricultural machinery and related inputs, it is clear that the costs of other inputs as assessed by the WPI inflation rate have risen significantly in recent years.

## 2.2 Control variables and Food Inflation

Several studies on the elements that determine food prices have been undertaken, notably in the context of the current rise in food prices. In 1973, there was the first big increase in food costs. According to Eckstein and Heien (1978), the major elements for the increase in food inflation in the United States in 1973 were monetary policy and steps made by the US and foreign governments, the Soviet grain deal, global economic

circumstances, a drop in the value of the dollar, and rapid income growth as the US economy emerged from the recession.

Samal et al. (2022) examined the influence of macroeconomic factors on the inflation of food prices in India using a monthly data series from January 2006 to March 2019. The ARDL bounds testing method of cointegration is used to confirm the variables' long-term relationship with one another. The long-run estimates' coefficients demonstrate that per capita income, the money supply, the price of food around the world, and agricultural wages all have positive and significant long- and short-run effects on food price inflation. While the short- and long-term effects of food price inflation are adversely and significantly impacted by the supply of food grains. The short-run estimations also showed that the real exchange rate had a favorable impact on the inflation of food prices. The coefficient, though, has little short-term impact. According to the Granger causality estimations, a short-run bidirectional causality between per capita income, the exchange rate, per capita net availability of food grain, and food price inflation is confirmed. Additionally, there is evidence of a one-way causal relationship between rising food costs and global food prices. However, there is no direct link between the short-term inflation of food prices and the money supply or agricultural wages.

Nadeem (2021) described the effect on food price inflation in Pakistan by using time series data from 1975 to 2019. The Augmented Dickey-Fuller (ADF) test and Autoregressive Distributed Lag Model (ARDL) were employed in this quantitative research investigation to determine the long-run and short-run relationships. Food import, food export, GDP growth, the food production index, food price inflation, and money supply are the primary factors that are taken into consideration. The outcome demonstrated that food import and export had a considerable and favorable impact on the inflation of food prices. The poor experience disheartenment as a result of the substantial price increases because 60% of their income is spent on food.

The volatility of sixteen food items was evaluated by Zehra and Fatima (2020) using monthly data from fourteen cities from 2002 to 2016. According to certain estimates, the majority of commodities' volatility (for different localities) results from the presence of five residual effects and previous variance. However, the volatility in a select few commodities (for various places) is only caused by aftereffects. The study also discovered that there is heterogeneity among cities, with variations in volatility intensity.

Watson (2016) stated that in Pakistan oil costs and food prices considered cause and impact system as oil costs goes up and down common costs go within the same heading owing to this system play a major part within the economy. Oil importing nations like Pakistan is confronted with instability in oil prices, which appeared huge impacts on the economy and for the most part in terms of trade expansion. On the other side, trade liberalization and food prices talk about are still undetermined. On one sided it appeared a positive impact on food prices, whereas on the other side appeared the converse and other found no critical relationship.

Different ideas on the determinants of high food costs have been developed by several schools of thoughts Hayes et al. (2011) identified the association between fuel prices and food inflation by utilizing weekly time series from 1998 to 2009 in South America. A study was conducted in 2011 for determining the elements that giving to the increase in Prices of agricultural commodities. The Stochastic volatility models were used in this research. Results concluded that there exist a positive between food and oil prices.

Gilbert (2010) used the Granger causality technique in a quarterly time frame in his research (1969-2008) selected China, Russia and India for analysis. The study's findings show that factors such as GDP growth, volatile oil prices, exchange rates, and fluctuations in money supply have a causal effect on agro goods prices. The currency rate was also employed as a factor for food inflation. Abdullah and Kaleem (2011) conducted research on Pakistan taking data from 1972 to 2008.To find long-term relationships, the Johansen co integration examination approach was used. According to the study Per capita GDP, money supply, horticultural subsidies, imports are the main variables of food inflation.

Abdoulaye et al. (2015) attempted to emphasize the impact of significant food crops on CPI in Mali from 1993 to 2014. The study's main goal was to look into the relationship between cereal prices and the CPI. Because variables of order 1 are integrated, the integration approach is used. There is a long-run association seen between CPI and input commodities such as rice, corn, and wheat, according to both long-run and short-run calculations. With the exception of millet prices, CPI and the variables have a negative long-run connection. The short-run causality is established since the error correction term is negatively significant.

Inflation is referred to be a monetary phenomenon in certain research, whereas it is referred to as a fiscal operative in others. Hossain (1990) defined inflation as a

monetary phenomenon in Pakistan, although experimentally, Bilqees (1988) stated that fiscal considerations had a greater impact on food price inflation. While several scholars disputed on the role of money supply in determining. Money is crucial to price stability, which in turn leads to economic stability. It has played an important role in determining income and prices. According to research on food inflation, such as Abdul (2007), food inflation in Pakistan is induced by devaluation in the public spending and exchange rate, however, the wheat support price has no effect on food inflation. According to Salman (2013), food inflation in Pakistan is generated by GDP growth, food export, and money, while credit provided to the farm sector has a negative impact on food prices.

The exchange rate in China, Colombia, and India, according to Gomez (2008), are useful for describing significant food inflation. The author, on the other hand, contends that starvation and an expansionary monetary policy were responsible for the recent surge in food price hikes in Colombia in 2007-2008, and that this influence is only transitory. Changes in consumer behavior as a result of rising per capita income enhance meat consumption compared to cereal demand, resulting in food inflation. Food inflation can be minimized through increased agricultural expansion, which is favorable for developing countries.

Ashley et al. (2011) explored the high food prices and the decline of economies, particularly in the Arab world. For the study, Authors looked at data from 2000 to 2010. The researchers used income disparity, political status (authoritarian or democratic) and GDP per capita as explanatory variables in the model. Food inflation was shown to be high in authoritarian economies such as Tunisia, Syria, and Egypt, but democracy had an inverse relationship with food prices. Adam et al. (2012) investigated Tanzanian food prices. The researcher employed time-series data from 2002 to 2011 for this investigation. According to the study, monetary policy, storage, supply shocks, fuel prices, and the exchange rate all had a role in Tanzania's recent food inflation. Hanif (2012) conducted research on food inflation in Pakistan by using the State Bank of Pakistan's platform, accumulating the period of January 1992 to January 2012. Worldwide food price fluctuations have had an influence on food prices in Pakistan over the last two decades, according to the research. Supply shocks are also caused by other factors such as rain and floods, leading to high pricing in the food industry. Researcher stated that the majority of businesses in Pakistan use outdated pricing tactics, which is one of the main reasons why price reductions do not have a significant impact on consumers.

Hasan and Mashi (2018) used the Nonlinear ARDL technique to assess the normality and stability of the indicators in order to investigate the origins of food prices in Malaysia. There appeared to be long-run co-integration between variables, according to the findings. The exchange rate is the most exogenous variable, according to the vector error correction model (VECM) and the Variance Decomposition. While the long-run link between food prices and currency rates looks to be symmetric, the short-run relationships are asymmetric, according to NARDL. Because the rate of exchange is the most unexpected shock in the study, and Malaysia has a flexible currency system, regulators find it difficult to control fluctuations in the Malaysian foreign rate when it comes to food prices.

In a co-integration and error correction modelling approach, Egwuma et al. (2017) investigated the inherent link among the demand and supply variables, crude oil price, GDP, food import, and food prices in Nigeria from 1988 - 2017. According to the study, food price has a long-run positive association with crude oil prices, food imports, and real GDP. The main factors of food prices, however, were real GDP and food imports. The ECM recommended a gradual transition, and the study advocated for expanding domestic agricultural production by providing agricultural inputs rather than utilizing cash as a governmental incentive.

Using quarterly data from 2008Q1 to 2017Q4, Ismaya and Anugrah (2018) used the GMM estimator to examine the determinants influencing food inflation in Indonesia. Food inflation is considered to be influenced by both backward-looking and forward-looking assumptions. Food production, infrastructure farm sector output, infrastructure, demand level (M1/consumption agriculture sector credit,) food imports, and seasonal occurrences all had a role in Indonesian food inflation. Qayyum and Sultana (2018) investigated the causes that affected food prices in Pakistan from the time span of 1970 to 2017. Food inflation was greatly boosted by food exports, GDP, food imports, and taxes, according to the study, whereas food inflation was significantly lowered by money supply.

Rehman and Khan (2015) used a VECM framework to evaluate the variables of food price in Pakistan utilizing data from 1990 to 2013. Indirect taxes and agricultural exports, according to the study's findings, have a significant and positive effect on food prices in Pakistan, but public subsidies and GDP have a negative impact. As a result, the research recommended that the government concentrate on agriculture while simultaneously decreasing food-related taxes.

Fenning and Khan examined into how monetary issues influence price increases in Pakistan. Inflation is directly affected by increases in the private sector's growth rate and the money supply. Credit to private sectors is treated as a conventional monetary variable, whereas support prices and the exchange rate are treated as supply side factors. International Rice Research Institute (2008) explained urbanization and the competitive demand for commercial rather than agricultural land are two key supply side drivers. Furthermore, the quick increase in rice supply can be attributed to a lack of investment in agricultural technology, infrastructure, and extension programmers.

Mushtaq et al. (2011) used Johansen's co-integration approach to study the impact of macroeconomic and monetary data on Pakistani wheat prices. Despite the fact that all of the factors are stationary at 1st difference except for trade openness, the Augmented Dickey-Fuller test revealed that the variables have a strong relationship. According to the author, openness, exchange rate money supply, all have a significant long-term impact on local wheat prices. Increasing wheat supply through greater production, as well as taking significant steps to strengthen the Pakistani rupee against all other currencies, should be priorities, according to the report. The mechanisms of food inflation and financial regulation in Iran were studied by Shahnoushi et al. (2009). The researchers collected annual time series data from 1976 to 2006 and applied the Vector Error Correction Method (VECM). The study discovered that the money supply and food inflation have a short and long run equilibrium relationship. Furthermore, monetary reforms have had a considerable impact on agricultural production and food costs.

From 1971 to 2007, Haye and Anwar (2009) investigated the empirical explanations of food prices and inflation in Pakistan. The empirical research was conducted using the Auto-Regressive Distributed Lag (ARDL) technique, and it was revealed that the money supply is not neutral in influencing food prices in Pakistan. One of the proposals is the importance of financial reform in stabilizing commodity and food prices. Zhang and Law (2010) looked into the reasons for food inflation in China and how it affected the country's total inflation rate. Contrary to popular belief, food inflation is generated through demand pressures instead of supply disruptions. According to the conclusions of this study, food inflation is not a significant driver of wage increases in China. Furthermore, the study found that food inflation had little effect on non-food inflation.

Bendara and Selvanathan (2001) conducted a survey analysis for south Asia and found reasonable food prices in Bangladesh, whereas food prices in the rest of the area, including India, Pakistan, and Sri Lanka, showed a considerable upward tendency over time. The global food crisis has also impacted Pakistan, Bangladesh, and Nepal, according to the report, because the majority of the poor in these countries are buyers rather than sellers of food. These countries' governments reacted to the changes by implementing short-term solutions to the problem, but such solutions resulted in very catastrophic long-term consequences for these countries.

## 2.3 Crude Oil Prices and Food Prices

Jalles (2009) stated that for its anticipated significance in the country's macroeconomic performance, oil price swings have remained a well-researched topic. This variable is especially important for macroeconomic stability after the oil shocks of 1973-1974 and 1979-1980. Hamilton proved a crucial role for oil price increases in most US recessions (in 1983, 1996, 2003, and 2008). Tatom (1998), Mork (1989), Mork et al. (1994), Kahn and Hampton (1990), and Huntington (1998) have all validated the effect of oil price shocks on output and inflation through empirical studies.

Peersman et al. (2021) explored that oil price increases caused by oil supply disruptions did not affect food commodity prices before the start of the millennium, but had positive spillover effects in more recent periods and particularly in the era around the Great Recession by using a structural time-varying-parameter Bayesian vector autoregression (TVP-BVAR) framework. Likewise, shortfalls in global food commodity supply resulting from bad harvests have positive effects on crude oil prices since the early 2000s, in contrast to the preceding era. The econometric evidence suggested that these developments are not the consequence of the popular biofuels narrative and more likely the result of informational frictions about the global business cycle and information discovery in financialized commodity markets.

