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Impact of COVID-19 Pandemic on Inflation: Cross Countries Analysis

by

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To My Beloved Parents

CERTIFICATE OF APPROVAL

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MMS201012

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Abstract

Inflation is a very critical issue in every country. Therefore, it is desirable to investigate the possible determinants of inflation. Previous studies mostly focus on demand-pull inflation. In this study it has been tried to find other possible determinants such as demand-pull, cost-push and imported theory of inflation. For this purpose, three countries monthly panel data are taken over the period January2020 to January2022. The results reveal that covid-19 whether measured by deaths or measured by confirmed cases has negative impact on inflation. It goes against the hypothesis. The probable reason is that covid-19 affects aggregate demand as well and it should be counted as a demand-pull factor rather than only a cost-push factor. Its impact on aggregate demand seems to be more than that on aggregate supply. The empirical results also show that money supply has positive impact on inflation as suggested by demand-pull theory. Similarly oil price shows a significant positive effect on inflation as suggested by cost-push theory. Oil is used as intermediate in input almost in every industry of the country therefore an increase in oil prices raises cost of production and thus inflation. Exchange rate also shows positive relationship with inflation. It means that theory of imported inflation applies in these countries. Policy recommendation of the study is that money supply should be control and alternate energy sources should be looked for to reduce reliance on oil.

Keywords: Inflation, Consumer price index, covid-19 death, covid-19 confirms cases, money supply, oil price, and exchange rate.

Contents

List of Tables

Abbreviations

ARDL	Auto Regressive Distributed Lag
COV	Covid-19 death
CPI	Consumer price index
EMEs	Emerging market economies
EFF	Extended Fund Facility
EX	Exchange rate
FEM	Fixed effect models
FMOLS	Fully Modified Ordinary Least Square
FY	Financial Year
GDP	Gross domestic product
IMF	International Monetary Fund
KSA	Kingdom of Saudi Arabia
M1	Money supply
OILP	Oil prices
OLS	Ordinary Least Square
REM	Random effect model
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SBP	State Bank of Pakistan
WDI	World Development Indicators
WHO	World Health Organization

Chapter 1

Introduction

1.1 Background of Study

Inflation means that the general level of prices in the economy is constantly rising. Inflation is a procedure in which the price indexes rise and the value of the money depreciates. The issue of inflation is crucial as inflation raises means deteriorating standard of terming. The inflation rate also affects interest rate, gross domestic product, exports, exchange rate, government expenditure, imports and tax revenue, etc.

The main difficulties faced by the world stem from rising inflation. As a result of the higher price level, people require additional money to carry out day-to-day dealing and transactions and buyers have to carry more cash or money with them as a result of which the value of money depreciates. Inflation discourages saving and favors spending. The negative impact of the intensity of inflation is highly societal than monetary because of erosion of the real worth of money.

The inflationary environment in the country is the main cause of low deposits and also the reduction in the savings rate. Pakistan is generally used to reducing inflation and therefore has a low tolerance for higher double-digit inflation. In this context, persistently high-inflation and the administration continue to combine a series of policy measures, such as controlling the budget deficit, improving agricultural productivity, promoting investment to stimulate production, and constant

supervision of market position to ensure adequate availability of affordable consumer goods for a common man to reduce inflation to an acceptable and justifiable level.

Inflation is largely link with monetary expansion. The experience of Pakistan is no different from that of other nations. Milton Friedman was an American economist who famously said, "Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output." The increase in the overall price level can be related to the growth of the money supply. While the direct objective of inflation is related to currency growth, the evolution of the fiscal stance is useful in predicting fluctuating in the money supply. In Pakistan, it is normally discussed that fiscal inequities may play an active role in explaining price fluctuations.

Because of its harshness, inflation is always in the political argument, especially in finding those responsible for inflation. Inflation can be a demand feature and also a supply-side element. The demand-side phenomenon indicates that inflation is a monetary element, while the supply-side phenomenon indicates that inflation takes place when the cost of production rises, i.e. owed to a variation in the total supply.

However, several studies almost completely confirm that the money supply is the ultimate important driver of inflation. For example, Qayyum (2006) found that the money supply grows explanatory power by 90%, which implies that the monetary aspect is accountable for inflation in the incident of Pakistan.

Oil is the key product in the consumer basket, as well as an integral portion of the production. Therefore, the rising in the price of oil also has an inversely effect on inflation over the rising in the cost of production. Thus, the cost of production and the cost of services change according to the variation in oil prices. While rising oil prices has a rapid effect, prices do not, and vice versa.

In addition, the exchange rate shows a significant direct association with inflation. This approves the conclusions of Egwaikhide et al. (1994) for Nigeria, Kia (2006) for Iran, and Jalil et al. (2014) for Pakistan that the price level will increase due to the collapse of the national currency against one of the major foreign currencies.

Additional trade in US dollars, the higher the rate of imports; which is cause to imported inflation. From the above argument, it is admissible to say that money and exchange rate is an important indicator to explain inflation.

The year 2019 brought with it many unprecedented challenges. The COVID-19 pandemic has hit economies everywhere in the sphere, particularly due to the actions taken by government authorities on forced closure and social prolongation. Pakistan is one of the nations which are maximums exposed to COVID-19, with the economic disturbance initiated by the pandemic. It escalated a current crisis. The government was struggling to cope with the economic blow of the pandemic that halted business for months. For a developing country like Pakistan, which is under a mountain of obligation and is already part of the IMF bailout, the situation was an almost impossible task. With the advent of the coronavirus, Pakistan has seen inflation higher not only in association with the industrialized countries but in developing economies as well.

Several important inflation factors have changed significantly after the Covid-19 outbreak. Economic activity fell and oil prices drop abruptly. During the same period, financial conditions are tighter. Official and private sectors are shut down due to lockdown. People are confined to homes due to covid-19. There are no sources of income many people become jobless due to lockdown. There are many studies on inflation but the influence of covid-19 on inflation is remaining unex¬plored. The economic impression of a covid-19 pandemic is upsetting as it hits harshly both the demand side and the supply side of the economy. Public distanc¬ing, quarantine, self-isolation, and travel limitations have led to concentrated staff throughout all economic sectors.

