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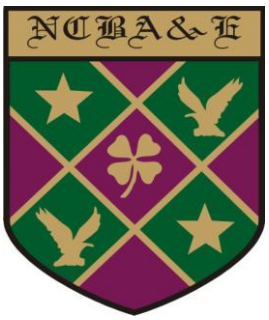

IMPACT OF FISCAL AND MONETARY POLICIES ON FOOD INFLATION AND ENERGY INFLATION IN PAKISTAN

BY

IQRA KANWAL

MASTER OF PHILOSOPHY
IN
ECONOMICS

DECEMBER, 2023

NATIONAL COLLEGE OF BUSINESS ADMINISTRATION & ECONOMICS

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Iqra Kanwal

A dissertation submitted to
Faculty of Social Sciences

In Partial Fulfillment oft he
Requirements for the Degree of

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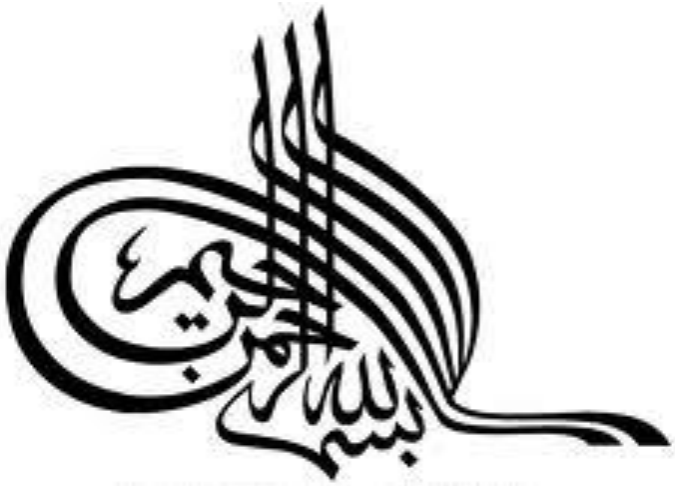

In the name of ALLAH,
The Most Beneficial,
The Most Merciful,

NATIONAL COLLEGE OF BUSINESS ADMINISTRATION & ECONOMICS LAHORE

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Dissertation Committee:

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Chairman

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Member

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Member

DECLARATION

It is to declare that this research work has not been submitted for obtaining similar degree from any other university/college.

IQRA KANWAL
December, 2023

DEDICATED

TO

My Parents

&

My Friends

ACKNOWLEDGEMENT

Profound gratitude ascends to the Almighty Allah, whose divine wisdom and understanding guided me onto the path of truth and knowledge, culminating in this thesis.

My deepest appreciation goes to Dr. Mussarat Khadija, Head of the Department of Economics at the National College of Business Administration & Economics (NCBA&E), Lahore. Her invaluable mentorship, unwavering support, and constructive feedback throughout my research journey were instrumental in shaping this thesis. I am eternally grateful for her guidance.

I acknowledge the significant contributions of Prof. Dr. A.R. Chaudhary, Dean of the School of Social Sciences at NCBA&E, and Dr. Zahid Parvaiz, whose dedication to fostering academic and research excellence in students has nurtured my own scholarly development.

To my beloved family and friends, whose tireless faith fanned the flames of my resolve, whose persistent encouragement echoed in my moments of doubt, and whose relentless support was my constant haven, my deepest gratitude? They have always been my pillar of support and inner strength.

RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis entitled **"Impact of Fiscal and Monetary Policies on Food Inflation and Energy Inflation in Pakistan"** has been carried out and completed by **Ms. Iqra Kanwal** under my supervision during her **M.Phil. Economics** Programme.

(Dr. Mussarat Khadija)
Supervisor

SUMMARY

Pakistan is a developing economy and currently facing several economic challenges, primarily in the form of inflation. High inflation rates have persisted over the last few years but it has aggravated exceptionally high as an outcome of COVID-19 and the Russian invasion of Ukraine in February 2022. It has become the most challenging all over the globe. Inflation has a variety of adverse effects as it reduces people's purchasing power, lowers economic growth, and creates macroeconomic instability. It's a prevalent belief that food inflation harms the poor more.

The consumer price index (CPI) is considered the most common measure of general inflation. It measures changes in the prices consumers pay for products and services that are divided into 12 main groups with various weighted averages. As per the Pakistan Economic Survey (2020–21), the group-wise breakdown of the CPI indicates that the food group covers a weightage of 34.6%, and the energy sector covers 23.6% of the national CPI. Jointly, these both shares more than 50 % of the CPI. Many experts at the national and international levels have explored the fiscal and monetary determinants of inflation but the literature is comparatively limited in exploring determinants of classified components of inflation such as food and non-food inflation.

This study has examined the role of monetary and fiscal determinants on inflation, food inflation, and energy inflation in the context of Pakistan using time series analysis. The period considered is from 1972 to 2021. It began in 1972 as a result of the structural break in Pakistan's economy caused by the separation of East Pakistan. Three models are constructed to analyze the determinants of inflation as well as the components of inflation (CPI) food and energy separately. Data for variables such as exchange rate, interest rate, indirect taxes, and government expenditure is sourced from the State Bank of Pakistan. Inflation rates, food inflation, and energy inflation data are extracted from Pakistan Economic Surveys spanning from 1972 to 2022, while data on population growth and Gross Fixed Capital Formation is collected from the World Development Indicator (WDI).

Findings from the analysis reveal that monetary tools, particularly interest rates and exchange rates, play a significant role in influencing inflation in Pakistan. The inverse relationship with interest rates is more pronounced than that with exchange rates. In contrast, fiscal tools public expenditure has an inverse and significant effect while indirect taxes have no significant impact on inflation. For food inflation monetary determinants are less responsive. The

exchange rate plays a positive and significant role while the interest rate does not have a significant impact on food inflation. Contrary to monetary tools, fiscal determinants are highly significant and positively related to food inflation. Similarly, the impact of monetary determinants on energy inflation is comparatively lower, with the exchange rate having a positive and significant impact, while the interest rate is insignificant. Fiscal determinants (indirect taxes and government expenditure) are highly significant with a positive relationship. Moreover, the Population growth rate has a positive and significant effect on all types of inflation.

The estimation, therefore reveals that the exchange rate has a positive and significant impact on inflation, food, and energy inflation. Otherwise, fiscal and monetary determinants' impact on food and energy inflation are quite similar, such as the interest rate being insignificant for both food and energy inflation, while the fiscal determinants are highly significant with a positive relationship. Thus, as per findings, a tight monetary policy seems suitable to control general inflation, and tight fiscal measures, therefore seem more appropriate to control food and energy inflation. Moreover, ECTs confer that for inflation the convergence of equilibrium will be within the period of three years and one year for food and energy inflation. All types of inflation have unidirectional or no correlation with their independent variables

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Developing economies are the subject of different economic challenges. Inflation and debts are the most common and hinder their economic growth as well as limit them to the poverty line. As an outcome of COVID-19 and the Russian invasion of Ukraine in February 2022, inflation has become the most challenging all over the globe. It has become a common topic of everyday conversation. Fighting inflation has become a top priority in developed as well as developing economies. Inflation has a variety of adverse effects on economies. It reduces people's purchasing power, lower economic growth, and creates macroeconomic instability. The inflationary environment also gives birth to many problems, such as a lower value of money and an increased interest rate on loans, which slows down the pace of an economy.

It's a prevalent belief that the poor suffer more from inflation than the wealthiest. "Food inflation harms the poor more than the rich," is another way to frame this. Poor people spend a higher proportion of their income on food than wealthier people (Hanif, 2012). Additionally, it holds true, particularly for low- and middle-income nations. According to the World Economic Forum, high-income countries like the US, Singapore, the UK, Canada, and Austria spend less than 10% of their income on food, compared to low- and middle-income countries like Azerbaijan, Guatemala, Pakistan, the Philippines, Algeria, Kazakhstan, and Nigeria, which spend 40 to 50% of their income on food expenses. These shares have decreased over time as actual per capita income has increased, as suggested by Engle's Law. Engel's Law states that as income rises, the proportion of income spent on food falls (and thus the income elasticity of food is between 0 and 1). The SAARC region is home to half of the world's poor (those living on less than $1 per day), hence South Asian nations, especially Pakistan, are worried about food inflation. As Pakistan's per capita income rises, less money is spent on food, with the percentage falling from 61.60 percent in 1959–1960 to 40.9% in 2018.

Pakistan has experienced a relatively higher inflation rate in the subcontinent over the last decade. Table 1 shows that the inflation rate in India fell from 11.9% in 2010 to 8.33% in 2021. Similarly, in Bangladesh, it fell from 8.13% in 2010 to 5.56% in 2021. While in Pakistan, it fell from 12.94% in 2010 to 9.5% in 2021, which is comparatively lower than the other two countries. The

inflation rate of India in 2023 is 4.81% (MOSPI, 2023), and the inflation rate of Bangladesh in 2023 is 9.27% (SBB, 2023). Pakistan's inflation rate in 2023 is 27.55% (PBS, 2023).

Table 1.1
Inflation Rates of Countries in Subcontinent

Years	India	Pakistan	Bangladesh
2010	11.99%	12.94%	8.13%
2011	8.86%	11.92%	11.40%
2012	9.31%	9.68%	6.22%
2013	11.06%	7.96%	7.53%
2014	6.65%	7.19%	6.99%
2015	4.91%	2.53%	6.19%n
2016	4.95%	3.77%	5.51%
2017	3.33%	4.09%	5.70%
2018	3.95%	5.08%	5.54%
2019	3.72%	10.58%	5.59%
2020	6.62%	9.74%	5.69%
2021	5.56%	9.5%	5.56%

Source: World Development Indicator

Diagram (1), is the graphical presentation of figures given in (Table 1.1). The graphs of India and Bangladesh's inflation rates have a smooth downward trend. While Pakistan's inflation has a sharp downward trend till 2015. While the sharp upward trend in 2018-2019