For various Asian countries, Cuado and Gracia (2004) have empirically shown disparities between fuel prices and macroeconomic indicators (consumer prices and economic activity). Huang and Yang use Mork's (1989) asymmetrical model to measure the relationship with fuel price movements and inflation rates. Long-run asymmetric reactions of inflation rates to real fuel price increases and declines are supported by their findings. The instant response of inflation to changes in real oil prices is normally

bigger than that of lagged periods, and the cumulative effect of a rise in real fuel prices is generally greater than that of a decline in real oil prices, according to the author. The vast bulk of study has been done in the case of developed economies. There is a lack of study on the influence of oil price changes in developing nations, particularly on the link involving oil price shocks and inflation. So far, no real attempt has been made to analyze the effect of fuel costs upon inflation in Pakistan.

Stage and Mcgranahan (2010) tried to determine the long-term correlation between the crude oil prices and food commodities in Palestine from the time period 1980 to 2009. This study employed Co-integration, unit root test by taking variables: wheat, maize, sorghum, soybean, linseed oil, barley, palm oil, soybean oil and crude oil prices. This analyse found strong an association between oil prices and food commodity prices. This study also observed that agricultural activities, i.e., planting, harvesting, irrigation, transportation, and marketing are highly affected by an increase in energy prices.

Zhao and Liu (2016) aimed to determine the long run association between oil and food prices and determine whether there is an existing causality between them from the time period 1975 to 2013. This study employed Co-integration, Unit Root and Granger causality test by including the variables: oil price, wheat, maize, palm oil, rice, sugar, meat, and barley prices. The study discovered that there is a long-term association between oil and food prices and that many analysts believe that food prices are greatly influenced by crude oil prices because agricultural commodities are produced using crude oil as an input. Others argue that rising food prices are caused by increased demand for food commodities.

Ali (2012) used the OLS method to look at the association between fuel prices and prices of food in Pakistan from 2001 to 2010. The price of diesel oil and the price of food were found to have a positive and substantial association in this study (chicken, rice, wheat, maize, and cooking oil). Bhattacharya and Gupta (2015) examined the factors of high food prices in India from the time period 1995 to 2014.They employed Structural Vector Auto regression (SVAR) framework and this study considered important inter linkages among macroeconomic variables in this framework. This study argued that fuel prices react moderately to the food prices while in addition to that gap between supply and demand plays a major contribution to increase in food prices. One of the crucial point authors have highlighted that transmission of food price to non-food price have persistent impact and take long to take out from the roots of the economy.

From 2001 to 2013, Olayungbo and Hassan (2016) examined the influence of oil and food prices in developing oil-exporting countries using a panel autoregressive distributed lag (ARDL) technique. This study discovered that there is a long-term association between food and energy prices that is significant and positive. Finally, the study stated that long-term agricultural projects in the sample countries should be regulated to prevent a global food crisis induced by oil price oscillations.

Kiani (2017) investigated the effects of increased fuel costs on the Pakistani economy from 1990 to 2008. The variables used in this study were real GDP, real interest rate, oil prices, real government expenditures, and real stock prices, which were all calculated using the OLS technique. The price of oil and economic productivity has a negative link, according to this study. A substantial increase in oil costs tends to cause an increase in inflation, which has a negative impact on household spending. Finally, the report recommended that the government give farmers power and diesel subsidies in rural areas, as well as some oil subsidies to city transporters. This may lower overall prices for all daily necessities, allowing disadvantaged people to better manage their family budgets.

Meyer et al. (2018) investigated the impacts of oil prices on food prices in oil-exporting developing countries from the time period 2001 to 2014. This study employed ARDL method to compute the relationship between them by taking the variables: food prices, consumer price index, trade liberalization, oil price. The study found significant and direct relation between oil prices and food inflation in the long run. This research suggested that the implementations must be adopted by policy makers that helps to trickle down the prices of food. In the end, this study concluded that these developing countries should enable to implements long term agricultural schemes which encouraged such policies which protect their countries from the global food crisis that may increase because of an increase in oil prices too much on fossil fuels. In order to attain optimal results, there should utilization of non renewable and renewable energy resources in an efficient way.

Chou and Tseng (2011) use data from 1982 to 2010 to look at the short- and long-term effects of international fuel costs on Taiwan's CPI index. The study's findings suggest that fuel costs have a long-term and major effect on Taiwan's national pricing level. According to the data, oil prices have a minor impact on Taiwan's CPI rate in the short term. Chou and Tseng (2011) use data from 1982 to 2010 to look at the short- and long-term effects of international fuel costs on Taiwan's CPI index. The study's findings

suggest that fuel costs have a long-term and substantial effect on Taiwan's national pricing level. According to the data, oil prices have a slight effect on Taiwan's CPI rate in the short term.

Jaffri et al. (2013) examined international price pass-through to domestic prices in Pakistan using quarterly time series data from 1993 to 2012. Global energy costs and food inflation, according to the research, have a direct and positive influence on prices in Pakistan. According to the report, monetary policy must be appropriately structured in combination with fiscal policy in order to avoid international inflation from passing across to domestic prices in Pakistan.

## 2.4 The relationship between inflation and trade openness

Romer analysed inflation on freer trade utilizing cross-sectional data from 114 countries across the post-Bretton Woods era (2020). The enduring relationship between inflation and liberalization was explored in politically unstable nations with autonomous central banks. Trade liberalization and prices are all linked to, political instability, imperfect competition, central non-traded sector pricing and bank independence, rigidity. Liberalization and inflation have a statistically significant negative association, according to cross-sectional research using OLS on 15 years of average yearly data from 2005 to 2020. Terra (1998) used regression analysis to examine Romer's research findings on a sample of twenty countries that were divided into four groups based on their debt levels. For severely, moderately, and considerably less debted countries, the study employed pre-debt crisis and debt crisis time frames. Prices and liberalization have a negative but significant relationship in Latin America's significantly indebted countries, although not in the moderately and less indebted ones.

Cavallari (2001) inserted the relationship with trade liberalisation and inflation. The theoretical model revealed that trade liberalisation has a positive or negative impact on inflation, with the final outcome depending on the extent of wage bargaining concentration in the country. The findings revealed that there was no link between liberalisation and inflation in nations where wage bargaining was concentrated. Liberalization and inflation have a negative relationship in countries where wage negotiation is decentralised.

Alfaro (2001) employed panel data from 146 nations from 1973 to 1998 to evaluate liberalization and inflation using ARDL regression. The findings showed that,

in short run, liberalization had no effect on inflation, and that a stable exchange rate was an essential element in lowering inflation. In the long run, she came to the conclusion that liberalisation and inflation had a negative and statistically significant association.

From 1973 to 1990, Temple (2002) attempted to draw a link with trade liberalization and the 'Phillips curve' for forty-four nations. The results of regressions showed that in open economies, Phillips' curve will be more bended. Ashra (2002) utilized multiple regressions to examine the relationship among inflation and liberalization employing panel data from 15 countries between 1980 and 1990. Researcher came to the conclusion that liberalization had an impact on inflation, regardless of whether the country was experiencing hyperinflation or not.

Zhao & Liu (2016) analyzed the agriculture trade liberalization impact of the China's rural household's food consumption. This study selected fifty-six regions and countries such as the United States Britain and Japan as the samples from the time period 1981–2012. This study adopted the Pedroni and Kao co-integration test tool, it was discovered that agricultural trade openness has a substantial positive effect on the total price level of rural residents' food, with the exception of a negative correlation with vegetable prices. Finally, the author concluded that global strategies must be controlled in order to overcome price variations in local agricultural products so, as a means of increasing supply potential for international agricultural products and reducing price volatility for international agricultural products. Some of the weaker importing countries learned a bitter lesson during the worldwide food price crises of 2006-08 and 2011-12.

To investigate the openness-growth and openness-inflation correlations for "Korea," Jin (2002) used variance decompositions (VDCs) and impulse response functions (IRFs) focused on quarterly moving averages from 1960-1 to 1997-3. Openness demonstrated inverse impacts on output growth however no long-run implications, as well as inverted effects on the financial trade and financial openness on production growth and prices, according to the IRFs' findings. The VDCs found that increased openness eliminated tariffs, resulting in lower import prices.

One of the most well-known statements in world commerce is that trade liberalization leads to lower prices, meaning that protectionism is inflationary, according to Mukhtar (2010). In small open economy economies, Romer (1993) advances the notion that inflation is lower, which is compatible with this approach. The

purpose of this research is to look into Romer's theory in Pakistan. The author used a multivariate relationship among the variables and a vector error correction model to examine the long-term relationship between variables. The study is based on data from 1960 to 2007. The findings of the cointegration test show that inflation and trade opening in Pakistan has substantial negative long-run relationship, corroborating Romer's hypothesis.

Between 1972 and 2016, Bilquees et al (2019) evaluated the association with both inflation and trade openness. This is the first study of its kind to examine the nature of Pakistan's inflation-trade openness link using the nonlinear autoregressive distributed lag (NARDL) technique. According to the statistics, both elements have a long-term symmetrical and positive relationship. Their link appears unbalanced and advantageous in the short term. Overall, this study refutes Romer's (1993) claim that as trade openness increases, inflation drops.

Economic theories or relationships have been used in certain studies to try to explain this relationship. To explain this relationship, Syed and Zwick (2015) employed the Cobb Douglas technique to simulate a nonlinear Phillips curve. Openness and inflation, according to the findings, are inversely related. In the existence of the convex Phillips curve, greater openness encourages people to import goods, lowering domestic inflation pressures as long as unemployment remains below the minimum. The Phillips curve renders this association negative if the level of unemployment is greater than the minimum rate of unemployment.

## 2.5 Trade liberalization and crude oil prices

In empirical studies, oil price changes have gotten a lot of attention. In most developed countries, the oil shock of the mid-and late 1970s resulted in sluggish growth, high unemployment rates, and high inflation Blanchard & Gali (2007). There are numerous viewpoints on how oil prices influence the trade balance. Akpan (2007) explained some people believe that fuel prices have a favourable influence on trade, while others believe they have no impact.

Forson et al. (2022) explained the effect of oil price volatility on the trade balance in sub-Sahara Africa (SSA) The researcher explored the effect of crude oil price volatility on the trade balance across 34 SSA countries using Pooled Mean Group (PMG) and Common Correlated Effect Pooled Mean Group (CCEPMG) estimators for the period January 2004 to December 2017. The author explored that crude oil price

volatility exerts a negative effect on the trade balance of SSA countries. The researcher further demonstrated that inflation, interest rates and exchange rates are significant transmission channels for oil price volatility to impact trade balance.

According to Hesary et al. (2016), energy, particularly crude oil, is one of the most essential production inputs. Oil plays a critical role in the global economy, as is frequently stated. The economic benefits of crude oil as a key production input in the post-industrial era, as well as its use in the transportation and power generating sectors.

The world oil prices market, according to Adelman (1984), is "a huge pool." Trade liberalization in one region is expected to have an immediate impact on other regions. Arbitration opportunities arise when the price differential in domestic fuel markets outweighs the shipping prices of third-party exporters. The price differential is anticipated to be reduced as a result of the subsequent supply pressure. Another significant influence of oil on international trade, as stated by Bridgman (2008) and Chen and Hsu (2012), is the dependency of transportation costs on energy prices. The authors came to the conclusion that oil prices have an impact on the value of exchange rates, which has a considerable impact on a country's international trade. Falling fuel prices cause the currencies of oil importers to appreciate while the currencies of oil exporters depreciate. Exports suffer when the national currency appreciates, and vice versa.

The impacts of fuel price volatility on international commerce were investigated by Chen and Hsu (2012). They used panel data regression and VAR model analysis for a sample of 84 nations from 1984 to 2008. They come to the conclusion that fluctuating oil prices inhibit international trade. Supply and demand-driven price changes have opposing effects on foreign commerce; the former has a major negative impact, while the latter has a beneficial impact.