Supply-side shocks are linked to the production process. The Covid-19 pandemic disrupted both the production and supply of the goods. As the pandemic spread, most countries implemented lockdown, delay international travel, and canceled export orders, disrupting global supply chains. Imports from Pakistan have declined in almost every sector has disrupted the production process in the country.

The lack of availability of essential inputs such as machinery, raw materials, metals, and fertilizers has had a destructive impression on the production of all areas of the

economy. The lockout and suspension of transport resulted in a lack of manpower in the workplace.

The industrial and manufacturing sectors have been hit hard by the lockout that led to the closure of factories and industrial plants in the country. In addition, the control of inter-provincial movements has led to distortions in the country's supply chain. But demand for consumer goods remains unchanged which created a shortage of necessary items. Prices of the commodities are also affected by a potential variation in stock.

The arrival of COVID-19 and social distancing strategies to control this pandemic have disrupted supply and demand around the world.

The State Bank of Pakistan (SBP) kept the interest rate in double digits to control inflation; the official rate has now been slashed by 525 basis points to 8%. The mitigation of official rates is intended to support economic activity in the wake of COVID-19.

Figures released by the Pakistan Bureau of Statistics show that rising food prices, especially those of basic goods, have been the main driver of general inflation. In July 2019, months before the epidemic, Pakistan had to pursue a programmer from the International Monetary Fund (IMF) because of its two shortcomings, viz. fiscal and current account.

With destructive margins on imports and an immense devaluation of the currency, the country managed to decline its current account deficit by more than 70% in the first seven months of the 2019-2020 fiscal years.

Fact and figures revealed by the Pakistan Bureau of Statistics demonstrated year-on-year inflation in January 2019 at 5.60%, with food inflation in urban at 2.60% and in rural at 1.80%, respectively. Conversely, by 2020 January, the percentage of inflation had improved to 14.60%, with food inflation at 19.5% and 24% in urban areas and rural areas respectively.

In March 2020, inflation fell to 10.20%, along with food inflation at 13% in the urban area and 15.50% in rural areas, respectively, but this was mainly due to interruptions and disturbances caused by the breakout.

TABLE 1.1: Selected Countries Inflation Rate - Historical Trend

YEARS	**Inflation in Pakistan** (%)	**Inflation in India** (%)	**Inflation in China** (%)
2000	4.37 %	4.01%	0.35%
2001	3.15 %	3.78%	0.72%
2002	3.29 %	4.30%	-0.73%
2003	2.91 %	3.81%	1.13%
2004	7.44 %	3.77%	3.82%
2005	9.06 %	4.25%	1.78%
2006	7.92 %	5.80%	1.65%
2007	7.60 %	6.37%	4.82%
2008	20.29 %	8.35%	5.93%
2009	13.65 %	10.88	-0.73%
2010	12.94 %	11.88%	3.18%
2011	11.92 %	8.86%	5.55%
2012	9.68 %	9.31%	2.62%
2013	7.69 %	11.06%	2.62%
2014	7.19 %	6.65%	1.92%
2015	2.53 %	4.91%	1.44%
2016	3.77 %	4.95%	2.00%
2017	4.09 %	3.33%	1.59%
2018	5.08 %	3.95%	2.07%
2019	10.58 %	3.72%	2.90%
2020	9.74 %	6.62%	2.42%
2021	10.74%	5.66%	2.42%
2022	12.2%	6.95%	2.42%

1.2 Various Inflation Theories

Inflation is the collective growth in the money supply, either increase in money income or prices. Inflation is generally considered to be an excessive raise in the general level of price.

From a theoretical point of view, three main theories discuss the major determinant of inflation, which is Demand-pull, cost-push, and imported inflation.

1.2.1 Demand-Pull Inflation

When the collective demand for goods and services exceeds the total supply, a situation of demand-driven inflation is created. Demand-pull inflation defines inflation as a case where collective demand is more that whole supply because of broadened monetary policy by growing the money supply or reducing the discount rate, also due to broadened fiscal policy by facilitating spending or reducing taxes. Demand-side inflation is driven by increased consumer demand. Suppliers often cater to this increase by increasing supply to meet demand. However, when de¬mand exceeds supply, sellers will raise their prices accordingly. This price increase is called demand-driven inflation and this is most commonly known inflation in the economy. There are two reasons for demand-pull inflation; budget deficit and a rising in money supply more than accelerate in production of goods and services in the country.

When administrations are facing budget deficits, they can stimulate "aggregate demand". It usually occurs during a downturn to boost the economy. For example, when a recession occurs, demand drops as people lose their jobs and have less currency to spend. Therefore, governments go in and create fake demand to avert economic depression. Governments try to mitigate that blow by increasing spending. That spending ends in the pockets of households, with governments expecting to spend and increase aggregate demand. Demand is more than supply so firms start producing more to meet that demand. Also, they increase the price if demand remains greater then supply.

The other reason is that there is too much cash pursuing too few things. That happens when a central bank reproductions too much currency. It organizes this to pay off its liability. Overflow of cash is the other main demand-pull driver of inflation. It can also occur if the central bank places too much credit into the banking system.

1.2.2 Cost-Push Inflation

One method to inflation analysis accepts that the prices of goods are essentially determined by their costs, but that the supply of cash responds to the demand.

Cost pressure inflation can be defined as the surge in the overall level of prices due to the rise in the cost of production. The chief causes of inflation under cost pressure may be a reduction in aggregate supply which may be due to cost of manufacture, high salaries, increased imports, increased taxes, budget shortage.

Cost-driven inflation occurs when general prices (inflation) rise due to an rise in the cost of production, including wages and raw materials.

Higher production costs can reduce aggregate supply (total volume of production) in the economy.

If the demand for products remains unchanged, then the increases in the cost of production lead to cost-push inflation.

Moreover, unexpected decreases in output, often due to natural disasters, such as floods, earthquakes, fires, and tornadoes may also classify as cost-push inflation. Covid-19 is another form of natural disaster for the economy.