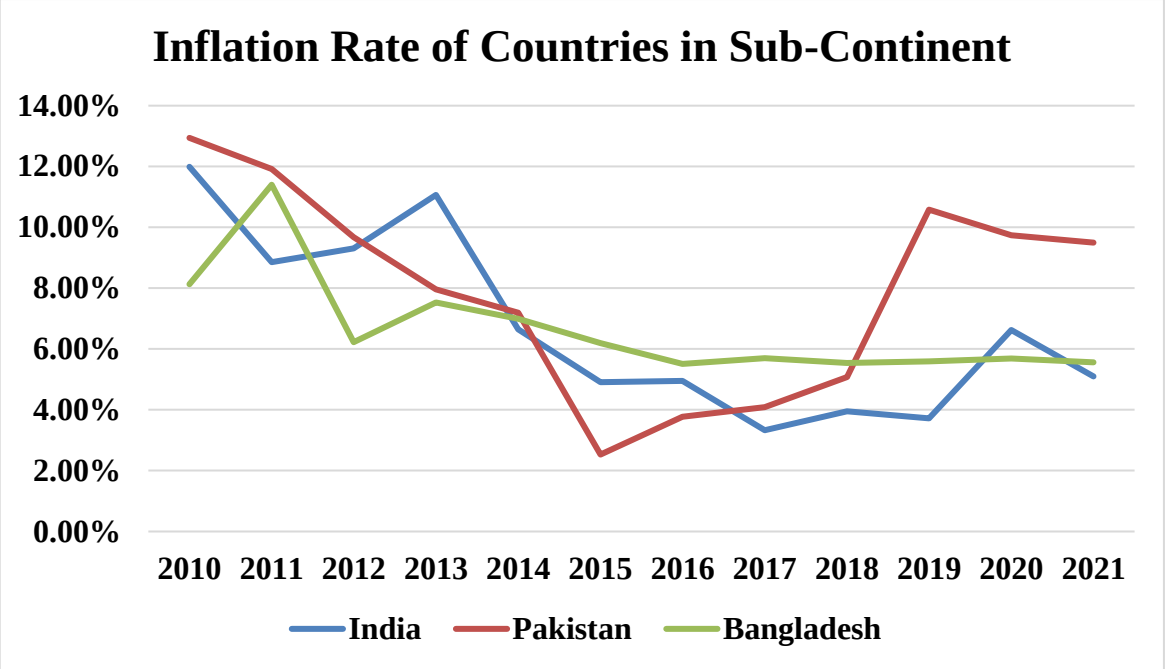

Figure 1.1: Inflation Rates of Countries in Subcontinent

Energy inflation in Pakistan refers to the significant increase in energy prices in the country over the years. Energy prices hike has been a major issue in Pakistan for the past few years. The energy sector in Pakistan has been facing numerous challenges, such as insufficient supply and outdated infrastructure, leading to increased energy costs. As a result, the cost of living has become more expensive for many citizens, and inflation has risen significantly. The energy inflation in Pakistan can be attributed to various factors, including a rise in international oil prices, an increase in domestic demand for electricity, and a shortage of supply due to outdated infrastructure and mismanagement. Pakistan's reliance on imported fuel has also contributed to the rising energy prices, as reported in an article by The Express Tribune (Zaidi, 2019). The impact of energy inflation has been felt across various sectors of the Pakistani economy. For example, the manufacturing sector has been particularly hard hit, with higher energy costs leading to decreased competitiveness and lower productivity (Bhutta, 2021). The agricultural sector has also been affected, with farmers struggling to bear the cost of irrigation and other energy-related expenses (Raza, 2021). According to an article by The Express Tribune, the government of Pakistan increased electricity prices by 47% in 2019, which was the highest increase in the country's history. This increase in electricity prices had a significant impact on the daily lives of Pakistani citizens, particularly those who belong to low-income families. Furthermore, according to a report by the International Energy Agency (IEA), Pakistan has been facing a severe energy crisis due to the lack of investment in the energy sector, insufficient infrastructure, and increasing demand for electricity. The report suggests that the demand for electricity in Pakistan has been growing at a rate of 8% annually,

which is higher than the global average of 2.8%. The energy crisis has also affected the country's economy, as highlighted in a report by the State Bank of Pakistan (SBP). The report suggests that the energy crisis has led to a decline in industrial production and exports, resulting in a negative impact on the country's GDP growth. Moreover, in recent years, the prices of petroleum products have also been increasing in Pakistan. According to an article by Dawn, the prices of petroleum products increased by 25% in 2021, which has led to a surge in inflation and the cost of transportation. According to a report by the International Monetary Fund, these economic challenges have also contributed to an increase in poverty in Pakistan (IMF, 2020).

The consumer price index (CPI) is considered the most common measure of general inflation. It measures changes in the prices consumers pay for products and services that are divided into 12 main groups (a basket of 487 items collected from 40 cities and 76 markets) with various weighted averages. As per the Pakistan Economic Survey (2020–21), the group-wise breakdown of the CPI indicates that food and non-alcoholic beverages comprise a major group with a weightage of 34.6%, and the energy sector (housing, water, electricity, gas, and other fuel) covers 23.6% of the national CPI. Jointly, these both shares more than 50 % of the CPI. The CPI measures the prices of retail goods and services, whereas the Wholesale Price Index (WPI) measures the prices of goods and services in bulk. The WPI measures goods and services divided into five groups (wholesale prices for 419 items included are being collected from 19 cities).

The last decade shows a rapid and significant rise in food and energy inflation, posing a complex challenge for global policymakers in general and South Asian policymakers in particular. Table 1.2 shows inflation (general), food inflation and energy inflation from 2010 to 2020. Inflation shows a variation from 14.1 % to 11.0 % during this period. Food and energy inflation are higher than inflation in most of the years.

Table 1.2
Inflation, Food Inflation and Energy Inflation in Pakistan

Year	Inflation	Food Inflation	Energy Inflation
2010	14.1%	18.4%	14.9%
2011	10.8%	11.03%	7.5%
2012	7.8%	7.12%	4.1%
2013	9.3%	9.34%	8.7%
2014	4.8%	3.59%	6.57%
2015	2.8%	2.1%	5.04%
2016	4.1%	3.9%	4.88%
2017	3.78%	3.8%	4.79%
2018	7.0%	3.5%	7.2%
2019	11.2%	15.9%	7.1%
2020	8.6%	13.4%	5.7%
2021	11.0%	11.8%	11.0%

Source: State Bank of Pakistan.

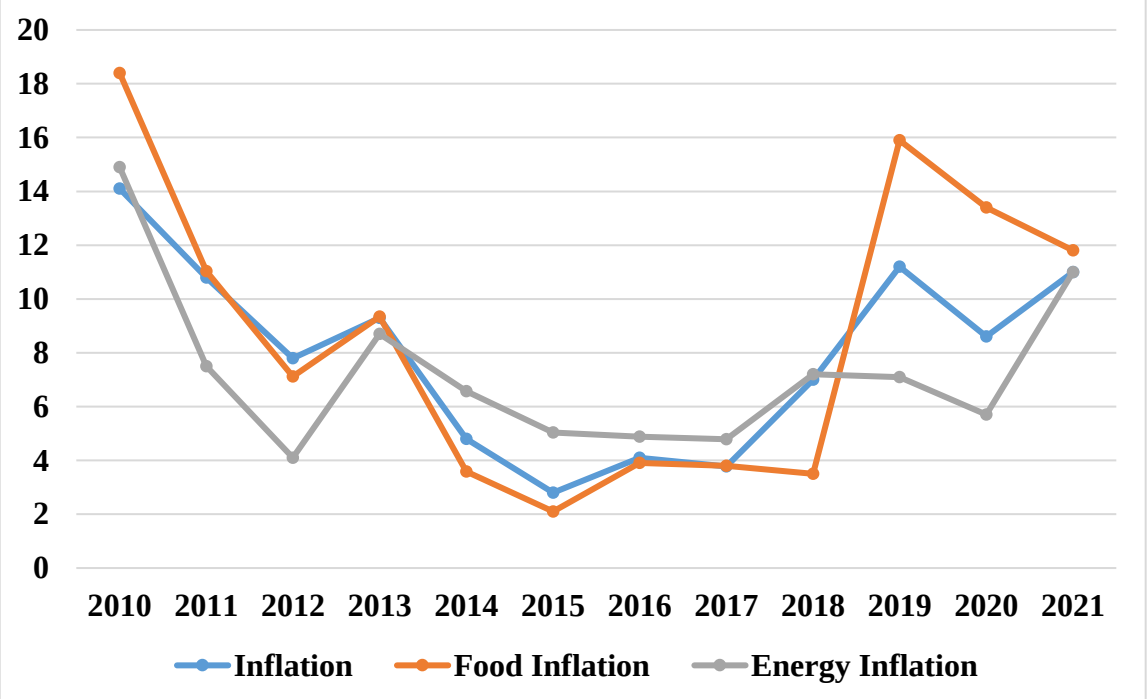

Figure 1.2: Inflation, Food Inflation and Energy Inflation in Pakistan

Imported fuel prices (palm oil, diesel, and gasoline) and foodstuff prices (raw materials such as seeds) were the major reasons for high energy and food inflation in Pakistan. Food inflation also increased by food shortages, un-favorable weather conditions, the Thar and Cholistan droughts, routine yearly floods, and etc. From 2019 to 2022, food and energy inflation increased mainly due to COVID-19, increased fuel prices, increased prices of staple foods (wheat, rice, etc.), depreciation in the exchange rate, increased electricity prices, and climate change.

The inflation in Pakistan, like other rising nations, are significantly influenced by shocks in food prices. Additionally, food price shocks in developing nations like Pakistan are more unpredictable and enduring, heavily influence non-food inflation, and thus tend to have more powerful and enduring effects on inflation (Khan and rehman, 2015). A high rate of food inflation reduces the purchasing power, which lowers the consumer's real income. The elasticity of the demand for food products is below one in developing nations. Basic food items account for 70% of people's spending. Therefore, identifying the causes of Pakistan's high food prices is essential (joiya and Shahzad, 2013).

In April 2023, food inflation was recorded at 48.07% (SBP, Apr 2023). Pakistan is a developing country, and it has to deal with the problem of exorbitant food prices. Poor households are hard hit by increasing prices, and their budget compels them to compromise on health, education, etc. The UN (2008) reported that high food inflation in Pakistan creates health and productivity problems. Serious measures are therefore needed to confront this problem.

In previous studies, the effects of fiscal and monetary policies on inflation have been discussed. But according to the best of my knowledge, the food and energy inflation has not attained due attention and addressed separately to examine the role of monetary and fiscal policy on subject inflations in Pakistan. This study will analyze the monetary and fiscal measures to control food and energy inflation.

Food inflation in Pakistan has been a persistent problem, with food prices increasing at a much higher rate than overall inflation. This has been driven by various factors such as supply chain inefficiencies, transportation costs, and weather-related events that have affected crop yields. The impact of food inflation has been particularly severe for low-income households, who spend a larger proportion of their income on food, leading to food insecurity and malnutrition.

Food inflation has recently surpassed headline inflation (Mitchell, 2008; Abdullah and Kalim, 2015; Shrestha and Chaudhary, 2012) and has become one of the main concerns of world stakeholders (Anugrah and Ismaya, 2018). Food price inflation has emerged as a major problem for international bodies, including Pakistan. The causes are simple: Consumers are impacted by food price initially (Kornher & Kalkuhl, 2013). Second, the cost of food has political implications that influence governmental initiatives and policies.

1.2 NOVELTY OF THE STUDY

There is a substantial body of literature that examines overall inflation. Whereas the determinants of food and energy inflation have not been explored much. Inflation (CPI), food and energy inflation may be analysed directly by cost push/ demand pull strategies. It can also be analysed through policy variables (monetary and fiscal). Though, these variables, ultimately influence the cost or demand for the products directly or indirectly.

Moreover, it seems more policy targeted analysis. Food inflation focussed more on the input cost (fertilizer, seeds, annual rainfall, subsidies, area under cultivation etc.) imports and exports of food, imports of energy (Crude oil, Petroleum products, Natural gas,), electricity rates prices, and the exchange rate. According to the best of my knowledge, there is hardly any study deals food and energy inflation for policy guidance fiscal and monetary determinants for in Pakistan.

1.3 PROBLEM STATEMENT

Inflation, food inflation, and energy inflation are major economic challenges facing by Pakistan. The country has also faced high inflation rates from the last few years. Food and Energy prices contribute more than 50% in general consumer price index. These increased prices of food and energy have affected each and every one but a severe impact on the purchasing power of majority lying-in low-income earner households. As exchange rate and interest rate have changed over few last years.

Apart from inflation, Pakistan has also experienced substantial variations in currency rates during the last ten years. The drastic devaluation has been recorded in Pakistani Rupee (PKR) compared with the US Dollar (from $1 =305.89). Indirect taxes, which account for a sizable amount of Pakistan's overall tax collection (62.8% of total tax), are largely reliant on the country's

ability to generate money. It directly affects consumers and producers buying when different tax rates are applied to diverse goods and services. This had a severe impact on households, particularly those living in poverty or with limited income, who are most vulnerable to the effects of rising prices.