Anson et al. (1993) investigated the effect of oil price fluctuations on the economy. Agricultural production in the United States from 1973 to 1991. Using the input–output method this study looked at direct and indirect prices links between energy and a variety of economic sectors using a model. General equilibrium that may be calculated (CGE) models are utilized to investigate the sectorial impacts of three different macroeconomic modifications on agriculture and energy. Increasing costs, as well as currency rate or foreign borrowing changes Costs of oil imports and government agricultural assistance programs. The findings demonstrate a considerable and strong

beneficial association between low fuel prices and the development of the agriculture sector.

Mussa (2000) studied the influence of growing gasoline costs on the world economy from 1970 to 2000 using global macroeconomic frameworks. India, Korea, and Pakistan are oil-consuming countries. This research is focused on Thailand, the Philippines, and Turkey. According to the research, higher fuel costs increase the price of producing products and services in these nations, resulting in a rise in the relative fuel price imports and deflationary pressure on profitability. According to the research, oil price fluctuations have a long-term effect on financial markets. A persistent rise in oil prices, according to predictions, will lead to a permanent shift of about 14% of world GDP from oil-importing to oil-exporting countries.

Between 1970 and 1996, Wilson (2001) studied the interaction between bilateral merchandise balance of trade and exchange rates in Malaysia, Korea, the United States, & Japan. The exchange rate seemed to have no effect on the amount of trade balance, according to the data. The study also investigates the amount of price difference among export and import due to supply and demand. Long-run stabilization measures improve the trade balance, according to the Bicker dike–Robinson–Metzler (BRM) imperfect substitution model with the well-known Marshal–Lerner condition. However, because of the unpredictability of the actual real effective exchange rate in regard to both the United States Japan's trade balances, the picture gets unclear in terms of consequences for export performance. Using a cointegrating vector error correction model, Dash (2005) evaluated the short- and long-run implications of actual exchange rate changes on India's trade balance with four major trading partners: the United States, the U.K and Germany. Between 1990 and 2004, the balance of trade, domestic and foreign income, real exchange rate, and fuel costs were all studied as variables. According to cointegration estimations, each country's terms of trade, oil prices, and local and international revenue all have a long-run relationship. The J-curve effect may also be seen in India's trade relations with Japan and Germany.

Based on annual data, Baffes (2007) explores the impact of fuel prices on the prices of the Top 35 international traded primary commodities from 1960 to 2005. According to the findings, higher crude oil costs reduce disposable income, which could lead to a reduction in industrial productivity. A reduction in discretionary income, in theory, has an effect on food consumption. The data also show that the price of oil has a substantial and considerable impact on traded commodities. According to the study,

crude oil price changes flow through to the total non-energy commodities index at a rate of 0.16. The correlation between both the primary commodity and the cost of oil is expected to have positive, however, the price measure of inflation will be unfavorable in the vast majority of situations, demonstrating the long-term influence of technological advancement on commodity pricing.

Akura and Billmeier (2008) examined the import and export volume elasticities in oil prices in 27 oil-exporting Middle Eastern and Central Asian nations from 1990 to 2006. Using the CGER method, the study assesses the impact of nominal exchange rate fluctuations on the trade balance. The study discovered a statistically significant link between a 10% fall in value and 2.2 percent of Its GDP, meaning that trade balances in industrialized economies will improve over time. Devaluation (appreciation) has a higher positive effect on trade balance to the Ratio of GDP of low-income and developing countries in general, according to the sensitivity of the balance of trade to GDP ratio for specific exports and imports to GDP ratios.

Malik (2008) analyses the many consequences and issues created by fuel prices for Pakistan from 1990 to 2006. The data explore that Pakistan's highest energy import expense is the price of importing oil and its components, which are largely used in the transportation sector 5.47 is the long-run proportional reduction in GDP caused by a big increase in price of US$ 36.93, which is similar to a shock dropping GDP by 5.5 percent. As a result, oil prices and output have a long-run negative connection, as high oil prices have a considerable influence on macroeconomic conditions due to high cost of production.

Baloch (2009) investigates and forecasts Pakistan's trade imbalance situation from 1984 to 2008. The study found a link between trade imbalances, oil prices, and economic growth, with a focus on Pakistan's agricultural performance. According to studies, Pakistan's trade/current finance imbalance is driven by a large number of importers, notably capital investment, and diminishing exports. The steep reduction in agricultural yields, which has ranged between 1.5 percent and 6.5 percent during last six years, has put food security in jeopardy. The results of applying Marshall and Lerner's elasticity analysis to the balance of payments show that trade deficits, such as trade deficits, slow GDP growth over time.

From 1990 to 2008, Sanchez (2011) investigated the influence of growing oil prices on welfare in oil-importing countries. Using a dynamic (CGE) computable general equilibrium model on six oil-importing developing nations, a significant inverse

influence on GDP was discovered (El Salvador, Bangladesh, Kenya, Tanzania, Nicaragua, and Thailand). As a consequence of the decreased GDP, there is greater unemployment and rising customer costs, which reduces wellbeing. When all the other factors are kept constant, the research shows that national output has declined as a result of rising oil prices. Tanzania's average annual real GDP loss varies from 0.1 percent to 20% in the United States (Kenya). Long-term rising oil prices lead to higher exporting sector production costs, lower trade balances, and higher trade costs, according to the statistics.

Between 1972 and 1978, Islam (1981) investigated the macroeconomic impacts of growing oil prices in Bangladesh. The impact of the huge increase in oil prices on Bangladesh's balance of payments, balance of trade, and capacity to afford for imports with export profits is examined in this article. According to studies using Paasche's, Laspeyre's, or Fisher's Ideal indices, higher oil prices result in large structural changes. Increasing crude prices have a significant negative impact on trade conditions, lowering exports. The rising price of imports as a consequence of elevated oil prices has a considerable impact on GDP, growth, and exports. In addition, the analyses suggest that the cost of vital imports such as rice, cotton yarn, fertilizer, and concrete has more than doubled or tripled.

The study covered the gap in existing literature to explain the role of trade liberalization, oil price, price wedge in order the measure the food inflation in Pakistan.

# Chapter 3

## 3.1 Theoretical Framework

The Demand pull and cost-push theory of inflation is employed as the theoretical basis for this study.

### 3.1.1 Demand-pull theory of inflation:

When the value of aggregate demand exceeds the value of aggregate supply at the full employment level, the inflationary gap arises. The larger the gap between aggregate demand and aggregate supply, the more rapid is the inflation. John Maynard Keynes (1883-1946) and his followers emphasized the increase in aggregate demand as the source of demand-pull inflation. Keynesian (Keynes and his followers) do not deny this fact that even before reaching full employment production factors and various appearing constraint can cause increase in public price. This inflation constraint that appears quickly during prosperity is originally resulting from nonproportionate section, branches and or various economic resources that are accounted from natural properties of discipline based on market. Therefore, in one period of prosperity it is completely natural. According to demand-pull inflation theory of Keynes, policy that causes decrease in each component of total demand is effective in reduction of pressure demand and inflation.

Ashra (2002) stated that that trade is a demand side factor and the association between trade openness and inflation is a celebrated proposition in the international trade context. The basic argument of the advocates of trade openness (spillover hypothesis) is that trade openness is associated with declining prices, so that protectionism is inflationary. Although, there are still concerns about lingering tariffs, non-tariff barriers, and other protectionist practices, it is apparent that the global economy has become more integrated.

### 3.1.2 Cost Push Theory of inflation

Cost-push is another theory of inflation that suggests that wage increases enforced by unions power inflation. Cost-push inflation is the rise in domestic prices caused by an increase in the prices of inputs. Examples include labor, raw materials, utilities, etc. An increase in the prices of the factors of production leads to a decrease in the supply

of these goods, even as demand remains constant. Due to that, the prices of commodities increase, causing a rise in the overall price level. This, in essence, is cost-push inflation. Long and Liang (2018) stated that oil serves as an essential input factor for various firms in the production of goods and services. Thus, when the price of oil increases in the international market, it affects the cost of the input factors. The firms incur a relatively higher cost to produce the same quantity of goods and services needed due to the increase in oil price, which is a critical factor of production. The firm passes on this cost to consumers through an increase in the prices of goods and services. The firms increase the prices of their goods and services to cover the increase in the cost of production and profit since the main aim of business is to make profit. This is one of the channels through which increase in oil prices are transferred to consumers.

The basic cause of Cost-Push inflation is the rise in money wages more rapidly than the productivity of labor. The labor unions press employers to grant wage increases considerably, thereby raising the cost of production of commodities. Employers in turn, raise prices of their products. Higher wages enable workers to buy as much as before, in spite of higher prices. On the other hand, the increase in prices induces unions to demand still higher wages. In this way, the wage-cost spiral countries, thereby, leading to cost-push or wage-push inflation. Cost-push inflation may be further aggravated by upward adjustment of wages to compensate for rise in cost of living. A few sectors of the economy may be affected by increase in money wages and prices of their products may be rising. In many cases, their products are used as inputs for the production of commodities in other sectors. As a result, cost of production of other sectors will rise and thereby push up the prices of their products. Thus wage-push inflation in a few sectors of the economy may soon lead to inflationary rise in prices in the entire economy. Further, an increase in the price of imported raw materials may lead to cost-push inflation.

## 3.2 Conceptual Framework

The linkage between trade liberalization and food price condition can be conceived of as two mechanisms where a set of contributors influence a number of intermediate indications, which then decide the end conclusion in terms of security status and food inflation (see Figure below). Because of modifying factors, the same

policy change in two distinct ways, whether inside a country at two discrete periods or across a group of countries, might have quite different outcomes.


*Figure 1*: *Simple Analytical Framework Trade Liberalization and Food Inflation*

Any initiative to assess the impact of trade on food security must take into account the prevailing policy and legislative surroundings, agro-climatic limitations, and the level of human and physical capital, all of which will impact the extent to which reform will result in a change in intermediate indexes. Furthermore, even if such reforms lead in increases in aggregate agricultural output and net incomes, this does not necessarily indicate that the insecure food security would enhance, especially if the benefits associated with increased agricultural output are not dispersed in their favor or the potential variability in agricultural production levels is mitigated, if not entirely eliminated, by changes elsewhere in the economy. To put it another way, the most efficient method will be determined by the available resources. Any effort to assess the impact of trade liberalization on food security must come into consideration current legal and policy frameworks. To comprehend the context specific of the consequences of economic measures on food security, a framework is provided. The influence on food security is characterized like a two-stage process, with the strength and scope determined by a number of factors. These variables account for a wide range of national and household reactions to policy changes, both within and across countries.

A conceptual framework is a research instrument that is used to raise awareness, clarify concepts, and identify linkages in order to facilitate communication. The association among determinants and food inflation in Pakistan was the subject of this study. The study's goal was to see if trade openness has an influence on inflation in Pakistan and if yes, what kind of effect it has. The hypothesis being investigated here is that trade openness and food inflation have a substantial inverse relationship, as postulated by Romer (1993) and to investigate pass through effect of oil prices. Previous research has found an inverse association between trade openness and inflation, as detailed in the previous studies. From 1980 through 2020, annual secondary data was

used in this study. Food inflation is represented and measured in this study using the consumer price index (CPI) that tracks trends in the price of goods for a given amount of goods and services. Previous research, such as Mukhtar (2010), Ahmad & Mahmood (2013) , Munir & Kiani (2013), Ojoko et al. (2014), Sikdar et al. (2013), have taken into account the aforementioned variables (2011). The chart below depicts the relationship between the study's parameters.