Due to lockdown workers cannot reach their workplace. Consequently, all factories, companies, and other institutions have to reduce their production.

That causes unanticipated harm to production capacity and closure of production chain so as the result of which reduction in supply day by day while demand remains same or constant.

1.2.3 Theory of Imported Inflation

When the overall price level increases in a country because of the rise in prices of imported commodities, inflation is known as imported. Inflation occurs owed to an increase in the prices of imported final products and intermediaries.

The rise in values of imported fuels, resources and components increases the prices of domestic production and leads to growths in the costs of locally produced goods. Import inflation can be offset by rising foreign prices or by depreciating the exchange rate of a country.

It is not uncommon for an economy like the Pakistani economy to see the rise in global service prices pushing national inflation, which is seriously dependent on imported energy, food, industrial commodities, capital goods, and so on.

1.3 Problem Statement

Covid-19 pandemic had an abrupt influence on developed and developing countries. The disruption of Covid-19 pandemic seems to be pretty abrupt and uncertain across the globe. The nations are trying to protect their economies against the consequence of pandemic. It has also disturbed the activity of the production, distribution and life style of an individual. Coronavirus pandemic has taken more than 6.22M lives worldwide and paralyzed the economies of the countries. The covid-19 outbreak has also led to severe worldwide socioeconomic disturbance, the delay or cancellation of cultural, religious, educational, political, and sporting events. Moreover, figures have revealed sharp reducing in the production of tourism, agriculture, travel, and trade sectors because of outbreak. Due to shutdown of activity in sectors, supply of production is badly affected. Additionally, the failure of supply chains between the various interrelated parties (consumers, employees, suppliers, businesses and financial intermediaries) is influenced by a disruption in the industrial production sector and work in services. Self-isolation, social distancing, avoid gathering and travel constraints have directed to a reduced labor force through all commercial sectors. Non-availability of necessary inputs affected both production and distribution of good. This study evaluates the influence of Covid-19 pandemic on inflation in emerging economic in Asia which is Pakistan, China and India.

The Novelty of this study is to define the impact of covid-19 on inflation; its impact on physical events has clearly been negative, although its role in the evo¬lution of inflation has not yet been explored. The paper will try to observe the impression of Covid-19 pandemic on inflation as theory of Cost-push inflation. Furthermore, the current study will focused on other supply and demand side determinants of inflation as well as imported inflation.

1.4 Research Gap

The major impact of inflation in Pakistan or any other countries have been ex¬plored by several number of scholars actively [Bilquees (1988); Khan and Qasim

(1996); Hussain (2006); Khan and Schimmelpfennig (2006)]. All of these investi¬gations mainly focus on demand pull inflation. That is why they have concluded that monetary aspects are the key and dominant determinant of inflation in long term [Bilquees (1988)]: Khan and Schimmelpfennig (2006)]. But in a small time span, however, another factors such as food prices stimulus inflation [Khan and Schimmelpfennig (2006); Bilquees (1988); Khan and Qasim (1996)].

But the current paper will focus on cost push inflation, the impact of decrease in production due to covid-19. Covid-19 is a form of disasters as it has forced workers to stop working. The study tries to observe the influence of Covid-19 outbreak on inflation. The impact of the Covid-19 pandemic seem rather ambiguous across the globe. Countries are trying to mitigate the impact of pandemic on their economies. It has affected the manufacturing of the product, supply and life style of the people. Coronavirus pandemic paralyzed the global economy. The evolving nations like Pakistan expect to face significant economic set back from this circumstance.

Another feature of previous studies is that for analysis of inflation they have mostly used annual data. It may hide the impact of supply side factors which mostly occur for short period of time and settle down over a year. Monthly data were use in this research to detect the influence of supply side factors on inflation. In December 2019 the very first cases of pandemic were found in China. So the time span is very short as the result of which collect data into monthly and also consider other countries like China and India.

The study major purpose is to reveal the effect of Covid-19 pandemic on inflation in emerging economies in Asia through observing the linking among consumer's price index (CPI) and the remaining independent variables which are covid-19 cases and death, the oil prices, money supply and exchange rate. Furthermore, the current research concentration on demand and supply side elements of inflation in Pakistan, India and China.

1.5 Research Question

In the light of above discussion the following research questions can be crafted,

- What is the impact of demand-pull determinants such as money supply on inflation?
- What is the impact of supply side or cost-push variables such as oil prices and covid-19 on inflation?
- What is the impact of imported inflation determinants such as exchange rate on inflation?
- Do different proxies of covid-19 have same effect on inflation?

1.6 Objectives of the Study

The broad objectives of the current research are given below;

- To explore the impact of demand-pull determinants such as money supply on inflation.
- To explore the impact of supply side determinants such as the oil prices and covid-19 on inflation.
- To explore the impact of imported inflation determinants such as the exchange rate on inflation.
- To explore the impact of alternative proxies of covid-19 such as covid-19 reported deaths and reported cases of covid-19 on inflation.

1.7 Significance of the Study

This research determines the impact of macroeconomic variables on inflation. Inflation is nonstop increase in overall price levels. Reasonable inflation is linked with economic development, while high inflation is an indicator an overheated economy. Inflation affects everyone in society and it often imposes some costs.

According to economies, this study is important because inflation is causing social violence and disturbance in the society. Inflation cause crime rate, an individual

will involve in illegal activities because of their failure to maintain a particular level of living or standard of life as a result of inflation.

This research leads to discover the key cause of inflation in emerging economies of Asia like Pakistan, India and China and also help to avoid such financial issues and to better utilization of resources for enhancement of the economy. Inflation stimulates all aspects of the economy, from individual spend¬ing and tax policies, business investment, interest rates and employment rates to government programs. It is important to understanding inflation for financing and investing because in¬vestment earnings are reducing due to inflation.