The study has therefore, tried to analyze the effectiveness of monetary and fiscal tools to control inflation, food inflation and energy inflation.

1.4 RESEARCH QUESTION

Regarding the impact of fiscal and monetary determinants on food and energy inflation in Pakistan, following are the key questions:

1. What is the impact of the exchange rate on inflation, food inflation and energy inflation?
2. What is the impact of the govt. expenditure on inflation, food inflation and energy inflation.
3. What is the impact of interest rates on inflation, food inflation and energy inflation.
4. What is the impact of indirect taxes on inflation, food inflation and energy inflation.

1.5 OBJECTIVES

1. To investigate the impact of the exchange rate on inflation, food inflation and energy inflation.
2. To explore the impact of interest rates on inflation, food inflation and energy inflation.
3. To investigate the impact of the govt expenditure on inflation, food inflation and energy inflation.
4. To investigate the impact of indirect taxes on inflation, food inflation and energy inflation.

1.6 HYPOTHESIS

1. H_0: Exchange rate has no impact on inflation, food inflation and energy inflation.

2. H_0: Interest rate have no impact on inflation, food inflation and energy inflation.

3. H_0: Govt. expenditure has no impact on inflation, food inflation and energy inflation.

4. Ho: Indirect taxes have no impact on inflation, food inflation and energy inflation.

1.7 ORGANIZATIONAL STRUCTURE

The thesis document is organized into different sections, such as the prefatory section, which mainly includes preliminary parts, i.e., the ‘’title page, table of contents, list of tables, and list of figures, whereas the body section consists of the main chapters of the introduction. The second chapter includes a literature review, data and methodology, results and discussion, and conclusions and recommendations. The last section comprises references.

CHAPTER 2

LITERATURE REVIEW

Many experts at the national and international levels have explored the determinants of inflation. They vary in terms of the econometric technique, policy variables, time period, sample size, variables selection, geographical region, etc. But the literature is comparatively limited in case of classified components of inflation such as food and non-food inflation. The literature is hereby classified by the determinants of Inflation, food inflation and energy inflation.

2.1 INFLATION

A substantial relationship between exchange rates and inflation has been found by empirical investigations. For instance, research by Blanchard, O., & Quah, D. (1989) conducted a study that examined the dynamic effects of aggregate demand and supply shocks on inflation. They analysed the relationship between these shocks and inflation. The study found that both types of shocks can have significant and persistent effects on inflation, with demand shocks having more short-term effects and supply shocks having more long-term effects. Blanchard, O., & Quah, D. (1989) conducted a study that examined the dynamic effects of aggregate demand and supply shocks on inflation. They analysed the relationship between these shocks and inflation. The study found that both types of shocks can have significant and persistent effects on inflation, with demand shocks having more short-term effects and supply shocks having more long-term effects.

Mishkin, F. S. (1997) reviewed empirical studies on inflation, focusing on the implications for monetary policy. The study discussed the relationship between inflation and variables such as money growth, output, and expectations. The article highlighted the importance of understanding the causes and consequences of inflation in formulating effective monetary policy. To investigate the connection between inflation and capital accumulation for 34 nations, Crosby and Otto (2000) employed structural VAR estimation methodology. The findings revealed no statistically significant correlation between Gross fixed capital formation stock and inflation. The influence of fiscal policy on inflation was investigated by Surjaningsih et al. (2012).

Quarterly data from 1990 - 2009 has been applied to a vector error correction model (VECM). The findings demonstrated that long-term economic growth was positively impacted by government expenditure and taxation. A rise in taxes has a negative impact on output in the near term, but an increase in government expenditure has a favourable impact. In Pakistan, the long-run and short-run dynamics of inflation were studied by Ahmad et al. (2014). The results of the research showed that factors such as exchange rate, government and non-government borrowing, indirect taxes, money supply growth rate, and import price index had a long-term influence on inflation. Yamach and Saatci (2016) conducted research on the economic variables influencing consumer pricing in Turkey. They looked at the long- and short-term effects of the favourable correlation between consumer price inflation and interest rates.

Yasmin et al. (2021) looked at the non-Ricardian regime and how inflation is determined in an open economy using Pakistan as a case study. Time series data covering the years 1976 through 2019 were employed in the study. The ARDL findings indicate that the price level (inflation) in an open economy is mostly determined by government involvement. Using time series data for Tanzania from 1992 to 1998, Laryea & Sumaila (2001) determined the factors that determine inflation. According to the study, short-term monetary considerations have an impact on inflation, whereas long-term effects of foreign exchange were shown in inflation. Kim (2001) investigated the factors that contributed to Poland's inflation between 1990-1999. The main causes of inflation were found to be the monetary, labour, and external sectors using cointegration and error correction models.

Using monthly data from the years 1989-2004 as their source, Saatsioglu and Korap (2006) investigated the potential causes of Turkey's high inflation. The results show that while demand-pull monetary factors have little impact on inflation, exchange rates, wage indexation, and real interest rates all have a considerable impact on inflation. Menji (2009); Sarker and Islam (2013) discovered that the exchange rate had a detrimental effect on inflation in their research that was done in Ethiopia. They discover that the effects of inflation and the exchange rate are negligible. Based on time series data, Monfared (2017) examined the connection between the exchange rate and inflation. According to the findings, inflation was positively impacted by both the money supply and the exchange rate. The money supply had a bigger impact on inflation than the exchange rate.

Ellahi (2017) conducted the study to examined the determinants of inflation through specified data to find the impact of each variable on inflation. The study reflected that the stability of the exchange rate reduced inflation in

the long run because inflation was a product of supply-side factors of the economy. The effect of monetary policy on property prices in Pakistan was investigated by Umar et al. (2019). From January 2011 through December 2016, the study examined monthly time-series data on inflation, housing prices, monetary policy, and stock market indices. The investigation showed that Pakistani housing values are highly impacted by monetary policy. House prices declined as a result of tight monetary policy, and vice versa. Housing prices and monetary policy have a one-way link.

2.2 FOOD INFLATION

Anam et al. (2014) evaluated the factors that contributed to food inflation. Food inflation was significantly and positively influenced by food imports, exports, and population. The findings demonstrated that the inflation of food prices was a function of both supply and demand factors. Khan and Rahman (2015) used time series data from 1990 to 2013 to investigate the determinants influencing food inflation. The findings revealed that food inflation had a negative relationship with government subsidies and GDP, whereas indirect taxes and food exports had a positive and significant influence on food inflation.

Odhiambo and Madito (2018) analyzed data from 1970 to 2015 to investigate the factors driving food inflation in South Africa. Their findings revealed that while GDP and exchange rates had negative impacts, inflation expectations, labor costs, government spending, and import prices acted as positive factors. Mian and Afzal (2020) focused on the key drivers of food inflation in Pakistan, examining time series data from 1997 to 2017. Their study identified agricultural value addition as a negative influence on food inflation, while food imports had the strongest positive impact. Additionally, excess money supply and the wheat support price were found to significantly contribute to food inflation.

Choudary Ihtasham Ali et al. (2022) examine the impact of monetary policy on food inflation in Pakistan using a quantile regression approach. The authors use monthly time series data from September 2005 to October 2020 on food inflation, monetary policy, and several other variables. They find that monetary policy has a significant positive impact on food inflation across all quantiles of the distribution. This means that a restrictive monetary policy will lead to higher food inflation, regardless of the level of inflation. The authors also find that transportation prices have a significant positive impact on food inflation, while the exchange rate has a significant negative impact. This

suggests that policies aimed at reducing transportation costs and stabilising the exchange rate could help to reduce food inflation.

The link between food inflation and factors including inflation expectations, the money supply, food import, support prices, and food export is uncovered by Abdullah and Kalim (2015). Time series data from 1971 to 2008 were employed. They discover that food inflation has a long-term link with factors including inflation expectations, money supply, per capita GDP, support prices, food imports, and food exports. With the exception of money availability, every factor has a positive and considerable impact on food inflation. As a result, the inflation of food prices in Pakistan is not a financial phenomenon.

Bhattacharya and Gupta (2015); Samal et al. (2021) investigated the impact of macroeconomic factors on food inflation in India using the monthly time series from 2006-2019. The results showed that per capita income, money supply, global food prices, and agricultural wages have positive and significant impact on food inflation in both short and long-run. Norazman et al. (2018) investigated price transmission theories and supply-side factors that affect food prices. From 1991 to 2013, they made use of monthly data. They discover that the actual effective exchange rate and the price of global food commodities are the main factors influencing food inflation in Malaysia.

2.3 ENERGY INFLATION

A study by Mork (1989) examines the impact of oil price shocks on the US economy during the 1970s. The study finds that oil price increases had a significant impact on both inflation and economic activity during this period. The study also suggests that the response of monetary policy to the oil price shocks was an important determinant of the impact on the economy. According to a study by Bernanke and Gertler (1995), energy price shocks have been identified as one of the most important sources of inflation in the US economy. The study suggests that energy price increases affect the overall price level through their impact on production costs and consumer spending.

A paper by Hamilton (2003) explores the relationship between oil prices and inflation. The study finds that oil price increases have a significant impact on inflation in the short run, but the effects diminish over time as the economy adjusts to the new price level. The study also highlights the importance of monetary policy in controlling the impact of energy price shocks on inflation. Another study by Kilian (2009) examines the transmission of oil price shocks to inflation in a global context. The study finds that oil price increases have a

significant impact on inflation in both developed and developing countries. The study also suggests that the magnitude of the impact depends on the degree of openness of the economy.

Study by Smith et al. (2010) analyzed the impact of energy prices on overall inflation in a sample of advanced economies. The findings suggested that energy prices had a significant positive effect on inflation, indicating that changes in energy prices can contribute to inflationary pressures. Study by Zhang et al. (2011) examined the relationship between energy prices and inflation in China. The results indicated a positive and significant impact of energy prices on inflation, suggesting that energy inflation plays a crucial role in overall inflation dynamics. Study by Ozturk et al. (2012) investigated the determinants of energy inflation in Turkey. The findings revealed that energy prices, exchange rates, and government policies had significant effects on energy inflation, emphasizing the importance of these factors in shaping energy price dynamics.

Study by Rahman et al. (2013) analyzed the impact of energy prices on overall inflation in Bangladesh. The results demonstrated a significant positive relationship between energy prices and inflation, highlighting the role of energy inflation in driving overall price levels. Study by Li et al. (2014) examined the link between energy prices and inflation in the United States. The findings revealed a significant positive relationship between energy prices and inflation, indicating that energy inflation contributes to overall price dynamics in the economy. Study by Aloui and Ben Aïssa (2015) investigated the determinants of energy inflation in selected MENA countries. The results indicated that energy prices, exchange rates, and government policies significantly influenced energy inflation, underscoring the need for policy interventions to manage energy price dynamics.

Khan and Qayyum (2015) examined the impact of energy prices, exchange rates, and international oil prices on energy inflation in Pakistan. The results indicated that energy prices and international oil prices had a significant positive impact on energy inflation. Exchange rate fluctuations also showed a positive but insignificant effect on energy inflation. Study by Wang et al. (2016) explored the relationship between energy prices and inflation in India. The findings revealed a significant positive impact of energy prices on inflation, suggesting that energy inflation has important implications for overall price stability.

Ahmed et al. (2016) analyzed the relationship between energy prices and inflation in Pakistan using the autoregressive distributed lag (ARDL) approach.