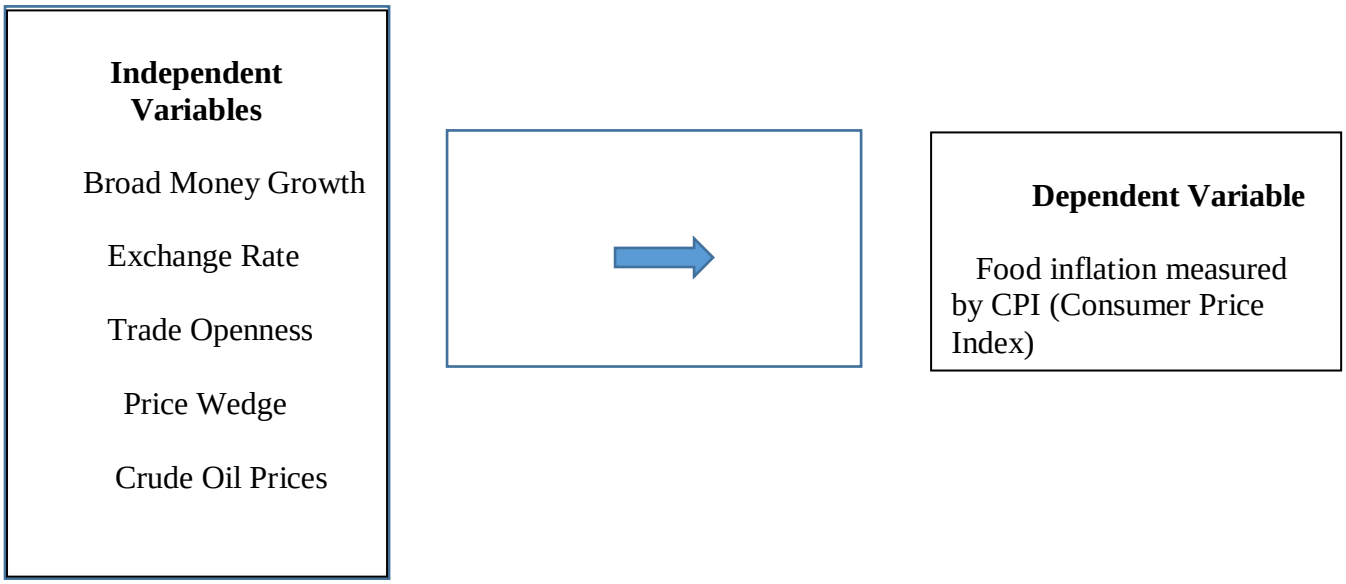



*Figure 2: Conceptualized Econometric Model Variable*

## 3.3 Methodology

### 3.3.1 Introduction

Methodology gives a structure and a way for numerous parts of the topic to be considered, ultimately providing a meaningful generalization about the occurrences (Thakur, 2013). The research plan is the outcome that allows the researcher to arrive at a concrete answerto difficulties encountered while conducting research (Nachmais & Nachmias, 1992). This chapter describes the procedures and tools used for data gathering, synthesis, and interpretation. As a result, the methodology selected for this study was explanatory and correlational. It also describes variables used in this research, research method, research plan, data collection, data analysis and software etc. It also described the variables used in thisresearch, the methods used to conduct the research, the research plan, data collection sources, methodology used to analysis, and software etc.

The quantitative and qualitative research methodologies are the two types of research methods. A quantitative study, as per Aliaga and Gunderson (2000), is a research method that accumulates numerical information and analyze it using statistical techniques to explain specific events. Denzin & Lincoln (2008) stated that descriptive research, on either hand, tries to create a platform for the research to explore a phenomenon through observation or interaction with study participants. The qualitative research focuses on words and prioritizes non-statistical data analysis tools and procedures, whereas the quantitative research approach concentrates on numbers and usually employs statistical data analysis tools and techniques (Veal, 2005). The current study has chosen to take a quantitative approach because it has quantifiable goals and a concentration on statistical approaches for data processing.

### 3.3.2 Research Purpose

There are two types of research (i) exploratory and (ii) explanatory. Both purposes have distinctive features and contrasts from one another. When there is insufficient information on a phenomenon or a problem that has not been properly identified, exploratory research is conducted (Saunders et al., 2007). Explanatory study looks for causes and explanations, as well as facts, to support or refute a theory or prediction. It is conducted in order to discover and report certain connections between various components of the phenomenon in question. As a result, the study used explanatory purpose to find the relationship between food inflation and other variables.

Correlation and causation are the two main types of research designs. Correlation describes a relationship between variables, when one variable change, the other does as well. A correlation is a measure of the relationship between two variables. Variables have a cause-and-effect connection, meaning that variations in one parameter affect variations in the other. There is a causal correlation between the two, as well as a link between them. Although causation may not always imply correlation, correlation does usually imply causation. As a result of the specific context to analyze associational among variables, it’s fits well with the correlational and causation design. The purpose of this research was to determine the characteristics of food inflation in Pakistan's economy. This section discusses the methods and procedures needed to undertake the quantitative analysis of the relationship between variables. This part also included information about the study's

data sources, scope, and model definition. A time-series analysis was performed on the data, which included the unit root test for stationarity and the ARDL bounds testing method for cointegration. All of the assumptions and hypotheses in this research were estimated using an econometric program (EViews).

The goal of this research was to see how the independent variables of the exchange rate, fuel prices, trade openness, and money supply influence the dependent variable of food inflation. According to past research, trade openness has a detrimental impact on inflation, and fuel costs are linked to a cause-and-effect framework. Food inflation is a good example of this. The goal of this research is to see if trade openness has any effect on food inflation in Pakistan, as well as to figure out what the nature of the relationship between openness and fuel costs in Pakistan is like, and to look into the cause-effect relationships between the price of oil and food inflation.

### 3.3.3 Data source

This section explains where the data for the variables originated from. The emphasized variable in the study are crude oil prices, trade liberalization, and food inflation. However, the data for the selected variables were gathered from the World Development Indicators (WDI) issued by the World Bank and various editions of the Pakistan Economics Survey for the time period 1980 to 2020. Food inflation as a change in the Consumer Price Index (CPI), which is the dependent variable, will be the focus of the study. The independent variables are M2 money supply, EX exchange rate, TO trade openness, PW price wedge. The financial crisis of 2008 occurred throughout this time period, which had a negative impact on emerging markets. During this time, remittances, exports, international aid, capital inflows, international aid, and productivity all fell short of expectations.

Table 3.1 shows the detail list of variables.

**Table 3.1: Data description with source**

| Variables | Variables Proxies | Data Sources |
|---|---|---|
| Trade openness | (Trade as % of GDP) as proxy for trade openness.<br>Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. | Data on trade openness is taken from World Development Indicator (WDI). |
| Crude oil (average spot price of Brent, Dubai, and West Texas Intermediate, equally weighed) | Crude oil price has been taken in US dollar per barrel to avoid exchange rate impact in conversion to Pak rupee. | World Development Indicator (WDI) |
| Food inflation | Food inflation is measured through CPI (Headline inflation) | Pakistan Economic Survey (2010, 2015, 2020) |
| Broad Money | (% of GDP) | World Development Indicator (WDI). |
| Exchange rate | Real effective exchange rate index (2010 = 100) | World Development Indicator (WDI). |
| Price wedge | % Of wholesale prices | Pakistan Economic Survey |

### 3.3.4 Empirical Examination of Data

The data are identified, compiled, and reformed in order to properly examine model. Because time-based models raised a variety of econometric challenges, appropriate strategies were employed to overcome those issues. The model is expressed in the most appropriate manner for econometric analysis. To estimate the parameters of the models, several econometric techniques are utilized, and various tests are performed to determine the degree of correspondence of the model with reality as reflected by the data.

## 3.3.5 Description of Variables

#### 3.3.5.1 Exchange rate and food inflation:

The relationship between the influence of the exchange rate and food prices is explained by Awan and Imran (2015) in two channels:

I) Exchange rate depreciation influence the costs of imported agrarian inputs like as fertilisers, insecticides, and seeds, as well as the costs of final goods such as beats and palm oils.

II) A devaluation in the currency rate creates an upward increase in the price of oil, which enhances the transport cost of rural goods and is passed onto the consumer as higher food prices.

#### 3.3.5.2 Money supply and food inflation

According to monetarist theory, money supply has a significant effect on prices in the economy, according to Awan and Imran (2015). Increased money supply as a result of the State Bank of Pakistan increasing credit to the government has a tendency to enhance monetary expansion, which has a considerable impact on overall food costs.

#### 3.3.5.3 Crude oil prices and food inflation

Awan and Imran (2015) measured that an increment within the cost of crude oil leads to rise in transportation and input costs such as employments of tractors and water provider apparatus. Higher oil costs made costly of the apparatus which include on the charges from the yield which is an imperative determinant to extend the food prices.

#### 3.3.5.4 Trade liberalization and crude oil prices

The impact of trade liberalization on food inflation is inverted, as per Awan and Imran (2015), because the direct and indirect pricing consequences of fewer

importation of final products and intermediate commodities may cancel out to a lower total price level. Furthermore, the degree to which an economy is open to the rest of the world might influence the incentives that financial institutions respond to when deciding a country's long-term inflation rate. As a result of the increased competition, trade liberalization may eventually result in lower inflation by boosting local productivity development. Trade allows countries to specialize in activities where they have a comparative advantage, areas where they are relatively inefficient, and sectors where they have a comparative advantage to a large extent. Faster productivity development enables businesses to pay greater wages without having to pass these costs on to consumers in the form of increased pricing

#### 3.3.5.5 Price Wedge

By studying the price disparities between retail and wholesale prices of food grains, Huria and Pathania (2018) established the validity of both short and long linkages with price gap and food grain inflation.

## 3.5 Data analysis procedure

### 3.5.1 The Variables and Econometric model

The research's dependent variable is inflation, as measured by the consumer price index. This study examines the dynamic relationship between Pakistan's economy and trade liberalization, food inflation, and oil prices. It is impossible to uncover and incorporate all the components that drive food inflation into a single system because it is a complicated process. Food inflation is used as the dependent variable, with trade openness, oil price, and other drivers as explanatory variables. Using annual time series data from 1980 to 2020, the following parameters will be calculated using the following econometrics model/equation:

Where,

$$\mathrm{FDI}F_t = \beta_0 + \beta_1 \mathrm{T}O_t + \beta_2 COP_t + \beta_3 \mathrm{E}X_t + \beta_4 \mathrm{BM}G_t + \beta_5 \mathrm{P}W_t + \varepsilon_t$$

$$= \mathrm{t}\ 1\ 2\ 3 \ldots \ldots \ldots \mathrm{T}$$

FDIF = Food inflation

TO = Trade as % of GDP

CO = crude oil (average spot price of Brent, Dubai and West Texas Intermediate, equally weighed).

EX = Exchange rate (Real effective exchange rate index (2010 = 100)

BMG = Broad money growth (percentage of GDP).

PW = price wedge (wholesale and retail food grain prices)

As a result, an econometric model will assume the shape shown in equation.

### 3.5.2 Empirical analysis

This section explains the econometric methods used to determine the validity of the previously mentioned relationship. We used a cointegration analysis to look at both the long- and short-term contributor to food costs. Some of the methodologies for this type of study are the Johansen Approach, the Engle-Granger Approach, and the ARDL Approach. Cointegration exists if the variables are stationary in the same order and the linear combination of the variables is examined in a lower order than the sequence of the variables. More modern strategies, on the other hand, are used for characteristics that are integrated of different orders.

Preliminary tests were performed on each series to examine the analysis of the phenomenon and its statistical features. The data for the variables was characterized using descriptive analysis, while a graph demonstrated the likely change of each variable over time. The variables were demonstrated to be stationary at different orders of integration using the Dickey Fuller unit root test, necessitating the adoption of the ARDL estimation approach. A correlation test was also conducted to prevent the issue of multicollinearity between variables in the computed econometric model.

The Akaike information criterion was used to establish the optimum lag length for model estimation. The study performed post-estimation tests after evaluating the model and achieving the variable coefficients to check the credibility of the proposed model, trying to ensure that the fundamental assumptions were not breached, and the integrity of the estimation method used and the conclusions from it. Stability was determined using the CUSUM test, normality was determined using the Jarque-Bera test, heteroskedasticity was determined employing the ARCH-LM test, and serial correlation was determined using the Breusch-Godfrey test.