1.8 Scheme of the Study

The study is divided into 5 chapters. Chapter one describe brief introduction of the topic of the study. It states the background to the study. Furthermore, it emphases the study by demonstrates the research question and the objectives that were used to guide the research. The importance of the study is also highlighted. After the introduction of the research the remaining part is structured as Chapter 2 covers the previous literature on the study. The theoretical as well as empirical framework of the study is also presented in this segment. Chapter 3 discusses the methodological approaches, which include econometric model and estimation techniques. Chapter 4 summarizes the results as well as discussion. Chapter 5 discusses the study's conclusion, recommendations, and limitations along with future directions.

Chapter 2

Literature Review

Over time, numerous research studies have been done to determine the reasons and consequences of inflation at the national and international levels. These studies argue a variety of element and factors responsible for generating the general increase in the price level due to covid-19. Inflationary pressures persisted during the first seven months of 2020. Headline inflation increased by 14.6% in January 2020, compared to 5.6% in the same month of the previous year, mainly due to a strong increase in inflation of the food. This trend has been attributed to a number of causes, including troubles in the supply of perishables and higher transportation costs. Another major reason is the change in weather patterns; all seasons in 2019 saw some changes from the usual schedule, leading to minor crop losses, increasing reliance on imported food.

Several other important factors of inflation have changed intensely after the Covid-19 eruption. All the Economic movement distorted and oil prices fell sharply due to covid-19. At the same time, exchange rates in many emerging market economies (EMEs) have devalued and financial conditions have tightened.

2.1 Studies Emphasize on Demand-Pull Factor

Fischer's (1993) research shows that inflationary growth is reduced by dropping investment and productivity growth level. He also points out that low inflation

and low budget deficits are not essential for high growth, even in long in run. Similarly, high inflation is not necessary for sustained economic growth.

Akcay et al (1996) use annual data from Turkey to test for a stable long-run con¬nection between the money growth, budget deficit, and inflation, and the results of the study have been positive. Using the integrated vectors obtained in the study, they con¬clude that the significant influence of the budget deficit on inflation cannot be denied under the assumption of long-run monetary neutrality. Moreover, using an unlimited VAR model on quarterly data corresponding to the post-bond funding period, the results showed a weak connection between the further variables and inflation. Kilindo (1997) sought to test the Tanzanian economic association among the money supply, fiscal operations and inflation. A structural model experiment for the period 1970-84, as demonstrated by the major coefficients of the structural model and the simulation results, illustrate that inflation have strong affiliation with money supply, the fiscal operation in Tanzania.

Lim and Papi (1997) illustrate the major cause of inflation in Turkey. This study uses time-series data from the period 1970 to 1995. The Johansen Co. integration technique is used in this study to analyze the outcomes. The inquiry reveals that wages, money, export prices and import prices have a positively effect on the national price level when an exchange rate has an inverse influence on the national price level in Turkey.

Liu and Adedeji (2000) construct an outline to analyze the main elements of inflation in Iran. For this study, time series data from period of 1989 to 1999 were selected. The research uses a Johansen error-corrected vector integration test model to observe the results. The estimation examine that the value of the money supply, money growth, the expected rate of inflation four years earlier are directly lagged by inflation, and that the value of the foreign exchange premium from the previous two years is negatively correlated with inflation.

Mallik and Chowdhury (2001) established a framework to analyze the effect of inflation on economic growth for India, Bangladesh, Sri Lanka and Pakistan and state two points of interest. Firstly, inflation and economic development are positive association with each other. Secondly, inflation is more sensitivity to changes in growth rates to the growth to changes in inflation rates.

In addition, the hypothetical model of Catao and Terrones (2005) showed that persistent fiscal deficits could create inflation by creating money. In addition, the fiscal deficit scaled by the small cash stock that represents a tax base for inflation is also linked with equilibrium inflation. They show by their model that inflation is relative to the product of the deficit-to-GDP ratio in line with the GDP-to-cash ratio. As a result, they were of the view that a change in the deficit ratio would have a strong impact on increasing the deficit on an economy operating at a higher level of inflation, as its inflationary tax base would be narrower. Normal it is worth highlighting that the deficit-inflation ratio is vigorous, because governments temporarily allocate seigniorage through debt. In addition, fiscal deficits in the present value play an important role in the monetary adjustment of government bond financing (Sargent and Wallace, 1981; Cat˜ao and Terrones, 2005).

London (2008) reveals experiential evidence on the correlation among money supply and inflation in Africa. To estimate used cross-sectional econometric anal-ysis and time series data, it implied that while the simple monetary inflation model seems to be valid while tested on cross-sectional equations spanning multiple states and averaged over multiple years, the identical result is usually not accurate for single country in time series, cross-sectional analyses, or studies. Research results reveals that factors other than the increase in rate of monetary played an vital role in responsible the short-term inflation trend in Africa and, given the smaller role to be assigned to short-term monetary factors term, the study demands for greater flexibility in the use of policy instruments towards inflation targeting in African countries and a warning against applying regional results-based rules in favor of country-specific results.

McCallum and Nelson (2010) examined the connection among monetary aggregates and inflation and whether there are significant reasons to change the policy analysis. Following Friedman's offer, if the monetary authority were to manipulate a variation in the (nominal) quantity of money differently, the long – term impact would be a vary in the price level (and other nominal variables) of the equal pro¬portion as the Stock of money has a contradictory view, without any consequent changes in the value of any real variable, that the monetary offer is in a model economy if and when the model does not show the property called

"neutrality of money" Therefore, they contradict the view generally state in the literature, by critics and supporters alike, of the use of money in monetary policy examined.

Hussein and Islam (2013) studied the determinants of inflation in Bangladesh. Applying the smallest common squares (OLS) regression to the time series data showed that the value of one year's money supply outweighs the negative reaction and the fiscal deficit on inflation by Bangladeshi.

Musa et al. (2013) explain the cooperative impact of the interaction between fiscal and monetary strategy on price and output development in Nigeria. The study results highlight the long-term progressive effect of the money supply and government revenues on prices and economic growth.