The findings revealed a significant positive impact of energy prices on overall inflation, suggesting that changes in energy prices have an important influence on inflationary pressures in the country. Anwar and Aftab (2017) investigated the impact of energy prices, exchange rates, and fiscal policy on energy inflation in Pakistan. The results showed that energy prices had a significant positive effect on energy inflation. Exchange rate fluctuations were also found to contribute to energy inflation. Additionally, expansionary fiscal policy, represented by increased government expenditure, was found to exacerbate energy inflation.

Chen et al. (2017) examined the impact of oil price shocks on inflation in a sample of developed and developing countries. The findings suggested that oil price increases contribute to inflationary pressures, particularly in countries highly dependent on energy imports. A paper by Li and Gong (2017) analyzes the impact of energy price fluctuations on inflation in China. The study finds that energy price increases have a significant impact on the overall price level in China, but the impact is weaker than in developed economies. The study also highlights the importance of energy price reform in mitigating the impact of energy price shocks on inflation.

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Study by Khoshkam et al. (2018) analyzed the impact of energy prices on inflation in Iran. The findings revealed a positive and significant relationship between energy prices and inflation, implying that energy inflation plays a crucial role in shaping overall price levels in the country. Ali et al. (2018) examined the determinants of energy inflation in Pakistan, focusing on the role of energy prices, exchange rates, and monetary policy. The findings indicated that energy prices had a significant positive impact on energy inflation. Exchange rate depreciation also contributed to energy inflation. However, monetary policy, represented by interest rates, showed an insignificant effect on energy inflation.

Study by Aslam et al. (2019) investigated the impact of energy prices, exchange rates, and international oil prices on energy inflation in Pakistan using the autoregressive distributed lag (ARDL) approach. The results revealed a significant positive impact of energy prices and international oil prices on energy inflation. Exchange rate fluctuations were found to have a mixed and insignificant effect on energy inflation. Mirza and Berg (2018) analysed the determinants of energy price inflation in several Middle Eastern and North African (MENA) countries. The study highlighted the significant role of energy subsidies, exchange rate movements, and international oil prices in driving energy inflation in the region. They discover that the effects of inflation and the exchange rate are negligible.

Study by Shafiee et al. (2019) investigated the determinants of energy inflation in the Gulf Cooperation Council (GCC) countries. The results indicated that energy prices, exchange rates, and government policies significantly influenced energy inflation, underscoring the importance of managing these factors to control energy price dynamics. Beine et al. (2019) investigated the impact of energy price shocks on inflation across a panel of advanced and emerging economies. The results showed that energy price increases tend to have a more significant effect on inflation in emerging economies compared to advanced economies. Salisu et al. (2019) examined the dynamic relationship between energy price shocks and inflation in Nigeria. The study revealed a bi-directional causality between energy price shocks and inflation, suggesting a feedback effect between the two variables.

Kandil et al. (2020) explored the relationship between energy price volatility and inflation in a sample of Asian countries. The findings indicated that energy price volatility has a positive and significant impact on inflation, highlighting the importance of energy price stability for controlling inflationary pressures. Study by Chen et al. (2020) examined the link between energy prices and inflation in selected Asian economies. The findings demonstrated a significant positive relationship between energy prices and inflation, highlighting the role of energy inflation in driving overall price dynamics in the region.

Balcilar et al. (2021) investigated the long-run relationship between oil prices and inflation in a panel of G7 countries. The study revealed a significant positive relationship between oil prices and inflation, suggesting that oil price fluctuations can have inflationary implications. Study by Wong et al. (2021) analyzed the determinants of energy inflation in Malaysia. The results revealed that energy prices, exchange rates, and government policies significantly influenced energy inflation, emphasizing the need for effective policy measures

to manage energy price dynamics. Study by Petrović et al. (2022) investigated the relationship between energy prices and inflation in European Union countries. The findings indicated a positive and significant impact of energy prices on inflation, highlighting the role of energy inflation in overall price dynamics within the EU.

Since oil is a necessary component of production, any increase in its price leads to higher producer prices, which in turn raises inflation. High oil costs also reduce one's purchasing power. Households could want greater pay as a result. Because businesses would pass these costs forward to customers, it may raise cost-push inflation (Blanchard and Gali, 2007).

Different determinants of food inflation like food import, food export, agricultural subsidies, fertiliser prices, per capita GDP, and rainfall have been explored, but no study has been conducted to analyse the impact of fiscal as well as monetary policy on food and energy inflation in Pakistan. The purpose of this study is mainly an attempt to analyse the competing and complementary theories of inflation. It will help to identify the significance of fiscal and monetary instruments to control food and energy inflation and the effectiveness of fiscal and monetary policy in Pakistan.

CHAPTER 3

THEORETICAL FRAME WORK

The effectiveness of monetary and fiscal measures in reducing inflation is equally responsible depends how the empirical evidences have shown them from time to time. Currently, both monetary and fiscal policies play an important role in achieving macroeconomic stability; however, the relative importance of these policies is still debatable between the two major schools of thought, Monetarists and Keynesians. The increasing trend of prices or inflation can be controlled by market forces aggregate demand and aggregate supply. These market forces can be regulated through monetary and fiscal measures. The monetarists believe that monetary policy exerts a greater impact on economic activities, whereas the Keynesians believe that fiscal policy rather than the monetary policy exerts a greater impact on economic activities. Monetary policy works under the central bank of an economy that regulates the money supply by controlling reserve ratios, interest rates and exchange rates. It is concerned with the measures used to regulate credit availability in order to achieve higher economic growth and price stability. The overall inflation, which includes food and non-food prices, is the result of higher monetary expansion brought on by extensive banking sector borrowing to cover the fiscal deficit (Michael, 2013; Batool, 2020).

Fiscal policy is the use of public sector spending and revenue to influence the economy. Governments typically use fiscal policy to promote sustainable economic growth, reduce inflation, and bring prosperity through alleviating poverty. The role and objectives of fiscal policy have gained prominence in the current crisis as governments have stepped in to support financial systems, jump-start growth, and mitigate the impact of the crisis on vulnerable groups (Laurence and Scott, 2020). When inflation is high, the government usually use contractionary fiscal policy to reduce aggregate demand and bring inflation down. Contractionary fiscal policy involves reducing government spending or increasing taxes. This takes money out of the economy and reduces aggregate demand. When aggregate demand decreases, businesses are less likely to produce goods and services, and consumers are less likely to spend money. This can lead to lower prices and reduced inflation.

Historically, the prominence of fiscal policy as a policy tool has waxed and waned. Before 1930, an approach of limited government, or laissez-faire, prevailed. With the stock market crash and the Great Depression, policymakers pushed for governments to play a more proactive role. More recently, countries

scaled back the size and function of government, with markets taking on an enhanced role in the allocation of goods and services. Now, with the financial crisis in full swing, a more active fiscal policy is back in favors (Auerbach and Feldstein (2020).

3.1 DATA COLLECTION AND METHODOLOGY

This study has examined the role of monetary and fiscal determinants on inflation, food inflation, and energy inflation in the context of Pakistan using time series analysis. The time period considered is from 1972 to 2021. It began in 1972 as a result of the structural break in Pakistan's economy caused by the separation of East Pakistan. The data is collected on an annual basis from different Pakistan Economic Surveys, the World Development Indicator (WDI), and the State Bank of Pakistan (SBP).

3.1.1 Model and Data Collection

There are three models to analyze inflation and components of inflation (CPI) food and energy separately. In the first model, inflation is a dependent variable and monetary variables (interest rate and exchange rate) and fiscal variables (indirect taxes, public expenditure) are independent variables. Whereas population growth and Gross fixed capital formation are the control variables. The functional forms of the models are given below:

$$Inf_t = \alpha_0 + \alpha_1 ER_t + \alpha_2 I_t + \alpha_3 G.EXP_t + \alpha_4 IT_t + \alpha_5 PC_t + \alpha_6 PG_t + \varepsilon_{t1} \quad (3.1)$$

$$FdI_t = \beta_0 + \beta_1 ER + \beta_2 I_t + \beta_3 G.EXP_t + \beta_4 IT_t + \beta_5 PC_t + \beta_6 PG_t + \varepsilon_{t2} \quad (3.2)$$

$$EnI_t = \gamma_0 + \gamma_1 ER_t + \gamma_2 I_t + \gamma_3 G.EXP_t + \gamma_4 IT_t + \gamma_5 PC_t + \gamma_6 PG_t + \varepsilon_{t3} \quad (3.3)$$

The data related to variables exchange rate, interest rate, indirect taxes, and government expenditure is from the State Bank of Pakistan; Inflation rate, food inflation, and energy inflation are from the Pakistan Economic Surveys from 1972 to 2022; and the data on population growth and Gross fixed capital formation is collected from WDI.

3.1.2 Description of Variables

- **Exchange Rate (ER):** The exchange rate is assumed to be the real exchange rate. Based on monthly averages of local currency units relative to the US dollar, it is calculated as an annual average. The official exchange rate is the rate set by national authorities in the officially recognized currency market. It is determined as an annual average based on monthly averages of local currency units in relation to the US dollar.

- **Interest Rate (I):** The interest rate is taken as the nominal interest rate based on yearly data. The amount that the lender charges the borrower over and beyond the principal amount is referred to as the interest rate.

- **Indirect Taxes (IT):** Indirect tax is used as a percentage of total tax collection in Pakistan. Indirect taxes, as defined by the State Bank of Pakistan, are levied on the consumption of goods and services as instead of on income or profits. Indirect taxes include customs duties, federal excise duties, sale taxes, surcharge taxes, and stamps on judicial taxes collected throughout the year.

- **Govt. Expenditure (G. EXP.):** Government expenditure is the total amount of money that a government spends in a given year, used as a percentage of the country's GDP. A government's overall expenditures on goods and services for the population in general as well as on infrastructure and other programmes.

- **Population Growth (PG):** The population growth rate is taken as a percentage of the annual growth in population in a year of those having legal residency and citizenship. Annual population growth rate. The population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.

- **Gross Fixed Capital Formation (GFCF):** Gross fixed capital formation is taken as a percentage of the annual growth of gross fixed capital formation in a year. Purchasing plant, machinery, and equipment; creating roads, trains, and similar structures; and building schools, offices, hospitals, private residences, commercial, and industrial structures are all examples of fixed assets.

3.2 METHODOLOGY

The goal of this study is to determine the role of monetary and fiscal variables on inflation (CPI), food and energy inflation over the long and short terms. Therefore, to investigate these effects, a time series analysis is performed.

3.2.1 Unit Root Tests

Standard time series econometric approaches assume that the variables in the econometric model are should be stationary variables. Otherwise, the usual statistical inferences are false and misleading. A non-stationary series should not be subjected to a classical regression analysis because this is wrong and should be avoided. The unit root approach assumes that the mean and variance of the variables are constant across time, even when nonstationary variables do not adhere to this presumption.

Most time series studies use ADF and PP tests as typical unit root tests to assess changes in variance and mean over a certain period of time. Unit root tests use an autoregressive model to determine whether a variable is stationary or non-stationary. A test to determine whether the mean, variance, and covariance of a time series are time-independent.

a) Augmented Dicky-Fuller Test

To determine whether a unit root exists in an autoregressive model, utilise the ADF approach. The ADF technique is the easiest way to find a unit root, but most long-term economic and financial data have a more complex and dynamic structure than a straightforward autoregressive model can capture. This is where the ADF test comes in.

The ADF method of unit root is regarded as a more trustworthy and suitable test, which evaluates a hypothesis by producing a t-statistic and a p-value that validates the probability value at the significant level. The Dickey-Fuller method is improved with the ADF method, which is especially helpful for samples with a wide temporal range.