This section broadly explained the econometric techniques that had been engaged to check for the relevance of aforesaid relationship. Since we are interested to investigating the dynamics of food inflation in Pakistan and assessing the role of crude oil prices and trade liberalization. This section also described the relationship among these variables long run as well as short run.

The methodology covers two core components, the first part is established on descriptive statistics and second part established on ARDL cointegration estimation. In first part we employ descriptive statistics and correlation matrices while in the second part we employ panel unit root testing for stationary and after that used ARDL cointegration estimator to explore the associations between food inflation and economic indicators exchange rate, trade liberalization, price wedge, arable land and crude oil prices.

Descriptive statistics are used to characterize the fundamental characteristics of data in a study. They provide concise summaries of the sample and measures. They are the foundation of almost every quantitative data analysis, along with simple graphical analysis. Descriptive statistics are used to convey quantitative information in an understandable manner. There may be numerous measures in a research project. Alternatively, we may assess a huge number of people using any metric. Descriptive statistics assist us in rationally simplifying enormous amounts of data. Each descriptive statistic condenses a large amount of information into a concise summary. One of the most popular and useful statistics is the correlation. A correlation is a single number that describes the degree to which two variables are related.

### 3.5.3 Unit Root

To identify the unit root of the series, the Augmented Dickey-Fuller (ADF) test is utilized, which takes into account both the static and trend on the log of all parameters. If a series has a unit root, it's non-stationary (not stationary at level). A long-run link between the variables may exist if the variables are stationary of the same order, say 1,1 and their linear combination is integrated of a lower order than the variables. Lag deviations are a crucial component of the ADF test for avoiding serial correlation. To calculate the ideal level of lags, the minimal Akaike Information Criterion (AIC) is utilized. The study used (ADF), which uses the t-ratio of a regression to assess for the time series' (non) stationary features. To reduce autocorrelation, the ADF test includes a lagged term for the dependent variable. The test was conducted using the following hypotheses:

Ho: Series is non-stationary series.

H1: The series is stationary.

$$\mathbf{Y}_t = \alpha \mathbf{Y}_{t-1} + \varepsilon_t$$

The goal of this is to test if $\alpha=1$

The regression equation is as follows:

$$\Delta \mathbf{Y}_t = \omega \mathbf{Y}_{t-1} + \varepsilon_t$$

If the t-statistic is smaller than the critical value, the null hypothesis is not rejected. The standard error is denoted by SE. Time series data have a property called stationarity (Gujarati, 2003).One of these strategies can be used to rectify non-stationary data in a time series. A time series trend variable is first included as an independent variable, utilizing trend stationarity. Detrending is the term for this process. Difference stationarity is another technique for removing non-stationarity. Differentiation refers to the procedure for estimating difference between the variables. As a result of this procedure, the conceptual interpretation of the differenced variable changes. Cointegration testing can be used instead of the first difference technique.

The Philip-Perron and KPSS tests are two other methods for determining the unit root in results. The ADF and KPSS tests were performed to confirm if there was a unit root in the series or not. The Philip-Perron test is applied when the results of both tests are inconclusive. The null hypothesis of the KPSS test, unlike the ADF test, is "no unit root in the series." The series is referred to as I (1) steady or integrated of order one if the null hypothesis is accepted. In the case of structural discontinuity in the data, the Philip-Perron analysis is a stationary test. The null hypothesis in both the Philip-Perron and the ADF tests is that the series has a unit root.

### 3.5.4 Information Criteria (Lag length Selection)

Models are chosen based on a variety of information criteria. The following factors are used to determine the number of repressors added to the model:

Akaik information Criterion (AIC) = ln AIC= (2k/n) + ln(RSS/n)

Schwarz information criterion (SIC) = ln SIC = k/n ln n +ln(RSS/n)

### 3.5.5 ARDL bounds testing approach

The ARDL bound testing method, which is employed in this study, was introduced by Shin, Pesaran, and Smith (2001). This test can be used to look into the long-term relationship between variables and to see if they are cointegrated. This method was chosen because it can investigate the cointegration of variables after they have been integrated using a mixed order of integration, such as I(0) or I(1), and it provides better results for limited time series data samples. The following is how the ARDL version is modelled:

Y= food inflation

V, W, X, Z indicate trade openness, crude oil prices, money supply and price wedge respectively, then the model is as follows:

$$Y_t = \beta_0 + \beta_t Y_{t-1} + \cdots + \beta_p Y_{t-p} + \alpha_t V_t + \alpha_t V_{t-1} + \cdots + \alpha_q V_{t-q} + \gamma_t W + \gamma_t W_{t-1} + \cdots + \gamma_m W_{t-m} + \delta_t X_t + \delta_1 X_{t-1} + \cdots + \delta_n X_{t-n} + \theta_t Z_t + \theta_1 Z_{t-1} + \cdots + \theta_j Z_{t-j}$$

### 3.5.6 Cointegration

The ARDL bounds test design specifies the maximum number of regressions that can be used to aid with lag selection. The Engle-Granger single equation two-step cointegration procedure, the multiple equation Johansen cointegration methodology, and the ARDL single equation approach are among the most extensively used cointegration methods. We don't need to apply the Johansen approach, which is a superior methodology when there are a lot of co-integrating vectors, because we're looking into the long-term reasons for food prices. The Engle-Granger approach has some problems that the ARDL approach of cointegration [Khan et al (2005), a technique devised by Pesaran and Shin] greatly overcomes (1997). ARDL gives consistent estimates of the long-run coefficients (0), according to Pesaran and Shin (1997), irrespective of the order of integration of indicators, that is, whether they are integrated of order one, I(1), or zero, I(0) (0). To check the importance of the variables in lag level forms together, the long-run equations are calculated using Equation (8) and the F-statistic, i.e., Ho is 1 = 2 = 0. We can presume that the presence of a long relationship if the F-statistic is significant. The long-run variables are calculated by applying the F-statistic to combine the significance of the independent variables in lag level forms, i.e., Ho = 2 = 0. We can conclude that the variables have a significant if the F-statistic is significant.

### 3.5.7 ARDL Approach to Cointegration

Cointegration implies a collection of dynamic long-run equilibrium since the levels required to achieve stationarity represent aspects of the equilibrium relationship between variables of interest. To explore cointegration, Pesaran and Shin (1996), Pesaran & Pesaran (1997), Pesaran & Smith (1998), and Pesaran, Shin, & Smith (2001) developed the "autoregressive distributed lag bound analysis. When dealing with integrated series of order 1 or I, this strategy outperforms Johansen cointegration. The Johansen cointegration technique is believed to be the most accurate when working

with integrated series of order 1 or I. The ARDL model is not only a more statistically meaningful method of detecting cointegration in limited data (Ghatak & Siddiki, 2001), but it can also be used if the regressors are I (1) and/or I (2). (0). This implies that the ARDL technique avoids the problems associated with classical cointegration, which requires the parameters to be labelled as I(1) or I(0) before being assessed (Pesaran et al., 2001). Shahbaz & Rahman (2012) and Islam, Shahbaz, & Butt (2016) employed this technique to investigate long-term correlations between their variables in the study.

### 3.5.8 Error Correction Mechanism (ECM)

The study applies the Error Correction Mechanism after obtaining cointegration (ECM). This study looks at how quickly factor Y, in this context food inflation, return to equilibrium after endogenous/independent variable changes. Because the first difference does not use analytics, it blends long and short-run linkages without compromising our ability to identify long-term effects.

The error correction model's equation is as follows:

$$\Delta Y_t = \sum_{t=0}^{p} \beta_t \Delta Y_{t-1} + \sum_{t=0}^{q} \alpha_t \Delta V_{t-1} \sum_{t=0}^{m} \gamma_t \Delta W_{t-1} \sum_{t=0}^{n} \delta_t \Delta X_{t-1} \sum_{t=0}^{j} \theta_t \Delta Z_{t-1} + \varphi \text{ECT} + \varepsilon_t$$

ECT stands for error correction term, which represents the rate of adjustment from short-term disequilibrium to long-term equilibrium.

### 3.5.9 Diagnostic Test

Following the estimation of the equations, diagnostic tests are used to determine the model's validity and sufficiency. The tests that will be performed include serial correlation, normality, and heteroscedasticity tests. Furthermore, stability tests must be performed, therefore the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests will be used to assess the stability of the coefficients estimated in this study. Model specification, residual normality, and serial correlation issues were all subjected to diagnostic procedures.

### 3.5.10 Normality test

In statistics, normality tests are used to see if a data set is well-modeled by a normal distribution and to assess the possibility that a random variable beneath the data set is distributed normally. The criteria are a type of model evaluation and based on how one sees probability, they can be construed in a number of ways: The goodness of

fit of a normal model to the data is evaluated in descriptive analysis; if the fit is poor, the data are not accurately characterized by a normal distribution in that aspect, even if no fundamental variable assumptions are made. Results were compared to the null hypothesis that it is uniformly distributed in statistical hypothesis testing.

### 3.5.11 Heteroskedasticity Test

When the standard deviations of an expected variable shift with the value of an independent variable or when compared to preceding time periods, heteroskedasticity arises. The tendency for residual errors to grow over time is a diagnostic indication of heteroskedasticity. The two types of heteroskedasticity are conditional and unconditional heteroskedasticity. Non-constant volatility that is tied to previous period volatility is referred to as conditional heteroskedasticity (e.g., daily). Unconditional heteroskedasticity represents a shift in variance structure that are unrelated to volatility in previous periods.

### 3.5.12 Ramsey Reset Test:

The generic specification test of a linear regression model. It looks at whether non-linear combination of explanatory variables, particularly their powers, can help explain the dependent variable. The test is carried out by regressing the dependent variable's projected value on the independent variable as well as their powers, and then testing the joint significance of the coefficient on the latter. If these are significant, the linear model is incorrectly defined.

### 3.5.13 Stability Test

In the $y = X\beta + \varepsilon$ model of multiple linear regression, a stability test is performed to guarantee that the model is stable. CUSUM tests are used to determine the stability of coefficients. The conclusion is drawn using a series of sums of recursive residuals (standardized one-step-ahead forecast errors) collected successively from nested subsamples of data.

# CHAPTER 4

# RESULTS AND DISCUSSION

## 4.1 Data Analysis

This chapter includes an analysis of the data collected for the purposes of this research, including tables and figures with discussion of the findings. The unit-roots exam, once more displayed in tables and charts, is also explained. The study's main objective is to examine the effects of changes in the price of oil, the price wedge, the exchange rate, trade openness, and the money supply.

## 4.2 Descriptive Statistic

The major statistical features of each of the parameters are summarized in Table 4.1. With 40 observations, the mean annual rate of increase in food prices was 8.491250 percent. This reflects a year-on-year growth of around 8%.

**Table 4.1:** *Descriptive statistics of variables*

| | **Food inflation** | **Broad Money growth** | **Exchange Rate** | **Trade Openness** | **Crude Oil Prices** | **Price Wedge** |
|---|---|---|---|---|---|---|
| **Mean** | 8.49 | 15.16 | 128.71 | 32.58 | 42.34 | 10.34 |
| **Median** | 7.77 | 14.65 | 116.29 | 32.96 | 29.27 | 3.20 |
| **Maximum** | 26.61 | 42.90 | 237.50 | 38.49 | 105.01 | 37.58 |
| **Minimum** | 1.68 | 4.31 | 96.48 | 25.30 | 13.08 | 1.06 |
| **STD. Dev** | 5.34 | 6.75 | 39.73 | 3.48 | 28.74 | 10.82 |
| **Skewness** | 1.01 | 1.69 | 1.54 | 0.49 | 0.99 | 0.95 |
| **Kurtosis** | 4.41 | 8.57 | 4.03 | 2.55 | 8.73 | 2.72 |
| **Jarque Bera** | 10.15 | 71.06 | 17.87 | 1.99 | 0.03 | 5.30 |
| **Probability** | 0.00 | 0.30 | 0.00 | 0.38 | 0.03 | 0.07 |
| **Sum** | 339.850 | 1863.9 | 606.73 | 1303.58 | 1693.81 | 350.80 |
| **Sum sq dev** | 1115.89 | 1751.8 | 61581.33 | 472.77 | 32225.8 | 3870.03 |
| **Observation** | 40 | 40 | 40 | 40 | 40 | 40 |

*Source*: Authors' own calculations

The standard deviation illustrates how each data series clusters around its mean. The standard deviation value decreases as the data collection becomes more clustered.