In a similar study, Havi and Enu (2014) studied the comparative importance of monetary and fiscal policy in economic development in Ghana, which major aim is determining of which two policies is highly effective in driving economic growth. The result shows a significant positive impact of both policies on the economy of the Ghana. Additionally, monetary policy has been observed to be more effective in promoting economic growth.

Kiganda (2014) verified the bonding among money supply and inflation using annual time series data over the period 1984-2012 in Kenya. The estimation reveals that "there is a significant long-term positive association between inflation and the money supply, with inflation significantly correcting errors by 68% per year."

Furthermore, the study analyses that one-way causation was shifting from the money supply to inflation and also proved that the money supply is a significant driver of inflation in Kenya.

Mahmood and Alkhteeb (2018) conduct investigation in Kingdom of Saudi Arabia (KSA) using the ARDL model to assess the short-run and long-term internal and external features that drive inflation. On the base of findings, he concluded that money supply and headline inflation have a significant direct impact on inflation in KSA, while growth has a indirect impact on GDP. He advocated tight monetary policy, reinforcement for import representatives, and reorientation.

Sultana et al. (2019) tested the "relationship between money supply and inflation in Bangladesh" data is collected monthly from May 2010 to December 2017, vector error correction, and integration methods are used. They showed that the money supply did not disturb inflation in the short run, not the other way around. They also identify a two-way causal association among the money supply and long-run inflation.

2.2 Studies Emphasize on Demand-Pull and Cost-Push Factor

Kuijs (1998) examined the determinants of inflation through variables; the exchange rate, the price level and output. In kujis study, time series data are used to estimate the result. In addition, a vector-based automated model was applied to study the interactions between the variables. The study recommends that the first price lag, the third price lag, the first lag of surplus money supply, and the first output lag are directly related to the price level, and the second molecule is directly related price, the fourth price delay and the output gap indirectly related to the price level in Nigeria.

Ghosh and Phillips (1998), utilize a huge panel dataset covering IMF member states between 1960 and 1996, result shows that very low inflation rates (below 2-3 percent) are directly correlated with inflation and growth. Though, they are adversely correlated with a high level of inflation. Likewise, Nell's (2000) experimental results recommend that inflation within the single-digit range may be advantageous, and that inflation in the two-digit range seems to dictate reduce growth.

Kibritcioglu (2002) merges the previous work of Akcay et al (1996) checking the determination of inflation in Turkey as the result of a sophisticated dynamic interaction of four groups of descriptive elements on the demand side (monetary) and on the supply side. This shows that growth in inflation is the result of the various structural and economic features. Garnet and Wong (2002) examine the political angle of this study. They examine the impact of an aggressive monetary policy on

the stability of inflation. A destructive inflationary plan consists of the willingness to respond to deviations from the inflation target. an adaptive learning framework is used in a specific condition, results show that aggressive anti-inflationary policies reduce the persistence of inflation.

Akinboade et al (2004) describe the influence of inflation in South Africa and in its model linking domestic inflation to a structural phenomenon mainly in money market, labor market and foreign exchange market conditions, that there is a direct association among labor forces rates, broad money supply and domestic inflation which contributes significantly to inflation in the long-term, due to the rise in labor costs. In his view, rising nominal interest rates, the magnitude of which is insignificant in the short-run, will not decrease inflation slightly in the long-term, and a rise in the broad money supply will add to home inflation in the long run.

Harashima (2005) discussed a fact that money growth is closely related to inflation in the long-run. He tells the essential factor of inflation as an unavoidable consequence of the heterogeneity in time preference rate among the government and household. This looks to be a departure from general perceptions that inflation has been effected by economic factors.

Jin (2005) analytically and empirically analyzed the relationship between the volatility of the real exchange rate, the effective interest rate and the money supply for the rate of inflation. The study applied a structured decomposition methodology and used annual time series data. The main findings highlighted the suggestion that structural shocks occurring in economies are largely responsible for differences in exchange rates between countries, leading to inflation.

Leheyda (2005) applied the integration and error correction (ECM) methodology to identify the core cause of inflation in the Ukrainian. The study theoretically cited various ways to promote inflation, but empirically as evidence it used three main channels that could be responsible for inflation, including oversupply of money, cost-driven inflation, and overseas inflation. The empirical results showed the money supply, purchasing power parity and interest rate as the main factors in the sample country driving inflation. However, in the short time spam, result reveals that wages, the exchange rate and the production of real causes are attributed to inflation.

Khan et al. (2007) the most important explanatory factors of current trends in inflation in Pakistan. To do this, they used time series data for the period 1972 to 2005. To estimate the results the authors used the usual method of ordinary least squares. The investigation concludes that public sector borrowing, the exchange rate, import prices, real demand, private sector borrowing, , the previous year's consumer price index, government taxes, , and support prices for wheat they contribute directly to the Pakistan Consumer Price Index.

Abdullah and Khalim (2009) examined the main causes of food price inflation in Pakistan. Time series data are collected from 1972 to 2008. To evaluate results Johansen's integration technique was used. The analysis shows that the money supply, food exports and imports, GDP per capita, and agricultural support price are the major cause of food inflation in Pakistan.

Olatunji et al. (2010) looked at recent factors influencing inflation in the economy of Nigeria. Time series data were utilize for this research. They use the Johansen technique to evaluate the results in this study. The examination shows that the previous year's food consumer price index, previous year's total imports, the previous year's exchange rate and the previous year's government expenditure had an adverse impact on inflation. On the other hand, the preceding year's exports, the preceding year's agricultural production, crude oil exports and the previous year's interest rate have a inversely influence on the inflation rate in Nigeria.

Khan and Gill (2010) concentrated on the major cause of inflation in Pakistan by means of various price indicators, e.g. CPI, WPI, SPI and GDP deflator. They took time series data from 1971 to 2005 for analysis. The common least squares model was used to estimate the values of the coefficients. The descriptive variables, namely, the exchange rate, the support price for wheat, the support price for sugarcane and cotton, the budget deficit, imports, and the supply of cash, have a positive influence on all price indicators while negatively related to the interest rate, to all explained variable in Pakistan.