ADF test is based on different regression equations and take the following forms:

Without trend and intercept

$$\Delta y = \beta y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta y_{t-i} + \varepsilon_{1t} \quad (3.1)$$

With Intercept

$$\Delta y_t = \alpha_o + \beta y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta y_{t-i} + \varepsilon_{2t} \quad (3.2)$$

With Trend and Intercept

$$\Delta y_t = \alpha_o + \alpha_1 t + \beta y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta y_{t-i} + \varepsilon_{3t} \quad (3.3)$$

where as

$$\Delta y_t = y_t - y_{t-1}$$

p = No of lags in the dependent variables.

$\varepsilon_{1t}, \varepsilon_{2t}$ and ε_{3t} are error terms

The ADF test for testing stationarity is a one-sided test and can use the hypothesis.

H_0: $\beta = 0$ ($y\ t$ is non-stationary)

H_1: $\beta < 0$ ($y\ t$ is stationary)

The null hypothesis will be rejected if the test statistics fall below the crucial value. The time series is implied to be stationary by this. If we are unable to reject the null hypothesis, the time series is not stationary at the level, and we must look for a first- or higher-order difference to prove stationarity.

b) The Philips-Perron Unit Root Test

The Philips-Perron approach is non-parametric, meaning that, unlike the ADF method, it does not call for choosing the level of serial correlation. The PP technique uses the same estimation process as the ADF method, with the addition of a correction for heteroscedasticity and autocorrelation.

The main disadvantage of the PP test is that it is based on asymptotic theory. Finally, this is a luxury whenever used to financial time series data because it only works well in large samples. Additionally, it has the same flaws as ADF approaches, including low sample power and sensitivity to structural fractures, which commonly results in unit root findings.

3.3 AUTOREGRESSIVE DISTRIBUTED LAG (ARDL)

The Johansen cointegration test cannot be employed directly since it demands that all variables be 1, even if the variables of interest have a mixed order of integration or are all stationary (1). Both non-stationary and mixed-order integration time series can be modelled using an autoregressive distributed lag (ARDL) model. This model employs an appropriate number of delays in a general-to-specific modelling framework to describe the data production process.

Economic study indicates that the factors under investigation have a long-term relationship. This indicates that the properties of long-term relationships are unaltered. In other words, over a lengthy period of time, variances and means remain stable. The majority of empirical research, however, have shown that the constancy of the means and variances is not satisfied when estimating time series factors. The majority of cointegration techniques are applied wrongly, estimated as a means of resolving the problem.

3.4 ERROR CORRECTION MODEL (ECM)

ECM is a time-series regression method that assumes two or more time series have an equilibrium linkage that governs both short- and long-run behaviour. James Davidson and David F. Davidson were the first to popularise the ECM in economics. ECMs are a theoretically driven approach that can be used to estimate both the short-term and long-term effects of one time series on another. The term "error-correction" refers to the fact that last period's deviation from a long-run equilibrium, the *error*, influences its short-run dynamics. Thus, ECMs directly estimate the speed at which a dependent variable returns to equilibrium after a change in other variables.

3.5 GRANGER CAUSALITY TEST

Economic analysis indicates that the factors under investigation have a long-term link. This indicates that the long-term Granger causality, commonly referred to as "G-causality," was initially proposed and used in economics in the 1960s. This technique has also been used recently in neurology.

A statistical technique for determining the relationship between variables is causality. In the pairwise causality approach, a variable is referred to as unidirectional if it exclusively influences the second variable and does not directly influence the first. When both variables in a paired causality test cause one another, this is known as "bidirectional causality." There is no causation when one of two variables in a pair does not cause the other variable. If variables are not stationary at the same levels, the common Granger (1969) causality test for inference yields erroneous regression findings.

After confirming that all variables are stationary and establishing the long-term link among the variables included in the study model, the Granger's pair-wise causality test is used to ascertain the direction of causality among these variables. The Granger causality test for the case of two variables Y_t and X_t involves the estimation of the following Vector Autoregressive (VAR) model:

$$y_t = a_1 + \sum_{i=1}^{n} \beta_i X_{t-1} + \sum_{j=1}^{n} \gamma_j Y_{t-j} + \varepsilon_{1t} \tag{3.4}$$

$$X_t = a_1 + \sum_{i=1}^{n} \theta_i X_{t-1} + \sum_{i=1}^{n} \delta_j Y_{t-j} + \varepsilon_{2t} \tag{3.5}$$

There will be four possible outcomes of the Granger Causality Test. The first expected outcome may be that both variables and Granger cause each other. which we call bidirectional causality. The next possibility is that one variable, Granger, causes another but not the other way around, as Granger causes but does not cause Granger to cause. Granger, for example, causes *X* but not *Y*. This will be called unidirectional causality. The final possibility is that neither variable (neither nor) Granger causes the other.

CHAPTER 4

EMPIRICAL FINDINGS AND DISCUSSION

This chapter presents the study's empirical findings. Before analyzing the long- and short-run dynamics, the unit root test is employed to check data stationarity and determine the integration order. The investigation then continues with tests for causation and co-integration.

4.1 INFLATION (MODEL 1)

4.1.1 Unit Root Tests

The results of the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) tests are applied to check stationarity, and the results are listed in Table 4.1.1 The test statistic is used to check the stationarity of the data (Unit Root). The results depict that inflation and interest rates are stationary at level I (0). Whereas, exchange rate, expenditure, indirect taxes, gross fixed capital formation, and population growth are stationary at the 1st difference. Details are given below: in Table 4.1

Table 4.1.1
Unit Root Test

Variables	ADF Test at Level		ADF Test at 1st Difference	
	T-Statistics	Probability	T-Statistics	Probability
Inflation	-3.672539	0.0077	-7.596387	0.0000
Exchange Rate	3.246048	1	-4.862101	0.0002
Interest Rate	-5.019791	.0002	-6.673803	0.000
Indirect Taxes	-2.47315	.1282	-7.9173	0.000
G. Expenditure	-1.744366	.4031	-6.032789	0.000
Gross Fixed Capital Formation	-2.707767	.0801	-6.213636	0.000
Population Growth	-0.738590	.8267	-5.624302	0.000

Philips Perron Test:				
Variables	**PP Test at Level**		**PP Test at 1st Difference**	
	T-Statistics	**Probability**	**T-Statistics**	**Probability**
Inflation	-3.644039	0.0083	-7.589026	0.0000
Exchange Rate	6.565846	1	-3.455839	0.0138
Interest Rate	-3.489200	0.0125	-6.673803	0.0000
Indirect Taxes	-2.473150	0.1282	-8.168564	0.0000
G. Expenditure	-1.901447	0.3290	-6.028966	0.0000
Gross Fixed Capital Formation	-2.780790	0.0686	-6.191658	0.0000
Population Growth	-1.015513	0.7407	-3.731622	0.0065

It was found that both the ADF and PP tests showed similar results, indicating that the time series data under consideration do not have a unit root problem and are stationary. This is an important finding to proceed further with the use of appropriate time series techniques to make a reliable estimation.

Diagnostic Tests: The histogram normality test is used to determine the normality of the data. Moreover, the variance inflation factor (VIF) and the Breusch-Pagan tests are applied to check the multicollinearity and heteroskedasticity of the model. The CUSUM (Commutative Sum) test is used to examine the stability of the data.

4.1.2 F-Bound Test:

The F-bound test estimates long-run association through the ARDL-bound test approach. Table 1 shows the output of the ARDL bound test statistics, and the empirical results confirm that there is a long-run association between inflation and independent variables. The statistical values of bound testing for the inflation model are analysed based on F-statistics. Comparing the F-statistics values of inflation (3.99) and the values of the lower critical bound I (0) and upper bound I (1). It is determined that other independent variables are co-integrated with inflation in the long run, and the results found are statistically significant at the 2.55% level of significance.

Table 4.1.2
F-Bound Test

Null Hypothesis: No Level Relationship		
Test Statistics	**Value**	
F- Statistics	3.99	
Critical Value Bounds		
Significance	**1(0) Bound**	**1(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

4.1.3 ARDL Long Run Coefficient:

The result shows that the exchange rate has a positive and significant impact on inflation in Pakistan. An increase in the exchange rate directly impacts the price of commodities. Findings show that a 1% increase in the exchange rate led to a 0.15% increase in inflation. Exchange rates can have a significant impact on inflation. When a country's currency depreciates relative to other currencies, it becomes more expensive to import goods from other countries and more competitive to export in international markets. This can lead to an increase in the import prices of goods, which in turn can lead to inflation. The results are in line with previous studies, but there is little variation in the relevant coefficients. For instance, Hossain and Akhtar (1986) and Naqvi et al. (1994) also established a positive relationship between inflation and the exchange rate, but it showed an impact of only 0.05%. Similarly, Maliszewski (2003), Khan and Gill (2010) with 0.32%. However, Mohanty and Chakraborty (2015) also established positive and with an exact coefficient of 0.15%. Findings go with literature and shows that in the long run, the exchange rate plays a positive role in causing inflation in Pakistan. While the interest rate shows a negative and highly significant impact on inflation, and vice versa. It implies that a 1% increase in the interest rate will cause a decrease in inflation of 1.15%. Literature supports the findings that interest has a negative influence on inflation, but it has a little impact of 0.8% on inflation in Turkey (Yucel and Gunalp, 2006) and 0.4% in Bangladesh (Jahan and Mahmud, 2016) and Hanif and Malik (2014), with a 0.4% impact in Pakistan. Findings support the tight monetary policy. Mankiw (2013) discusses in his text the relationship between interest rates and inflation, stating that if the central bank increases interest rates, people will be less willing

to borrow and spend, which can lead to a decrease in the velocity of money and ultimately a decrease in the general price level. It is one of the primary tools that central banks use to combat inflation. In contrast, when interest rates are low, borrowing becomes cheaper, and individuals and businesses are more likely to take out loans to finance investments or purchases. This can lead to an increase in demand for goods and services, which can lead to higher prices and inflation. A study by Choong and Liew (2010) does not support the literature and shows a positive relationship between interest rates and inflation with a coefficient of 0.25% in Malaysia.

Table 4.1.3
ARDL Long Run Coefficient

Dependent Variable = Inflation				
Variables	**Coefficient**	**Standard Error**	**T-Statistics**	**Probability**
Exchange Rate	0.158985	0.062052	2.562121	0.0217
Interest Rate	-1.151115	0.309469	-3.719645	0.0021
Indirect Taxes	-2.6906	3.82	-0.704804	0.4917
G. Expenditure	-1.048842	0.462543	-2.267554	0.0386
Gross Fixed Capital Formation	1.967302	0.908885	2.164523	0.0470
Population Growth	7.665232	2.74378	3.097841	0.0073
C	17.04163	14.63246	1.164645	.2624

Whereas the fiscal determinants of inflation are concerned, indirect tax has a negative but insignificant impact on inflation. As per existing literature on the impact of indirect taxes on inflation. However, government expenditure has a significant and negative impact on inflation. As per estimation, a 1% increase in public expenditure decreases inflation by 1.04%. A study by the IMF also explored that 1% increase in public expenditure causes a proportionate decrease in inflation. An increase in public expenditure on infrastructure such as transportation, will reduce transport costs. It will help to lower the prices. Whereas, on the contrary, a study by Attari and Javeed (2013) showed a positive impact of public expenditure on inflation.