Board money growth, price wedge, trade openness, and food prices are all clustered around their means, whereas the exchange rate and crude price of oil are widely spread around their means. The skewness of a series' distribution depicts its symmetry Food prices, price wedge, board money growth, and crude prices were all positively skewed, trying to imply that the long tails of their distributions were to the right, suggesting that the majority of the research results had lower values, whereas trade openness was negatively skewed, inferring that the long tails of the distributions were to the left, implying that the majority of the findings had higher values. The kurtosis of a distribution reflects its degree of peakness (pointedness of the peak), and the food price and currency rate were leptokurtic, suggesting that they were strongly peaked, whereas the other factors were platykurtic (a bit flat peak). Jarque-Bera analysis is a more in-depth test that integrates skewness and kurtosis aspects to analyze the normalcy of a series dispersion. The test found that the food exchange rate, food prices, price wedge, and crude oil prices were not normally distributed since their Jarque-Bera probability were less than 0.05, rejecting the null hypothesis.

## 4.3 Correlation Analysis

The degree of linear link between two variables is referred to as correlation. In order to prevent multi collinearity problems among explanatory variables in this study, multivariate correlation analysis was used as part of the analysis.

**Table 4.2:** ***Correlation Analysis***

| | **Food Inflation** | **Oil Prices** | **Exchange Rate** | **Money Supply** | **Trade Openness** | **Price Wedge** |
|---|---|---|---|---|---|---|
| FDIF | 1 | | | | | |
| COP | 0.24 | 1 | | | | |
| EX | -0.11 | -0.56 | 1 | | | |
| BMG | 0.13 | -0.03 | -0.09 | 1 | | |
| TO | 0.56 | -0.14 | 0.22 | 0.30 | 1 | |
| PW | -0.09 | 0.72 | -0.34 | -0.18 | -0.36 | 1 |

*Source*: Authors' own calculations

Turning to the correlation among the variables, Table 4.2 shows that the variables price wedge and exchange rate have a negative association with food inflation. This signifies that none of the variables move in the same direction with food inflation. Moreover, it is observed that price wedge is positively correlate with the oil price and exchange rate, money supply, trade openness is negatively correlate with food prices. This suggests that oil price has a possible influence on the price wedge in Pakistan. Money supply and price wedge is negatively correlate with exchange rate and positively correlate with trade openness. Furthermore, trade openness is positively correlate with money supply. It is further observed that the strength of correlation existing among the variables are significant at one percent error level. Additionally, none of the correlation coefficients exceed 0.80. This is an indication of an absence of multicollinearity in the dataset employed (Kennedy, 2008).

## 4.4 Unit root Results

The first stage in our investigation is to determine whether or not the variables are stationary. The study looks at two versions of the traditional Augmented Dickey Fuller (ADF) test for determining the unit root problem: with intercept just at a level and at first difference. Table 4.3 provides the test findings, which show that all of the indicators are stationary at the same level.

**Table 4.3:** *Augmented Dickey-Fuller (ADF) Unit Root Result*

| **Variables** | **At Level** | | **At 1st Difference** | | **Conclusion** |
|---|---|---|---|---|---|
| | T-statistics | Probability | T-statistics | Probability | |
| **FDIF** | -2.2493 | 0.1931 | -10.1728*** | 0.0000 | I(1) |
| **BMG** | -4.9390 | 0.0002 | -7.5349*** | 0.0000 | I(0) |
| **EX** | -2.0018 | 0.28487 | -5.8416*** | 0.0000 | I(1) |
| **TO** | -2.3273 | 0.1688 | -6.5874*** | 0.0000 | I(1) |
| **COP** | -1.3168 | 0.6121 | -5.8305*** | 0.0000 | I(1) |
| **PW** | 0.3808 | 0.9790 | -4.7280*** | 0.0006 | I(1) |

*Note:* *** are given to 1 %, ** for 5 % and * for 10% ideally.

*Source*: Authors' own calculations

The calculated ADF estimates of the variables, together with their p-values, are listed in the table. Because all indicators are found at the level and 1st difference, the ARDL technique is employed for analysis. Food inflation, broad money growth, trade openness, crude oil prices, and the price wedge are all covered by time-series data from 1980 to the present.

The results reveal a scenario of stationary economic indicators with a trend, but they are otherwise integrated to order one. As established by the ADF test, money supply is integrated at level, and exchange rate, trade openness, food price, and price wedge are integrated at order one. Similarly, the price of crude oil is integrated to the first order. This stationary test also meets the requirement that no variable of order two I (2) is integrated before using the ARDL technique. At the national level, most emerging markets have evidence that is not stationary (Malkiuk,2007). The initial difference made all of the variables immobile. After establishing that the variables were stationary, the study employed the Auto Regressive Distributed Lag (ARDL) technique to cointegration methodology to evaluate the model.

## 4.5 Lag selection

The Schwarz Information Criterion is used to choose the lag order in the first stage (AIC)

## 4.6 Cointegration

The lag selection criterion on the basis of Schwarz Information Criterion (SIC). The maximum lag selected was 4 but the model chose to use a lag of 2. The model selected was ARDL (2,0,2,0,2,0) which shows different lags for the variables. The number of lags for food inflation, price wedge and money supply are 2. Crude oil prices, exchange rate and trade openness have 0 lags.

## 4.7 Result of Bound Test

**TABLE 4.4:** *ARDL Bounds Cointegration Test*

| **Dependent Variable** | **Critical value** | **F-statistic =5.86** **Lower bound** | **Upper bound** |
|---|---|---|---|
| Food Inflation | 10% | 2.75 | 3.79 |
| | 5% | 3.12 | 4.25** |
| | 1% | 3.93 | 5.23 |

*Note:* *** are given to 1 %, ** for 5 % and * for 10% ideally.

*Source*: Authors' own calculations

The F-statistic is calculated and analyzed to the critical value of the bound testing table 5.86, and the ARDL bound testing is utilized to test for long-run cointegration. At a 5% confidence level, the upper bound critical value is 4.25 and the lower bound critical value is 3.12. In the table below, the F-statistic is 5.86, which is higher than the upper level bound of 4.25. As an outcome, the null hypothesis of no co-integration between variables is rejected, implying a long-term link between the variables.

To see whether there is long-run cointegration, the F-statistic is generated and compared to a crucial value of the bound testing table 5.86. Based on a 5% confidence level, the highest bound critical value is 4.25, whereas the lowest bound critical value is 3.12. In the table above, the F-statistic is 5.86, which is greater than the 4.25 upper level bound. As an outcome, the null hypothesis of no co-integration among indicators is rejected, implying a long-term link between the variables.

## 4.8 Long Run Analysis

The ARDL limits testing approach can be used to test for cointegration and determine the long-term relationship among determinants. This technique was selected because it enables the examination of component cointegration when they are combined in a mixed order of integration, such as I(0) or I(1).

**TABLE 4.5:** *Long Run Analysis Result*

**Autoregressive Distributed Lag Estimates**

**The dependent Variable is Food inflation**

| Variables | Coefficient | Standard Error | T value | P value |
|---|---|---|---|---|
| **BMG** | 1.6645 *** | 0.5741 | 2.8997 | 0.0092 |
| **COP** | 0.1127** | 0.0504 | 2.2359 | 0.0376 |
| **EX** | -0.5466** | 0.2097 | -2.6055 | 0.0174 |
| **TO** | -1.8700** | 0.7400 | -2.5270 | 0.0205 |
| **PW** | 1.7196*** | 0.5639 | 3.0491 | 0.0066 |

*Note*: *** are given to 1 %, ** for 5 % and * for 10% ideally.

*Source*: Authors' own calculations

Because the series were of different orders, the Autoregressive Distributed Lag model (ARDL) framework is most suited for their analysis. The Lag selection criterion test is advised that a lag length of 2 be used for the study. The results reveal that the model's demand-pull and cost push variables have a considerable impact on rising food prices in Pakistan.

### 4.8.1 Crude oil prices and food inflation

Increases in input prices or production costs, as per to the cost push theory, have an immediate impact on commodity prices, resulting in food inflation. Haji and Gelaw (2012), Abdullah's (2009) findings are consistent with our results. Second, according to the cost-push theory, the price of oil products is also tied to the price of food. In Pakistan, it has been established that increased oil prices result in higher transportation expenses, which are passed on to consumers as a cost. Masood & Azeem (2012), Faisal Aftab's and Hamid Salman, previous investigations are similarly consistent with our findings (2013). The long-run equation for crude oil prices indicates that they have a significant and positive impact on food inflation throughout time. According to the findings, a 1% increase in the oil prices is associated with a 0.11% increase in food inflation and the variable is also significant in long run. This is due to the fact that oil

is a crucial component of every economy. As a result, activities related to food production, such as transportation costs and the creation of food packaging items, are directly affected, as are all the shock spillover effects food inflation. Results shows that there is an oil prices pass-through effect on food inflation.

### 4.8.2 Exchange Rate and food inflation

In terms of exchange rates, they are negatively correlated with food costs. The coefficient has a negative sign, and the variable is also significant. Results shows that 1% depreciation in exchange rate is associated with 0.54% decreases in food inflation. The decrease in the value of the rupee has made Pakistani food cheaper, leading to an increase in exports. The decrease in imports widens investment opportunities in the agricultural activities, resulting in more production and lower food prices. Our findings are similar to Qazi Masood's (2014); however, they differ from Hamid Salman. Our findings are similar to Qazi Masood's (2014); however, they differ from Hamid Salman. Furthermore, food inflation caused by foreign exchange could be ascribed to a demand push for domestic food consumption.

This data supports Oyejide's (1989) claim that, through the cost-push inflation channel, exchange rate depreciation resulted in higher local currency costs of imported commodities (raw materials and intermediate capital goods) and final goods. Because of the fixed nature of domestic production, excess demand for non-tradable, non-importable commodities would result in higher prices in the short run. Through a demand-pull process, the price increase reveals domestic inflation.

### 4.8.3 Money supply and food inflation

Similarly, the money supply variable is included in the analysis, which demonstrates that it has a positive impact on the food price. If 1% increase in money supply is associated with a 1.66% increase in food inflation. Since the coefficient estimate for money supply is significant, it implies that there is a significant long-run relationship between food inflation and the money supply. It invalidates the notion that Pakistan's food inflation is unrelated to the country's monetary system. To cover its deficit, the government borrows money from the State Bank of Pakistan (seignorage), which is then spent on non-productive reasons, resulting in higher prices in Pakistan's economy. Rana Ejaz (2007) and M. Abdullah (2007) both came to similar conclusions (2009). As a result, the findings contradict the monetarist idea that an increase in money

supply has a long-term impact on inflation. As a result, this study concludes that money supply alone cannot reduce inflation in Pakistan.

### 4.8.4 Trade openness and Food inflation

Given that Pakistan is a heavily dependent on imports, these findings could be driven by the fact that Pakistan has considerable bargaining power on its imports or is engaged in trade with countries that have free trade agreements, allowing it to benefit from regulated tariffs, taxes, and imports, all of which are linked to increased investment in the country. The study's findings, on the other hand, are in line with previous research that has demonstrated a negative association between food costs and trade openness. Because Pakistan's economy is so intertwined with international trade, the local price level cannot remain immune to global fluctuations. Food inflation and trade liberalization have a considerable negative long-run connection with the Romer hypothesis, according to the expected empirical findings. Our data backs up Romer's theory's popularity in Pakistan. The negative sign of the Trade Liberalization ratio is statistically significant, meaning that a 1 % increase in trade liberalization is associated with a 1.87% decrease in food inflation. Commodity prices, particularly agricultural products, fall as trade openness rises, lowering food prices.