Pekarski (2011) was of the opinion that the budget shortfall could be distributed into two portions; one that creates an inflationary impact and one that does not have. The literature has shown that the consumption factor of public spending

cause to an increase in the fiscal deficit in the long run and that investment spending is more sustainable in the long run (Tiwari et al., 2012).

Mishal and Abu-Dallow (2014) examined "the effect of the money supply on real output and prices using quarterly data for the period 1990 to 2010 in Jordan". They represented a lack of consistency among the joint variables in the research and also demonstrated a one-way connection from the money supply to actual output and a two-way fundamental relationship among actual output and the price level in Jordan.

Jalil et al. (2014) that fiscal imbalances should be corrected immediately by testing the price level fiscal theory for Pakistan. The study found that the fiscal deficit is an element of price levels as are variables such as interest rates, public sector debt, and private debt. Institutions can play a very significant role in analyzing the link between deficit and inflation. Examining whether inflation deficits exist in the presence of dependent central banks and fragile financial markets, Tahira and Hassan (2015) find that eleven Asian countries have inflationary deficits, even though inflationary pressures from budget deficits are extremely strong in the presence of changing financial markets and non-autonomous central banks.

The role that institutions play in analyzing the connection among deficit and inflation may be very significant. By examining whether or not inflation deficits exist in the presence of dependent central banks and fragile financial markets, Tahira and Hassan (2015) found that eleven Asian countries have inflationary deficits, whereas budget deficits are the product of inflationary pressures, particularly severe in the existence of emerging financial markets and non-autonomous central banks.

Adayleh, RM applied the modified approach of at least Common Squares (FMOLS) to evaluate the factors driving inflation in the economy of Jordanian. Data were collect over the period 2000 to 2017 and the variables used were credit, supply money, interest rate, oil price and output gap. The experimental results disclosed a significant positive influence of the variables of credit, money supply and oil prices, and the output gap. On the other hand interest gap began to show significant reverse effects. The impulse response function and variable decomposition

tests used showed that oil prices, and thus the supply side, explain long - term inflation in the Jordanian economy.

Nazima Ellahi (2017) discussed the causes of inflation in Pakistan using a dataset from 1975 to 2015. The test is conducted through the use of the auto-regression slowdown distribution methodology. Studies show that national spending has a directly association on inflation, while the money supply has an inverse impact on inflation. In addition, GDP growth has an adverse impact on inflation while inflation has positive connection with imports of goods and services. The results of the short-term influence exposed that none of the variables appear to be a significant factor of short-term inflation. In short, the research made a number of policy recommendations to keep inflation at the level which is mandatory for the country's growth.

Batool et al. (2020) that the COVID-19 outbreak has affected economies everywhere in the world, which means that the economic return of protective measures such as the lockdowns is enormous.

Asgar et al. (2020) discuss that covid-19 the poorest economic depression since the Great Depression in the 1930s. COVID-19 is a novel kind of virus that spreads very quickly from person to person and began to spread in late December 2019 from Wuhan city of China. Furthermore, within a month, the World Health Organization (WHO) has declared COVID-19 "an international public health emergency" (WHO 2020). On March 11, 2020, the WHO declared COVID-19 a global pandemic because of its global blowout and shocking global impression.

TABLE 2.1: Selected Empirical Studies on Causes of Inflation

Author's and Publication Year	Period of Data	Empirical Method's	Main Variables	Results
Akcay et al (1996)	Study used annual data for the period 1948-1994 and quarterly data for 1987:01-1995:4 in the analysis.	Using the integrated vectors.	Money growth, budget deficit, and inflation.	Using the integrated vectors obtained in the study, they conclude that the significant influence of the budget deficit on inflation cannot be denied under the assumption of long-run monetary neutrality. Moreover, using an unlimited VAR model on quarterly data corresponding to the post-bond funding period, the results showed a weak connection between the further variables and inflation.
Lim and Papi (1997)	They use time series data from period of 1970 to 1995	The Johansen Co. integration technique is used in this study to analysis the results.	wages, money, export prices and import prices and exchange rate	The inquiry reveals that wages, money, export prices and import prices have a positively effect on the national price level when an exchange rate has an inverse influence on the national price level in Turkey.
Kilindo (1997)	For the period of 1970-1984.	The Johansen Co. integration technique was used.	Fiscal operations, money supply and inflation.	The evidenced by the significant coefficients of the structural model and simulation results, shows a strong relationship between fiscal operation, money supply and inflation in Tanzania.

Author's and Publication Year	Period of Data	Empirical Method's	Main Variables	Results
Ghosh and Phillips (1998),	Using large panel dataset, covering IMF member countries over 1960 to 1996.	Panel least square model.	Inflation and growth rate.	Results found that at very low inflation rates (less than 2-3 per cent) inflation and growth are positively correlated. However, they are negatively correlated at high level of inflation.
Liu and Adedeji (2000)	For this study, time series data from period of 1989 to 1999 were selected.	The research uses a Johansen error-corrected vector integration test model to observe the results.	Money supply, money growth, expected rate of inflation four years earlier, foreign exchange.	Major objective of the study is to analyze the main elements of inflation in Iran. The estimation examine that the value of the money supply, money growth, the expected rate of inflation four years earlier are directly lagged by inflation, and that the value of the foreign exchange premium from the previous two years is negatively correlated with inflation.
Mallik and Chowdhury (2001)	The study uses annual time series data from 1975-2016 for Bangladesh, Pakistan, India and Sri Lanka and analyses the determinants of TFP for all the countries.	This study employs Johansen co-integration and Vector error correction model (VECM).	Inflation and economic development.	Result shows that inflation and economic development are positive association with each other. And the sensitivity of inflation to variations in growth rates is greater than growth to variations in inflation rates.