Gross fixed capital formation and population growth have a positive and significant impact on inflation. Both cover the demand side of inflation and support the existing literature. An increase in gross fixed capital formation will cause an expansion in an economy and will increase inflation. The findings reveal that a 1% increase in gross fixed capital formation raises inflation by 1.9%. Different studies showed similar findings that an increase in the gross fixed capital formation increases inflation with a coefficient 0.02 by Al-Mulali et al. (2015), with a coefficient of 0.02 by Toma and Marinescu (2016), with a coefficient of 0.04%; Haider and Butt (2018). Population growth also has a positive and significant impact on inflation. The result shows that a 1% increase in population growth will cause an increase of 7.66% increase in inflation. Population growth can have an impact on inflation by affecting the demand for goods and services in the economy. An increase in population can lead to an increase in demand for goods and services, which can lead to inflation if the supply of goods and services does not go with the increase in demand. It goes with the existing literature that an increase in population will lead to a rise in inflation.

4.1.4 Error Correction Model

The error correction model is used to investigate the short-term relationship and the rate of adjustment, also known as the error correction term. The overall short-run result is present in the table 4.4, the sign of the coefficient, the error correction term, is negative, which shows the speed of adjustment towards equilibrium due to short-run shocks in the preceding period. The value of the coefficient is -0.337038, which denotes an equilibrium speed of 33 percent per annum. The ECT coefficient is -0.33, which indicates that the dependent variable adjusts towards long-run equilibrium at a rate of 33% per period. This means that the dependent variable will take approximately 3 years to reach equilibrium. The results also show that inflation in Pakistan is a long-run as well as a short-run phenomenon. In the short run, only expenditure, exchange rate, and population growth rate are significant and directly increase inflation, while other variables are significant in the short run. R-Square values show that 88.5% of the variation in inflation was captured by explanatory variables in the model. Durban Watson's value of 2.43% confirmed that there was no autocorrelation in the model.

Table 4.1.4
Error Correction Model

Variable	Coefficient	Std. error	t-Statistics	Prob.
D (ER)	0.058800	0.067985	0.864898	0.4007
D (ER (-1))	0.241438	0.105752	2.283048	0.1736
D (ER (-2))	0.145704	0.115446	1.262102	0.2262
D (ER(-3))	0.506309	0.138317	3.660508	0.002 3
D (G.EXP)	-1.475203	0.342868	-4.302535	0.0006
D (G.EXP(-1))	1.825967	0.325415	5.611201	0.0000
D (G.EXP(-2))	-0.032703	0.326781	-0.100075	0.9216
D (G.EXP(-3))	1.173060	0.317963	3.689297	0.0022
D (Indirect Taxes)	-1.4206	2.3306	-0.607899	0.5523
D (Indirect Taxes (-1))	-6.0906	2.4306	-2.507637	0.0241
D (Indirect Taxes (-2))	-6.3706	2.6906	-2.369580	0.0316
D (Indirect Taxes (-3))	-5.6506	2.2606	-2.498831	0.0246
D (I)	-0.225004	0.193589	-1.162275	0.2633
D (I(-1))	0.116650	0.189875	0.614352	0.5482
D (I(-2))	0.634787	0.170679	3.719193	0.0021
D (GFCF)	0.038752	0.364097	0.106433	0.9166
D (GFCF(-1))	-1.197624	0.394333	-3.037086	0.0083
D (GFCF(-2))	-0.310586	0.300260	-1.034390	0.3173
D (GFCF(-3))	-0.558845	0.306864	-1.821147	0.0886
D (PG)	0.985602	1.376271	0.716140	0.4849
D (PG(-1))	-0.039217	1.652699	-0.023729	0.9814
D (PG(-2))	9.153699	1.675049	5.464736	0.0001
ECM	-0.337038	0.044771	-7.527977	0.0000
R-Squared	0.8850	Adjusted R-Square	0.7700	
Durban Watson stat 2.44				

4.1.5 Pairwise Granger Causality Test

Pairwise Granger causality test is applied to examine the Granger causality relationship among the variables in the model and the results are presented in Table 4.1.5. The null hypothesis of the test is that "no causal relationship exists between the two variables" given as a pair. The probability value presented in the table confirms the presence or absence of causal linkage between variables. When the prob. value is equal to or less than 5 percent, the null hypothesis of "no causal relationship between variables" is rejected, and the alternative hypothesis of "presence of causal linkage between variables" is accepted. The results showed a mix of casual relationships (unidirectional causality, bidirectional causality, or no causality) among variables. Results showed unidirectional causality between inflation and Government expenditure and inflation and interest rates with a 1% level of significance.

The causal relationship between population growth and inflation is found bidirectional at a 10% level of significance.

Table 4.1.5
Pairwise Granger Causality Test

Sample: 1980 – 2020			
Lags: 2			
Null hypothesis: No Granger Causality Running Form	**Observation**	**F-statistics**	**Prob**
ER to INF	47	0.09821	0.9067
INF to ER		0.56876	0.5705
G. EXP to INF	47	5.96155	0.0053
INF to G. EXP		0.53336	0.5906
INDIRECT TAX to INF	47	1.20312	0.3104
INF to INDIRECT TAX		0.18274	0.8336
I to INF	47	0.47007	0.6282
INF to I		8.85198	0.0006
PG to INF	47	2.09460	0.1358
PG to INF		0.21174	0.0810
INF to GFCF	47	0.34565	0.7098
INF to GFCF		0.64812	0.0528

4.1.6 Conclusion

It has been concluded from the findings that the monetary tools interest rate and exchange rate are playing a significant role in influencing inflation in Pakistan. The role of interest rate is inverse and greater than the exchange rate. Whereas, fiscal tools are comparatively less effective, especially indirect taxes.

It does not have a significant influence on inflation. While the impact of public expenditure is inverse and significant. Moreover, the ECT confers the convergence of equilibrium within the time period of three years. The causality test established that the pair wise causality among dependent and independent variables of this model is mostly unilateral.

4.2 FOOD INFLATION (MODEL 2)

4.2.1 Unit Root Tests

The results of the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) tests are applied to check stationarity, and the results are listed in Table 4.2.1 The results depict that food inflation and interest rates are stationary at a level of I (0), supporting the alternative hypothesis that the variables are stationary and rejecting the null hypothesis. Exchange rate, expenditure, indirect taxes, gross fixed capital formation, and population growth are stationary at the 1st difference. Entirely variables were stationary with a mix of level and first difference, which provides a basis for using the ARDL method for short- and long-run estimates.

Table 4.2.1
Unit Root Test

Variables	ADF test at Level		ADF test at 1st Difference	
	T-Statistics	Probability	T-Statistics	Probability
Food Inflation	-4.096393	.0023	-10.61201	0.0000
Exchange rate	3.246048	1	-4.862101	0.0002
Interest rate	-5.019791	.0002	-6.673803	0.000
Indirect taxes	-2.47315	.1282	-7.9173	0.000
G.Expenditure	-1.744366	.4031	-6.032789	0.000
Gross Fixed Capital Formation	-2.707767	.0801	-6.213636	0.000
Population Growth	-0.738590	.8267	-5.624302	0.000

Philips Perron Test:

Variables	PP Test at Level		PP Test at 1st Difference	
	T-Statistics	Probability	T-Statistics	Probability
Food Inflation	-4.080532	0.0024	-10.61202	0.0000
Exchange Rate	6.565846	1	-3.455839	0.0138
Interest Rate	-3.489200	0.0125	-6.673803	0.0000
Indirect Taxes	-2.473150	0.1282	-8.168564	0.0000
G.Expenditure	-1.901447	0.3290	-6.028966	0.0000
Gross Fixed Capital Formation	-2.780790	0.0686	-6.191658	0.0000
Population Growth	-1.015513	0.7407	-3.731622	0.0065

4.2.2 F-Bound Test:

The F-bound test estimates long-run association through the ARDL-bound test approach. Table 1.1 shows the output of the ARDL bound test statistics, and the empirical results confirm that there is a long-run association between inflation and independent variables. The statistical values of bound testing for the inflation model are analyzed based on F-statistics. Comparing the F-statistics values of inflation (4.391021) and the values of the lower critical bound I (0) and upper bound I (1) It is determined that other independent variables are co-integrated with inflation in the long run, and the results found are statistically significant at the 1% level of significance.

Table 4.2.2
F-Bound Test

Null Hypothesis: NO Level Relationship		
Test Statistics	**Value**	**K**
F-Statistics	4.391021	6
Critical Value Bounds		
Significance	**1(0) Bound**	**1(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

4.2.3 ARDL Long Run Coefficient

The outcome demonstrates that the fiscal measures play vital role in food inflation. Indirect taxes and Government expenditure, both the variables are highly significant with higher coefficients. The results show a positive and significant impact of indirect taxes on food inflation, indicating that a 1% increase in indirect taxes will lead to a 4.97% increase in food inflation. Indirect taxes can increase food inflation as these taxes (usually paid as sales tax on goods and services) are passed on to consumers in the form of higher prices. When indirect taxes on food items are increased, the price of food also increases accordingly. This can lead to higher food inflation. Several empirical evidences relate to results such as Anjum and Rihan (2020) on Bangladesh with a coefficient of 0.23%, Ben Aissa and El Montasser (2019) on Tunisia with a coefficient of 0.09%, Kiran and Thapa (2019) in Nepal with a coefficient of 0.12%, Keban and Kucuksenel (2019) in Turkey, Ram and Ram (2018) in India with a coefficient of 0.25, and Akhter et al. (2017) on Pakistan with a coefficient of 0.15 suggest that indirect taxes can have a significant impact on food inflation. The current finding narrates that the impact of indirect taxes on food inflation has been considerably increased by the year 2022.

Table 4.2.3
ARDL Long Run Coefficient

Dependent Variable= Food Inflation				
Variables	**Coefficient**	**Standard Error**	**T-Statistics**	**Probability**
Exchange Rate	1.2662	0.2363	5.3569	0.0001
Interest Rate	0.3143	0.4311	0.7291	0.4764
Indirect Taxes	4.9750	9.8606	5.04	0.0001
G. Expenditure	2.5131	0.5875	4.280	0.0003
Gross Fixed Capital Formation	0.8104	0.4175	1.940	0.1097
Population Growth	2.4007	4.6968	4.7220	0.0002
C	21.33935	17.85	1.19	0.0008

An increase in government expenditures can cause an expansionary effect on the economy. It will increase the demand for food as well and ultimately increase food prices. The results showed a positive and significant impact of govt. expenditure on food inflation with a coefficient of 2.51. It indicates that a 1% increase in expenditure will cause an increase in food inflation by 2.513%. The findings support the available literature. Many empirical analyses, such as Alimi and Ogundipe (2020) on Nigeria with a coefficient of 0.04, Dikko et al., Manamba and Masocha (2019) in Malawi, Dong et al. (2019) in China and Khalil et al. (2020) on Pakistan with a coefficient of 0.13%, suggest that government expenditure can have direct and significant influence on food inflation.

However, findings stated in above table 4.2.3 reveal that the monetary determinants are comparatively less effective for food inflation. The estimation shows that the impact of an exchange rate is positive and highly significant. The coefficient shows that a 1% increase in the exchange rate will cause an increase of 1.26% of food inflation. An increase in the exchange rate is an appreciation of local currency. It causes an increase in demand for imported food items and high demand will push the prices. Food inflation is the subject of economies, where a heavy consumption of imported food products is recorded. As per latest data for fiscal year 2023 issued by the State Bank of Pakistan, country's major imports are wheat, palm oil, tea and pulses. It is nearly 70% of the total imports.

When the exchange rate increases, the demand for imported food increases. This can lead to an increase in food inflation. Findings support the existing literature suchas, studies conducted by Díaz-Cassou et al. (2010) in developing countries with a 0.25% coefficient, Yu et al. (2014) on China with a coefficient of 0.16%, and Ahmed et al. (2019) on Pakistan with a coefficient of 0.36%. However, the impact of interest rate on food inflation is positive but insignificant.