Overall, the findings contradict Evans (2007), Rajagopal (2007), Terra (1998), Cooke (2010), Ghanem (2010), Zakaria (2011), Samimi et al., (2012), Munir and Kiani (2011) Thomas (2012), and Neeraj et al that there is a positive relationship between inflation and trade openness (2014). As a consequence, a positive shock to trade liberalization will cause inflation to rise, whilst a negative shock will cause inflation to fall. The positive shocks raise major doubts regarding the State Bank of Pakistan's price stability goal, especially in light of the Pakistani government's declared intention of increasing the economy's outward orientation. This conclusion is supported by the prominence of fuel, equipment, and other manufactured products imports to Pakistan, which would have a strong influence on the country's price level as a result of their positive trend.

As a result, we find the validity of Romer's claim that inflation and trade openness are linked in the long run in Pakistan. In Pakistan's case, despite its great openness to international trade, the country's production and export diversification are limited. This makes it prone to adverse market fluctuations and shocks, as seen by fluctuations in trade terms and the volatility of its economic performance.

Free trade creates chances for more efficient resource utilization, technological advancements, and other trade-related facilities, which leads to better foreign exchange revenues and the facilitation of other sectors of the economy. The premise is backed up by a large body of research, with some studies concluding that international commerce plays an important role in developing countries. Because trade is such an important aspect in every economy's development, it may be boosted by lowering import and export levies and barriers. Import incentives are likely to be stronger than export incentives, which could wreak havoc on the balance of payments and, as a result, slow overall economic growth. Due to a lack of infrastructure and capital facilities, this situation is known as the trade liberalization paradox, and it is particularly common in developing countries**.**

### 4.8.5 Price Wedge and Food Price

Our wholesale markets had really been bearing a chunk of the external shocks of food inflation, particularly during in the post-2008 worldwide commodity price crisis era, and as a result, (retail) food inflation volatility in Pakistan was half that of world food price increases. However, the persistence of food price volatility in Pakistan was larger than that of global food inflation volatility. According to the findings, a 1% increase in the price wedge is associated with a 1.71% increase in food inflation in Pakistan. The coefficient has a positive sign and it also significant. Our results are consistent with results of Huria and Pathania (2018) that there is direct relationship between price wedge and food prices.

## 4.9 Results of Error Correction Model

The Error Correctional Term (ECT) is being used to account for both short- and long-term volatility, as well as diverge from equilibrium. The error correction term is predicated on the residual from regression as money supply is stationary at a level as well as the other indicators were stationary at the first difference.

**Table 4.6:** *Error Correction Model*

| Variables | Estimate | Error | T-statistics | P-value |
|---|---|---|---|---|
| **D(FDIF(-1))** | -0.4384 | 0.09857 | -4.4477 | 0.000 |
| **D(BMG))** | 0.1713 | 0.08241 | 2.0787 | 0.051 |
| **D(BMG(-1))** | -0.40749 | 0.08076 | -5.0451 | 0.0001 |
| **PW** | 0.56602 | 0.17727 | 3.1930 | 0.004 |
| **D(PW(-1))** | -0.47631 | 0.20556 | -2.31715 | 0.0318 |
| **ECT (Speed of Adjustment)** | -0.5438 | 0.08154 | -6.6687 | 0.0000 |
| **R-square** | 0.802640 | **Adjusted R square** | 0.745077 | |
| **F-statistic** | 13.94363 | **Durbin –Watson** | 2.209384 | |
| **Prob ( F-statistic )** | 0.0000 | | | |

*Note*: *** are given to 1 %, ** for 5 % and * for 10% ideally.

*Source*: Authors' own calculations

The calculated value of the ECT term is -0.54 depend on the results in Table 4.6. The results support the presence of a food inflation and the independent variables because the error correction term is negative and significant.

The ECM term of -0.54 denotes a 54 percent rate of adjustment towards long-run equilibrium between the variables. The adjusted R-square coefficient is 0.74, implying that the independent factors account for 74 percent of the fluctuations in food inflation. The calculated value of the ECT term is -0.54 based on the results in Table 4.6. The results support the presence of food inflation and the independent variables because the error correction term is negative and significant.

## 4.10 Results of Stability test

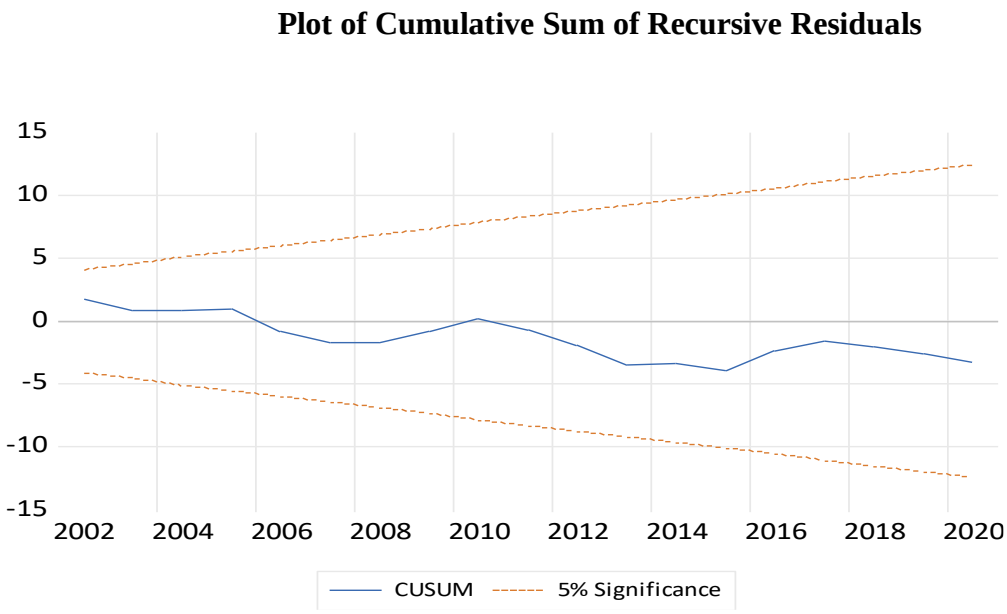



*Figure 3: Cumulative Sum of Recursive Residuals*

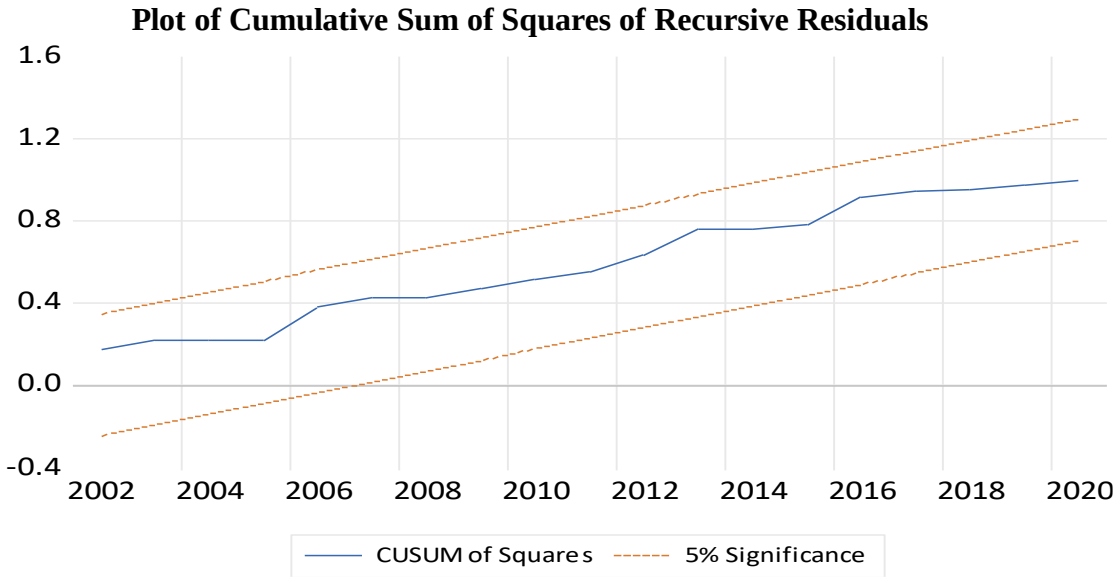



*Figure 4: Cumulative Sum of Square of Recursive Residuals*

The stability test was also employed in the study to ensure that the model was stable. This study used Brown et al cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) stability testing techniques to determine the stability of the selected ARDL model (1975). Figures 1 and 2 show the CUSUM and CUSUMSQ plots, respectively. At a 5% level of significance,

both graphs remain inside critical boundaries, indicating that the model is structurally stable.

The stability tests are used to establish whether or not a parameter is stable. The position of the figure in relation to the 5% critical bound is used to determine parameter stability. This study employs the CUSUM and CUSUMSQ statistics. The indicators of the model are stable over the study period if the plots of the CUSUM or CUSUMSQ stay inside the area between the two crucial lines. Figures 2 and 3 show the results of the stability test. It shows that the CUSUM and CUSUMSQ plots both stay inside the area between the two crucial lines, indicating that the indicators are stable across the study period. In other words, no structural changes have occurred.

## 4.10 Results of Diagnostic Test

Stability and diagnostic procedures have been used to assess the model's reliability, validity, and sensitivity. The CUSUM test was used to check the stability of the calculated ARDL model, and the findings confirmed the model's stability, indicating that it was properly described. Heteroscedasticity (variation in the variance of the error term across changing regressor values) is a breach of the fundamental OLS assumption, and thus poses a risk to econometric models. As a result, the ARCH-LM test was employed to see if the estimated model had any heteroscedasticity. The null hypothesis of "no heteroscedasticity" was rejected since the probability level was higher than the permissible limit of 5%.

**Table 4.7:** *Diagnostic Test*

| **Breusch – Godfrey** (Serial Correlation LM Test) | **Heteroskedasticity** ARCH | **Ramsey Reset Test** Linearity Test | **Jarque – Bera** Normality Test |
|---|---|---|---|
| 2.9842 | 0.039 | 0.1604 | 1.1850 |
| (0.2249) | (0.8425) | (0.26) | (0.5529) |

*Note: The values enclosed in brackets are Probability values.*

*Source*: Authors' own calculations

Some of the techniques utilized include the LM test for serial correlation, ARCH for heteroskedasticity, Ramsey Reset for linearity and Jarque-Bera

### 4.11.1 Serial Correlation

The null hypothesis: There is no serial correlation

Breusch-Godfrey produced an R-squared probability Chi-Square of 0.2249, which is more than 0.05. Finally, the hypothesis is refuted because the data shows no indication of a serial correlation.

### 4.11.2 Heteroskedasticity

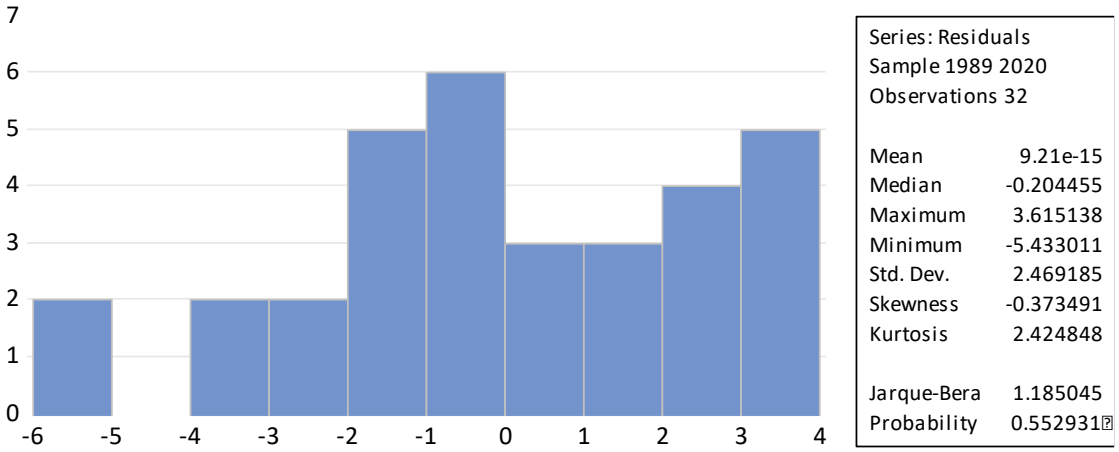
The null hypothesis: Homoscedasticity, the variance of residual is constant

ARCH revealed a chi-square R-squared probability of 0.8425, which is higher than 0.05. As a consequence, the null hypothesis is not rejected, and there is no evidence of heteroskedasticity in the data.