Author's and Publication Year	Period of Data	Empirical Method's	Main Variables	Results
Khan et al. (2007)	Time series data for the period 1972 to 2005.	To estimate the results the authors used the usual method of ordinary least squares.	public sector borrowing, the exchange rate, import prices, real demand, private sector borrowing, , the previous year's consumer price index, government taxes, , and support prices for wheat	The investigation concludes that public sector borrowing, the exchange rate, import prices, real demand, private sector borrowing, , the previous year's consumer price index, government taxes, , and support prices for wheat they contribute directly to the Pakistan Consumer Price Index
Abdullah and Khalim (2009)	Time series data are collected from 1972 to 2008.	To evaluate results Johansen's integration technique was used.	Money supply, food exports and imports, GDP per capita, and agricultural support price.	The analysis shows that the money supply, food exports and imports, GDP per capita, and agricultural support price are the major cause of food inflation in Pakistan.
Khan and Gill (2010)	time series data from 1971 to 2005 in Pakistan	The common least squares model was used to estimate the values of the coefficients.	Exchange rate, support price for wheat, the support price for sugarcane and cotton, the budget deficit, imports, and the money supply, interest rate, CPI, WPI, SPI and GDP	The descriptive variables, namely, the exchange rate, the support price for wheat, the support price for sugarcane and cotton, the budget deficit, imports, and the supply of cash, have a positive influence on all price indicators while negatively related to the interest rate, to all explained variable in Pakistan.

Author's and Publication Year	Period of Data	Empirical Method's	Main Variables	Results
Kiganda (2014)	Used annual time series data during the period of 1984–2012.	The common least squares model was used to estimate the values of the coefficients.	Tested the relationship between inflation and money supply in Kenya.	The results indicated that "there is a significant positive long-run relationship between inflation and money supply, and inflation is significantly error correcting at 68% annually." Moreover, the study found that a unidirectional causality was running from money supply to inflation and concluded that money supply is a significant determinant of inflation in Kenya.
Mishal and Abu-Dallow (2014)	quarterly data for the period 1990 to 2010 in Jordan		Money supply on real output.	They represented a lack of consistency among the joint variables in the research and also demonstrated a uni-direction connection from the money supply to actual output and a two-way fundamental relationship among actual output and the price level in Jordan.

Author's and Publication Year	Period of Data	Empirical Method's	Main Variables	Results
Havi and Enu (2014)	The study period was from 1980 to 2012.	The method of Ordinary Least Squares estimation technique was utilized in the study.	Interest rates, lending rates, inflationary rates, and exchange rates to promote and ensure economic growth, economic stability, economic sustainability and economic development in Ghana.	Havi and Enu (2014) studied the comparative importance of monetary and fiscal policy in economic development in Ghana, which major aim is determining of which two policies is highly effective in driving economic growth. The result shows a significant positive influence of both policies on the economy of the Ghana. Additionally, monetary policy has been observed to be more effective in promoting economic growth.
Nuhu et al. (2015)	Quarterly time series data spanning from 1980Q1 to 2012Q4.	The cointegration and error correction methods approach were employed.	Inflation, interest rate, exchange rate, money supply and oil-price.	The estimated result reveals that for the period covered, interest rate, exchange rate, money supply and oil-price are the major causes of inflation in Nigeria. It was also observed that although in the short-run increased in income encourages inflation; proper utilization of the growth would reduce inflation. The Money supply variable shows a significant positive impact on inflation both in short and long runs.

Author's and Publication Year	Period of Data	Empirical Method's	Main Variables	Results
Nazima Ellahi (2017)	Dataset from 1975 to 2015.	the use of the auto-regression slowdown distribution methodology	national spending, inflation, money supply, GDP growth, imports of goods and services	Studies show that national spending has a directly association on inflation, while the money supply has an inverse impact on inflation. In addition, GDP growth has an adverse impact on inflation while inflation has positive connection with imports of goods and services. The results of the short-term influence exposed that none of the variables appear to be a significant factor of short-term inflation.
Sultana et al. (2019)	Using monthly data from May 2010 to December 2017.	The Co-Integration and Vector Error Correction Techniques were used.	Money supply and inflation.	Checked the relationship between money supply and inflation in Bangladesh. They demonstrated that the money supply did not affect inflation in the short term, not vice versa. They also found a bidirectional causal relationship between money supply and inflation in the long term.

2.3 Formulation of Hypotheses

On the basis of given literature, the following hypotheses are formulated.

H_1: There is direct relationship between covid-19 deaths and inflation.

H_2: There is direct relationship between covid-19 cases and inflation.

H_3: There is direct relationship between M2 and inflation.

H_4: There is direct relationship between oil prices and inflation.

H_5: There is direct relationship between exchange rate and inflation.

Chapter 3

Research Methodology

3.1 Data Description

This portion of study presents the data collection mechanism from where the data has collected. Data was obtained from World Bank report, state bank of Pakistan and world development indicators.

In this study, monthly data were used to identify the determinant of inflation. In this model at least, one determinant of inflation suggested in each of the three theory (demand pull, cost push and import inflation) of inflation has been included.

That is money supply captures demand-pull inflation, covid-19 and oil price show the cost-push inflation and exchange rate represent imported inflation.

3.1.1 Sample Size

To identify the major cause of inflation in case of Pakistan, India and China the study use monthly data set of all the series from jan-2020 to feb-2022.

Reason of using monthly data from jan-2020 is unavailability of monthly data of covid-19 before December 2019. Because the first cases of the pandemic were recognized in China, in December 2019.

So the time span is very short as the result of which collect data into monthly and also consider countries Pakistan, China and India.

3.1.2 Sources of Data

This study based on secondary data, which is already available and ready for use. Data was obtained from World Bank report, state bank of Pakistan and world development indicators.

To address the potential influence of the recent pandemic on inflation, a systematic review of the literature and websites of international and national organizations was conducted to analysis the recent situation.

For more detailed evidence, such as macroeconomic indicators by country, use the websites of the central banks of the studied countries, along with the websites of various international organizations like the International monetary fund (IMF), World Bank (WB), coronavirus statistics world meter and Asian development bank etc., for the best possible information.