The estimation shows a positive but insignificant impact of Gross fixed capital formation on food inflation. While the population growth rate has a positive and highly significant impact on food inflation. The findings show that 1% increase in population will cause an increase of 2.4 % increase in food inflation. It supports the literature that an increase in population will cause an increase in demand of food and higher demand will push the prices upward. Several studies by Dorward et al. (2009), Diao et al. (2012) in Africa with a coefficient of 0.23%, Nauges and Thoyer (2011) in Senegal with a coefficient of 0.27%, Sarris and Savastano (2011) in developing countries with a coefficient of 0.2%, Arora et al. (2020) in India, and Qureshi et al. (2016) with a coefficient of 0.38% have found that the population growth has a positive and significant impact on food inflation.

4.2.4 Error Correction Model:

The error correction model is used to investigate the short-term relationship and the rate of convergence of equilibrium from short term to long run also known as the Error Correction Term. The overall short-run result is present in the table 4.2.4. The sign of the coefficient of the error correction term is negative, which shows the convergence speed of adjustment towards equilibrium due to short-run shocks in the preceding period. The value of the coefficient is -0.994596, which denotes an equilibrium speed of 0.99 almost 1 and period (which is one year) of adjustment. The results also show that food inflation in Pakistan is a short-run phenomenon, and in the short run, most variables are significant. R-Square values show that 88.5% of the variation in food inflation was captured by explanatory variables in the model. Durban Watson's value of 2.28% confirmed that there was no autocorrelation in the model.

Table 4.2.4
Error Correction Model

Variable	Coefficient	Std. error	t-Statistics	Prob.
D(F-INF)	0.806125	0.185109	4.354862	0.0006
D (F-INF(-1))	0.866792	0.147570	5.873750	0.0000
D (F-INF(-2))	0.162640	0.105808	1.537131	0.1451
D(EXP)	1.454791	0.545129	2.668708	0.0175
D(EXP(-1))	-1.806466	0.568300	-3.178721	0.0000
D(EXP(-2))	-1.154744	0.653875	-1.766002	0.0000
D(EXP(-3))	-2.533199	0.552348	-4.586239	0.0001
D (Indirect Taxes)	1.8805	4.3806	4.298424	0.0001
D (Indirect Taxes(-1))	-1.7105	4.6906	-3.656089	0.0000
D (Indirect Taxes(-2))	-1.2405	4.6406	-2.670309	0.0001
D(I)	1.926525	0.274026	7.030457	0.0000
D(I(-1))	0.235991	0.359525	0.656397	0.0000
D(I(-2))	0.666709	0.337551	1.975134	0.0000
D(I(-3))	1.677765	0.405164	4.140953	0.0000
D(GFCF)	-1.244076	0.528002	-2.356195	0.0000
D(GFCF(-1))	0.210496	0.575983	0.365455	0.0000
D(GFCF(-2))	0.607400	0.557263	1.089969	0.0008
D(GFCF(-3))	-1.154681	0.531911	-2.170816	0.0004
D(PG)	-1.2105	2.6906	-4.521870	0.0000
D(PG(-1))	1.4405	4.3706	3.303950	0.0002
D(PG(-2))	-1.3905	4.0506	-3.424966	0.0001
D(PG(-3))	3.5306	2.0206	1.762040	0.0000
ECM	-0.994596	0.261055	-7.526208	0.0000
R-Squared	0.920448	Adjusted R-square	0.847814	
Durban	2.283041			

4.2.5 Pairwise Granger Causality Test

To examine the Granger causality relationship among the variables in the model of the present study, a pairwise Granger causality test has been used, and the results are presented in table 4.2.5. The null hypothesis of the test is that "no causal relationship exists between the two variables" given as a pair. The probability value presented in the table confirms the presence or absence of causal linkage between variables. When the prob. value is equal to or less than 5 percent, the null hypothesis of "no causal relationship between variables" is rejected, and the alternative hypothesis of "presence of causal linkage between variables" is accepted. The sample included a time period from 1972 to 2022 with a 2-year lag. The results show a uni-directional and no causality

relationship between variables. Results show unidirectional causality between food inflation and G. expenditure and gross fixed capital formation with a 13% level of significance. Similarly, the relationship between food inflation and indirect taxes is also unidirectional with 1% level of significance and inflation and interest rate is with 8% level of significance.

Table 4.2.5
Pairwise Granger Causality Test

Sample: 1980 – 2020			
Lags: 2			
Null hypothesis: No Granger Causality Running Form	**Observation**	**F-statistics**	**Prob.**
ER to F-INF	47	0.96974	0.3875
F-INF to ER		0.59087	0.5584
I to F-INF	47	0.69254	0.5059
F-INF to I		2.59446	0.0866
INDIRECT TAX to F-INF	47	1.84833	0.1701
F-INF to INDIRECT TAX		4.43771	0.0178
G. EXP to F-INF	47	0.63567	0.5323
F-INF to G.EXP		0.81023	0.1315
GFCF to F-INF	47	0.64015	0.5323
F-INF to GFCF		0.13016	0.1315
PG to F-INF	47	0.12039	0.8869
F-INF to PG		0.46197	0.6332

4.2.6 CONCLUSION

It has been concluded from the estimation of determinants of the food inflation in Pakistan that fiscal determinants are highly significant and are positively related to food inflation. The findings support the tight fiscal policy to lower the indirect taxes as well as G. expenditure to control food inflation. Whereas, the monetary determinants are concerned, exchange rate has a positive and significant role on food inflation but interest does not play significant role in it. Moreover, population growth is also playing positive and significant role in food inflation. on in the case of Pakistan. ECT reveals that the convergence to long run equilibrium will be almost in a year with the value of (-0.995). The pair wise causality among dependent and independent variable is either uni-directional or no causality.

4.3 ENERGY INFLATION (MODEL 3)

4.3.1 Unit Root Test

The results of the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) tests are applied to check stationarity, and the results are listed in Table 4.3.1. The test statistic was used to compare the alternative hypothesis that the data are stationary to the null hypothesis that they are not stationary (they have no unit root). The results depict that energy inflation and interest rates are stationary at a level I(0), supporting the alternative hypothesis that the variables are stationary and rejecting the null hypothesis. Exchange rate, expenditure, indirect taxes, gross fixed capital formation, and population growth are stationary at the 1st difference. Entirely variables were stationary with a mix of level and first difference, which provides a basis for using the ARDL method for short- and long-run estimates.

Table 4.3.1
Unit Root Test

Variables	ADF test at Level		ADF test at 1st Difference	
	T-Statistics	Probability	T-Statistics	Probability
Energy Inflation	-4.549832	0.0006	-5.271694	0.0001
Exchange Rate	3.246048	1	-4.862101	0.0002
Interest Rate	-5.019791	.0002	-6.673803	0.000
Indirect Taxes	-2.47315	.1282	-7.9173	0.000
G. Expenditure	-1.744366	.4031	-6.032789	0.000
Gross Fixed Capital Formation	-2.707767	.0801	-6.213636	0.000
Population Growth	-0.738590	.8267	-5.624302	0.000

Philips Perron Test:

Variables	PP Test at Level		PP Test at 1st Difference	
	T-Statistics	Probability	T-Statistics	Probability
Food Inflation	-4.080532	0.0024	-10.61202	0.0000
Exchange Rate	6.565846	1	-3.455839	0.0138
Interest Rate	-3.489200	0.0125	-6.673803	0.0000
Indirect Taxes	-2.473150	0.1282	-8.168564	0.0000
G.Expenditure	-1.901447	0.3290	-6.028966	0.0000
Gross Fixed Capital Formation	-2.780790	0.0686	-6.191658	0.0000
Population Growth	-1.015513	0.7407	-3.731622	0.0065

4.3.2 F-Bound Test

The F-bound test estimates long-run association through the ARDL-bound test approach. Table 1 shows the output of the ARDL bound test statistics, and the empirical results confirm that there is a long-run association between inflation and independent variables. The statistical values of bound testing for the inflation model are analyzed based on F-statistics. Comparing the F-statistics values of the inflation (5.22272) and the values of the lower critical bound I (0) and upper bound I (1). It is determined that other independent variables are co-integrated with inflation in the long run, and the results found are statistically significant at the 1% level of significance.

Table 4.3.2
F-Bound Test

Null hypothesis: No Level Relationship		
Test Statistics	**Value**	**K**
F-Statistics	5.22272	6
Critical Value Bounds		
Significance	**1(0) Bound**	**1(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

4.3.3 ARDL Long Run Coefficient

The outcome demonstrates that the fiscal determinants of the model are more effective and play significant role in Pakistan's energy inflation. However, the monetary variable, exchange rate is effective and plays a direct effect on energy inflation bur the interest rate is insignificant in determining energy inflation. The variable exchange rate has a positive and significant impact on energy inflation. The variable coefficient 0.392620 shows that a 1% increase in the exchange rate will be led by 0.39% in energy inflation.

The estimation reveals that an increase in indirect taxes cause a direct effect on energy inflation with a coefficient of 2.5. It reveals that 1% increase in indirect taxes will cause an increase of 2.50% increase in energy inflation. Indirect taxes, such as value-added taxes (VAT) and excise taxes, can have a significant impact on energy inflation. When indirect taxes on energy products increase, energy inflation also increases. This is because indirect taxes are passed on to consumers in the form of higher prices. The findings are in line with existing literature. Empirical evidence Attar et al. (2019) in Lebanon, Keane and Ketenci (2019) in the European Union, and Malyarenko et al. (2019) in Russia suggest that increases in indirect taxes on energy products can lead to higher energy prices and inflation. However, to the best of my knowledge there is hardly any study on the fiscal determinants of the energy inflation. Another fiscal determinant, government expenditure also shows a positive and significant impact on energy inflation with the coefficient of 1.75. It reveals that a 1% increase in government expenditure will lead to a 1.75% increase in energy inflation. The impact of government expenditure on energy inflation though seems a complex phenomenon. The available literature states that an increase in government expenditure on infrastructure and public services can lead to an increase in demand for energy. The higher demand will push the prices of energy high. Which will in turn lead to higher energy inflation. The expansionary fiscal policy will lead to an increase in aggregate demand for goods and services as well as the energy. This will lead to higher prices of energy, especially if the supply of energy is not sufficient to meet the extended demand. Government expenditures can crowd out private investment in the energy sector. The available literature is quite mixed regarding the role of public expenditure on energy inflation. The studies from Asongu et al. (2018) in 15 African countries and Gbadebo and Iwedi (2019) in Nigeria are in line with the estimation stated in table 4.3.3. However, a study by Fan et al. (2019) in China found that increased government expenditure has an inverse impact on energy inflation. The government expenditure is specifically to subsidies energy, which will lead to lower energy Inflation.