### 4.11.3 Normality of the residuals

The null hypothesis: Normal distribution

When the Jarque Bera probability is 0.552931 which is greater than 0.05 and the null hypothesis is not rejected, the residuals are normally distributed.




### 4.11.4 Ramsey Reset Test

The null hypothesis: Model is specified

The null hypothesis is not rejected when the Ramsey Reset probability is 0.26 and more than 0.05, indicating that the model is properly specified.

In recent years, rising food costs have posed a severe danger to Pakistan's and the world's economies. Food costs have risen considerably, hurting the poor's cost of living, as they invest more than 60 percent of their money on food. The elements that

influence food costs in Pakistan are investigated in this study. As determinants of food inflation in Pakistan, time-series research from 1980 to 2020 integrates cost-push variables like fuel prices with demand-pull macroeconomic factors like money supply and currency rate. All indicators are integrated of order one and at level in the ADF test, and the ARDL method should be done if all indicators are stationary at the level and at the first difference, according to the rule of thumb. The credibility of the central bank, the degree of cooperation between fiscal and monetary policies, the exchange rate mechanism, and the amount of monetary policy aggressiveness are all found to be connected to the effectiveness of monetary policy in stabilising prices. The price-setting behaviour of enterprises in the country is one of the variables influencing inflation dynamics. Inflation stickiness occurs when a rising number of enterprises modify their prices based on historical data. Inflation stickiness is described as the propensity for inflation to gradually revert to its long run measured by the amount of a shock.

Inflation cannot quickly shift to a (new) lower steady state in response to any surprise announcement of a stable and plausible fall in nominal income growth, notwithstanding the fact that a large number of enterprises use backward looking data when determining prices. To investigate inflation persistence in Pakistan, the Pakistan Bureau of Statistics (PBS) releases month-by-month time series data for the consumer price index (CPI) from 2010 to 2019, as well as various group-level consumer pricing indices and 374 individual prices. They identified evidence of continuous core (non-energy, non-food) inflation in Pakistan throughout the last decade, but no evidence of sustained food inflation.

The core inflation basket is dominated by manufacturing products. Pakistan and global food inflation have moved in lockstep over the previous two decades, with world food volatility driving food inflation in Pakistan. In Pakistan, however, there was some small food inflation, which culminated in food inflation (sugar, wheat, vegetables, meat, and fresh milk). As a result, Pakistan's food inflation rate has been less than its non-food inflation rate. Food inflation has been revealed to be linked not only in terms of levels but also in terms of volatility in Pakistan and around the world. Our wholesale markets had been soaking up a lot of the volatility in global food inflation, especially during the global commodity price crisis of 2008, and as a result, (retail) food inflation volatility in Pakistan was twice as high as global food price spikes. Pakistan's food price volatility, on the other hand, was more stable than global food inflation volatility.

The model's demand-pull and cost push variables are both significant to food inflation, according to empirical findings. The main goal of the research is to investigate the major variables influencing high food price in Pakistan. The unit root, long and short-run relationships with the determinants were investigated using a variety of econometric approaches in this study. The econometric results show that oil prices plus trade liberalization have a long-term positive and considerable influence on food prices. All factors are positively related to food prices, according to the findings. High fuel prices result in high transportation costs, which in turn raise food prices. Food prices have a long-term association with fuel prices, price wedges, and trade openness. Furthermore, the ECT term in the vector error correction model has an inverse relation indicating the rate of adjustment toward long run equilibrium.

# CHAPTER 5

# CONCLUSION AND RECOMMENDATIONS

## 5.1 CONCLUSION

The focus of this research was to determine the impact of openness to trade and crude price of oil on food inflation in Pakistan, specifically to see if Romer's Hypothesis holds true in Pakistan. The empirical findings of this study suggest that there is a significant negative association between openness to trade and food inflation in the long run, based on the ARDL model of estimate. In the short run, however, there is correlation between trade openness and food inflation. In the long run, this analysis backs up Romer's premise that more trade openness lowers inflation. The findings are likewise consistent with those of who tested Romer's hypothesis and came up with the same results. This suggests that increasing international trade flows could lower inflation dramatically. In both short and long run methods, the study discovered that crude oil prices have a positive and significant impact on food inflation. This emphasizes the importance of oil in Pakistan's economy, both in terms of production and other service-oriented features. As a result, it points to spillovers from oil-driven services like transportation and agricultural production

However, this analysis discovers a significant link with supply of money and food inflation, supporting the monetarist assumption that money supply has a significant impact on prices. This could also mean that Pakistan's monetary policy mechanism is insufficient to manage inflation, and that the money supply is a substantial determinant in inflation.

On the other, hand price wedge which is a difference between retail and wholesale prices shows a significant positive association with food prices. This positive relationship indicates that difference between wholesale and retail price leads to increase in food prices so the government should look into long-term price mechanism options such as increasing storage capacity and stockpiling to protect against future declines in food availability or increased demand. Fuel is a key component of agriculture, thus any increase in its cost should have a direct and favorable effect on the cost of food items. From being used as a fuel for various agricultural machines to

transport food from farmers to wholesalers, retailers, and consumers, as well as its function in supplying customers, we must not overlook how fuel costs affect food costs.

Furthermore, food inflation caused by foreign exchange could be connected to a demand drive for domestic consumption of food. Because of the demand-supply gap, we are becoming more reliant on imported food, which is growing more expensive as our currency devalues. Pakistan must address supply in order to reduce food inflationary pressures. We can increase our output by spending more in R&D, which will lead to innovation and the acceptance of new technology.

This study fills that need by investigating the causes of food inflation, which, if properly addressed through policy intervention, might help manage not only food prices but also the total consumer price index basket. It is widely considered that inflation affects the impoverished more than wealthy. This sentence, in my opinion, should be reworded to emphasize that food inflation disproportionately affects the poor. Poor people spend a higher percentage of their income on food than the wealthy. This is particularly true for countries with low and moderate incomes. Despite the fact that these shares have declined over time as actual per capita income has climbed, food spending in low and middle-income countries (40%) is double that of high-income countries (20%).

In conclusion, the current study contributes to the existing knowledge by investigating the role of supply chain inefficiencies on the ultimate price of food grains, a widely traded commodity. This interaction market was examined because of Pakistani culture, and it contains a large number of intermediary stages between the supply of commodities by one entity and its receipt by another. Farmers sell their goods to consumers, who subsequently purchase them. The price difference created by intermediary steps has been considered a source of supply chain instability in the agriculture industry.

Crude oil prices and trade liberalization were key short-term factors affecting food prices in Pakistan, whereas money supply, price wedge, exchange rate, and crude oil prices constituted significant long-term factors. Trade liberalization showed a negative relationship with food inflation consistent with Romer's hypothesis in short run but in the long run means Romer hypothesis doesn't hold in Pakistan. The validity of the models generated was confirmed by post-estimation testing, which included tests for stability, autocorrelation, heteroscedasticity, and normality of residual distribution.

The study looked at the important macroeconomic determinants that influence food price in Pakistan. The World Bank and the Pakistan Bureau of statistics provided relevant statistics for the years 1980 to 2020. The descriptive statistics, graphical depictions, and stationary tests were all used to evaluate the research statistical features. In the graphical analysis, the bulk of the series indicated increasing trends over time, while correlation analyses demonstrated association between the research variables, raising econometric problems for the model developed.

Food price wedge, exchange rate, oil prices, and money supply were all major macroeconomic variables impacting food price in Pakistan in the short run, but trade openness, money supply, and crude oil prices were all significant. The validity of the models generated was checked by a post-estimation test that included tests for stability, heteroscedasticity, autocorrelation, and normality of residual distribution.

However, various domestic factors have influenced food inflation in Pakistan. The federal government indicated from the start that the 18th constitutional amendment would be rendered ineffective. Through this amendment, provinces have completed administrative power over agriculture. The present government signaling backfired, especially in Sindh, which is the second-largest food-producing region after Punjab. This, together with the numerous policies in place across Pakistan for administratively controlling food prices, made it more difficult to control food inflation. The is the political issue of excessive food inflation. If no progress is achieved in this area, food inflation may continue to be a concern for policymakers, even if the FFPI is eased — and the food trade imbalance may be reduced this fiscal year. The FFPI fell slightly in July compared to June this year, but it's unclear whether this trend will continue until June next year. However, Pakistan's food trade deficit is likely to decrease this fiscal year. (Imports of wheat and sugar are expected to be lower in 20201-22 than in 2019-21.)

Between mid-March and the end of June 2020, the State Bank of Pakistan (SBP) lowered its benchmark interest rate by 625 basis points to help the economy escape a sharp recession caused by the Covid-19 pandemic. Since then, the interest rate has remained steady. This extraordinary loosening of monetary policy contributed to a 0.5 percent recession in 2019-20, as well as 3.9 percent GDP growth in 2020-21. However, it had an inevitable effect on demand-induced inflation. Domestic demand was boosted by monetary easing and the government's fiscal subsidy program, resulting in general inflationary pressures and high food inflation. Food inflation has been kept up and

continues to be kept up by higher demand for food goods, greater cost of agriculture due to the removal of subsidies on energy and agricultural inputs, and some supply constraints.

## 5.2 Policy Implications

i. Government should Promote agricultural sector to increase the local production further to increase the production of diversified crops, which reduce the consumer reliance on imported.

ii. As the high international crude oil prices are out of government's control, the government should provide crude oil at subsidize rate to the producers to reduce the input cost.

iii. There is a need to construct proper transportation system from farms (villages) to the cities' markets to reduce the transportation cost.

iv. Government should design the plan to measure the food market inefficiencies. As a result, the government must adopt urgent and long-term actions to keep food grain prices from rising. A step that focuses on minimising intermediary processes and bringing farmers and consumers closer together may raise farmer earnings, consumer prices, and finally settle pricing differences.

v. It is essential to bring further competition to the agriculture sector through the liberalization of imports, along with the removal of barriers to entry to the establishment of new mills.

vi. Social safety nets to provide price information in different markets as a introduction of guidance application to both sellers and buyers.

Both domestic and international market dynamics are affected by food inflation. Worldwide oil pricing, as well as world's economic interdependence via trade and capital movements, are examples. According to Finck & Tillmann (2019) the continuous integration of economic and products markets is changing gradually in the inflation process. They are keen to point out, however, that quantifying the magnitude of that influence is difficult. Food inflation tends to outstrip non-food inflation, causing overall inflation to rise. As a result, if food prices can be efficiently managed, overall inflation can be effectively managed as well.

## 5.3 Limitation of the study

However, we were unable to address the underlying issues that contribute to rising food prices, including such other political factors and smuggling, due to the difficulty in obtaining statistics on the black or undocumented sector. The political situation in Pakistan is also an economic aspect that contributes to rising food prices. Smuggling is a big factor on both sides of the border, posing a threat to the economy. A large amount of wheat is smuggled across the border due to government instability, and stockholder hoarding is another complicated matter for the Pakistani economy.

## 5.4 Suggestion for future studies

Future research should include data from different time frames, such as monthly/quarterly data, to strengthen the validity of the results, as the current study only used annual data. In South Asian countries, panel data is analyzed. Because bilateral trade is increasing in South Asian countries and such studies are limited, a comparison of the countries is required to evaluate the pass-through impact of the oil prices on food inflation and, second, to see whether trade openness has any influence on food inflation.

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