Table 4.3.3
ARDL Long Run Coefficient

Dependent Variable= Energy inflation				
Variables	**Coefficient**	**Standard Error**	**T-Statistics**	**Probability**
Exchange Rate	0.392620	0.201632	1.95	0.0166
Interest Rate	0.395118	0.367967	1.07	0.2921
Indirect Taxes	2.5005	0.60206	4.15	0.0003
G. Expenditure	1.752299	0.660668	2.65	0.0130
Gross Fixed Capital Formation	-1.296778	0.848451	-1.53	0.1376
Population Growth	3.1607	1.2907	2.45	0.0205
C	35.90481	16.30846	2.20	0.0361

Monetary determinants of energy inflation are comparatively less effective. The exchange rate has a significant and positive influence on energy inflation, while the interest rate is statistically insignificant. According to the Economic Survey of Pakistan 2022-23, the energy mix consists of 58.8 percent thermal, 25.8 percent hydel, and 8.6 percent nuclear power. The major production of electricity is import-based ingredients, its demand is influenced by the exchange rate. A continuous increase in the exchange rate makes the imports less expensive for a country. It causes an increase in the demand for imported resources and extended demand will eventually increase the energy prices. The findings reveal that a 1 % increase in exchange rate will cause an increase of 0.39% in energy inflation. It can be justified that Pakistan's energy production is an import resource based like an oil and gas. The increase in exchange rate, lower the prices of imported items and extend the demand for imported resources for energy. Extended demand pushes the prices of energy up and makes it more expensive for domestic as well as commercial or industrial consumers. It leads to higher energy prices and increase energy inflation. The findings are in line with existing literature. Several studies, such as Zhang and Chen (2020) in China with a coefficient of 0.10%, Chen et al. (2019) in 25 countries with a coefficient of 0.26%, Gürkan and Akçelik (2017) in Turkey with a coefficient of 0.08%, Asongu and Nwachukwu (2016) in 11 African countries, and Haider et al. (2014) with a coefficient of 0.38% in Pakistan, showed exchange rate fluctuations can have a significant impact on energy

prices and energy inflation. The interest rate though shows a positive but insignificant impact on energy inflation.

The population growth rate also shows a positive and significant impact on energy inflation. The coefficient of population growth rate 3.16 reveals that a 1% increase in population growth will lead to a 3.16% increase in energy inflation. Findings are in line with existing literature. The gross fixed capital formation has a negative but insignificant impact on energy inflation. The finding does not go with existing literature as the number of studies such as Dagher and Yacoubian (2020) in developing countries, Liddle and Lung (2010) in 30 OECD countries, Wang and Lin (2017) in China, Leduc and Wilson (2017) in the U.S. found that Gross fixed capital formation has significant and positive relationship with energy inflation and an increase in it leads to an increase in energy inflation. But here the negative impact is insignificant.

4.3.4 Error Correction Model

The error correction model is used to investigate the rate of convergence from short-term volatility to long run equilibrium or the rate of adjustment. The sign of the coefficient of the Error Correction Term is negative, which assures the convergence, while value of the ECT shows speed of adjustment towards long run equilibrium due to short-run shocks in the preceding period. The coefficient of the ECM is -1.23 as stated in table 4.3.4. It represents the adjustment of the long run equilibrium within a period of one year. Specifically, the coefficient indicates that if the dependent variable deviates from its long-term equilibrium level by one unit, then it will adjust before the next period. Since we used annual data, we assume it takes less than a year to restore equilibrium. The results also show that energy inflation in Pakistan is both a long-run and a short-run phenomenon; most variables are significant. R-Square values show that 88.5% of the variation in food inflation was captured by explanatory variables in the model. Durban Watson's value of 2.24% confirmed that there was no autocorrelation in the model.

Table 4.3.4
Error Correction Model

Variable	Coefficient	Std. error	t-Statistics	Prob.
D(E-INF(-1)	0.274666	0.138361	1.985147	0.0570
D (ER)	0.193850	0.172019	1.126911	0.2693
D (ER(-1))	-0.759241	0.215471	-3.523635	0.0015
D(ER(-2))	-0.427778	0.194461	-2.199812	0.0362
D(G.EXP)	0.874561	0.790583	1.106223	0.2780
D(G.EXP(-1))	0.197608	0.789307	0.250356	0.8041
D(G.EXP(-2))	-2.825062	0.765934	-3.688390	0.0010
D(I)	1.177229	0.428751	2.745719	0.0104
D(PG)	-5.09E-06	2.35E-06	-2.155471	0.0399
D(PG(-1))	4.36E-06	2.35E-06	1.853834	0.0743
ECT	-1.233997	0.170759	-7.226529	0.0000
R-square	0.703805	Adjusted R-Square	0.619178	
Durbin-Watson stat 2.241537				

4.3.5 Pairwise Granger Causality Test

To examine the pair wise causality relationship among the variables in the model, a pairwise Granger causality test has been used, and the results are presented in table 4.3.5. The null hypothesis of the test is that "no causal relationship exists between the two variables" given as a pair. The probability value presented in the table confirms the presence or absence of causal linkage between variables. When the prob. value is equal to or less than 5 percent, the null hypothesis of "no causal relationship between variables" is rejected, and the alternative hypothesis of "presence of causal linkage between variables" is accepted. Results show a unidirectional causality between energy inflation and interest rate with nearly 5% level of significance. While rest of the dependent variables have not shown pair wise causality with energy inflation as an independent variable.

Table 4.3.5
Pairwise Granger Causality Test

Sample: 1980 – 2020			
Lags: 2			
Null hypothesis: No Granger Causality Running Form	**Observation**	**F-statistics**	**Prob.**
ER to E-INF	47	0.43059	0.6530
E-INF to ER		0.94597	0.3964
I to E-INF	47	0.23240	0.7936
E-INF to I		3.18596	0.0515
INDIRECT TAX to E-INF	47	0.27800	0.7587
E-INF to INDIRECT TAX		0.16613	0.8475
G.EXP to E-INF	47	0.41778	0.66121
E-INF to G.EXP		0.28448	0.7538
GFCF to E-INF	47	0.19395	0.8244
E-INF to GFCF		0.05795	0.9438
PG to E-INF	47	0.97179	0.3867
E-INF to PG		0.59169	0.5579

4.3.6 Conclusion

It has been concluded from the estimation that fiscal and monetary determinants impact on food and energy inflation are quite similar. The fiscal determinants are highly significant with positive relationship. The values of coefficients are also high. The tight fiscal measures seem more appropriate to control energy inflation. Indirect taxes have to discourage and govt. expenditure needs to control to lower the energy inflation. However, the monetary determinants have comparatively lower impact on energy inflation. Exchange rate has positive and significant impact on energy inflation with coefficient of 0.39. While interest rate is insignificant with the coefficient value of 0.39. Moreover, Population growth rate has positive and significant effect on energy inflation. The formation of physical capital has negative but insignificant influence on dependent variable. The Error Correction Term reveals that there is a convergence to long-term equilibrium within a period of one year. It will not take long for an equilibrium. It has also been concluded that the independent variables except than interest rate, lack pairwise causality with dependent variable energy inflation.

CHAPTER 5

POLICY RECOMMENDATIONS

All economic objectives are not possible to address at a time. Policymakers have to priorities the objectives and need to employ the policies according. As per Philips theorem, inflation and unemployment are inversely related. To increase employment level, expansionary policies cause an increase in prices/inflation. Similarly different components of particular objective, inflation or employment may also need to use variation of policies to address the priority of the component of an objective.

5.1 FOR INFLATION

In case the priority is to control overall inflation, as per findings both the monetary tools considered in the study, exchange rate and interest rate plays opposite but significant influence on inflation. The interest rate is inversely related to inflation, whereas the exchange rate has a direct and positive influence on the exchange rate. So, to curtail inflation the interest rate has to be increased and contrary to the interest rate, the currency has to be devalued to lower inflation. Higher interest rate will increase the opportunity cost of consumption and will encourage the households to save. It will push the aggregate demand down and so the inflation. However, the lower exchange rate is the devaluation of the local currency and it makes the exports less expensive and imports relatively more expensive. The demand for local products will increase in international markets. Whereas, the aggregate demand for imported products will go down and their price level as well. So, the inflation is less likely to occur. However, as per findings, indirect taxes are insignificant. While government expenditure has an inverse but significant influence on inflation. On the basis of these findings, it is recommended to lower government expenditure to control inflation.

The findings recommend a mixed monetary policy, which seems more effective to control inflation. These measures will control the inflation by lowering aggregate demand. It may restrict the economic expansion but will directly help to control inflation.

5.2 FOR FOOD INFLATION

If the target is to control specifically food inflation, the findings show that the fiscal determinants are positively related to food inflation and are highly significant. Whereas, the monetary determinants are also positively related with food inflation but only exchange rate plays a significant role in determining food

inflation. A contractionary fiscal policy, as per findings seems appropriate to control food inflation. The contractionary policy implies to lower govt. income through reducing indirect taxes. Indirect taxes are mostly transferred to the third party, consumer in the form of higher prices. It directly hits food inflation because in developing economies, a major part of income of consumer is spent on food. However, a decrease in Govt. expenditure will help to control food inflation. As in the case of Pakistan, an increase in govt expenditure is mostly not to provide infrastructure, subsidies and to facilitate small farmers as well as investors. Therefore it does not lower the cost side and neither raises the income of the masses. The increase in govt. expenditure for repaying the debts and mismanagement of public funds don't help in lowering the cost of production. However, lowering the Govt expenditure will reduce the pressure on public revenue generation. It may empirically support to control inflation but in general it may not be viable and highly recommended. While mismanagement of public funds is highly discouraged.

The exchange rate among monetary determinants has a significant and positive influence on food inflation. It has already been stated in the study that the country's major imports are wheat, palm oil, tea and pulses. It is nearly 70% of the total imports. When the exchange rate increases, the import value of imported food will decrease. It increases the demand for imported products and so its prices. But as the Pakistan is facing a short of foreign exchange, so the imports are discouraged and stresses more on exports to earn foreign exchange. However, the interest rate has a positive but insignificant influence on food inflation. It is recommended to focus more on fiscal tools to control food inflation.

5.3 FOR ENERGY INFLATION

The findings of food and energy inflation are quite similar. Fiscal determinants (Indirect taxes and government expenditure) are highly significant and are positively related to energy inflation. The exchange rate is also statistically significant and positively related to energy inflation. However, the interest rate is statistically insignificant for energy inflation. As per the findings, it is recommended to focus more on fiscal tools to control energy inflation and to strengthen the exchange rate in general to control inflation.

5.4 FUTURE RESEARCH PROSPECTS

In the light of conclusion of findings following suggestions and future research prospects are recommended:

- Fiscal determinants are more effective for food and energy inflation. As per findings of the study, a contractionary fiscal policy is recommended to control food and energy inflation. Government expenditure is needed to control as well as channel such that it facilitates the local producers/farmers to increase local production. It will increase the supply of local food production and help to control food inflation. Similarly encourages the production of local energy sources such as solar, and wind energy and to restrict the Govt. expenditure on foreign-funded energy projects or to adjust circular debt. Indirect taxes are also recommended to lower to control food and energy inflation as the burden of indirect taxes is directly transferred to the third party in the form of higher prices.

- Fiscal tools are not highly effective for inflation. G. expenditure is recommended to increase but of course with targeted objectives and to avoid mismanagement of public funds.

- In light of the conclusion of the study, it is recommended that the role of the public sector may be more meaningful for inflation, food and energy inflation through the governance quality rather than govt. expenditure. It is recommended for the future research prospects.

- Monetary tools are more effective for inflation and relatively less effective for food and energy inflation. However, as per findings, the exchange rate is equally significant for all types of inflation. As it has a positive and significant influence on all types of inflation, it is highly recommended to keep it low to control all these types of inflation. The lower exchange rate makes the imports expensive and discourages to import of food and non-food items, energy sources, etc. It encourages exports through local production and therefore contributes to lowering foreign debt. Interest rate is insignificant for food and energy inflation but shows an inverse but highly significant influence on inflation. Inflation can be controlled by increasing interest rates, though not highly recommended because it overall squeezes the economy. In the light of conclusion of the study, it is recommended to explore the outcomes of exchange rates such as the trade volume of imports and exports in determining the inflation, food and energy inflation. Terms of trade is also recommended for future research prospects for inflation and types of inflation.

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