3.2 The Model

The model of the current study is framed on the basis of existing literature on the topic. The explanatory variables have been chosen on the basis of related theories of inflation stated in chapter one. The model in general form is given in equation 1 and the model to be estimated in this research is given in equation 2 and equation 3.

$$CPI = f\left(COV_1, COV_2, M_1, OILP, and EX\right) \tag{1}$$

$$CPI_{it} = b_0 + b_1 COV_{1it} + b_2 M_{2it} + b_3 OILP_{it} + b_4 EX_{it} + \mu_{it} \tag{2}$$

$$CPI_{it} = b_0 + b_1 COV_{2it} + b_2 M_{2it} + b_3 OILP_{it+} b_4 EX_{it} + \mu_{it} \tag{3}$$

Where:

CPI = Consumer price index.

COV1 = covid-19 death

COV2 = covid-19 confirmed cases

M_2 = money supply

OILP = Oil prices

EX = exchange rate

Subscript i represent selected countries

Subscript t represents time period

μ = is the random error terms of the regression

Both cross sectional and time-series data in this research is for the period of 2020 – 2022. This study is constructed on secondary source of data which are easy accessible and available, and ready for use. Sources of secondary data consist of World Bank report, World Development Indicators and pervious literature.

3.3 Construction of Variable

To identify the influence of Covid-19 breakout on the inflation, data were collect over the period 2020–2022 using monthly data. The major sources of data are including the State Bank of Pakistan statistical bulletin for several years, the World Development Indicators (WDI) and World Bank report. Consumer price index values were used as a substitution for inflation which tells us about the movement of prices of goods and services in the region. The proxies used to identify covid-19 effect on inflation of the studied country are covid-19 reported

deaths and covid-19 reported cases. The selected variables are believed to be a basic determinant of inflation, which also reflects the various features describing the economy. Consumer price index (CPI) which denotes the dependent variable of the study, while the covid-19 deaths (COV1), covid-19 confirms cases (COV2), money supply (M2), the oil prices (OILP) and exchange rate (EX) symbolize the particular descriptive variables. Where CPI is consumer price index, which is the cost a "market basket" of products and services acquired by an urban family, a market basket whose single items are measure or weighted by how much the urban family paid for them, COV is number of covid-19 deaths and cases during pandemic, M1 is money supply, EX is exchange rate and OILP the oil prices. To observing the connections among the consumer price index (CPI) and the remaining indicators which are covid-19 deaths (COV1) and cases (COV2), money supply (M2), the oil prices (OILP) and exchange rate (EX).

3.3.1 COVID-19 Death (COV1)

The 2019–2021 coronavirus pandemic, known worldwide as COVID-19, has disturbed the whole globe. In December 2019, the very first cases of the covid-19 were found in Wuhan, the city of China. Since then, it has infected more than 509M people in the globe. The coronavirus (COVID-19) outbreak had spread to the globe, with more than 6.22M million people dying after contracting the respiratory virus.

3.3.2 COVID-19 Cases (COV2)

The COVID-19 breakout which is also called the coronavirus pandemic is a current worldwide endemic of coronavirus disease 2019 (COVID-19) affected by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In December 2019, the very first cases of the unique disease covid-19 were found in Wuhan, the city of China. Efforts to combat the virus there failed as the result of which it blowout around the world. The World Health Organization (WHO) announced a Public Health Emergency of International Concern on 30 January 2020 and a pandemic

on 11 March 2020. As of till date, this breakout had affected more than 509M cases and 6.22 million deaths, making it one of the worst deadliest in history.

COVID-19 injections have been permitted and widely spread in several nations since December 2020. Other suggestion to avoid covid-19, preventive measures are include improving social elongation, cover the face, ventilation and air purification, and quarantining for those who have been effected or presenting symptoms. Government intermediations include lockdowns, workplace risk controls, business limitations and shutdown, travel restraints, testing systems, quarantine, and contact tracing of ill people.

The pandemic has provoked great social and economic hardship everywhere in the globe, which comprising the greatest worldwide downturn since the Great Depression. Supply chain shortages, including supply shortages, panic purchases and inflation are widespread supply shortages, including food shortages. Pollution has led to an unprecedented decline due to the near-global lockdowns. Educational institutions and public areas were partially or completely closed and many proceedings were canceled or adjourned. Disinformation is spread over social networks and the media, and political tensions are intensifying. The pandemic elevated matters of ethnic and geographical discrimination, health equity and the balance between individual health needs and individual rights.

An overview of the total COVID-19 confirmed cases and deaths for the particular studied countries is represented in the below table.

Table 3.1: Total COVID-19 cases and deaths in selected countries

Country	**Total Cases**	**Deaths**
Pakistan	1,525,466	30,361
India	43,028,131	521,374
China	154,738	4,638

3.3.3 Consumer Price Index (CPI)

The inflation rate identify by the consumer price index (CPI), which reflects the trend in the costs of goods and services in the region. The CPI, which is the main

inflation, largely identifies movement in the price, thus used as a sign of inflation. Consumer price index (CPI) measure inflation rate reflects the change in the prices of goods and services in the economy.

A consumer price index is a price index, the price of a weighted average market basket of consumer goods and services acquired by families. Price fluctuations over time are trace by change in the CPI.

The annual percentage variation in the consumer price index is used as an indicator of inflation. CPI can be used to index (that is, adjust for the effects of inflation) the real worth of incomes, salaries, and pensions; adjust prices; and decrease the amount of money to demonstrate changes in actual values. In most nations, CPI and census are one of the largely observed national economic statistics.

CPI is a statistical estimate by means of representative sample prices for regularly collected goods. The sub-indices and sub-indices of the numerous groups and sub-groups of products and services may be combined and calculated to produce an overall index, with weights indicating its share of the total consumer spending covered by the index. It is one of numerous price indices measure by statistical agencies in most countries. The index is calculated monthly or quarterly in certain regions, as a weighted average for sub-indices of various aspect of consumer spending, that are food, accommodation, clothing, shoes, and every sub-index is following transfer-weighted average in turn sub-index. The CPI is a statistical estimate created using sample prices for representative items whose prices are collected periodically.

3.3.4 Money Supply (M2)

The total stock of money circulating in an economy is the money supply. The cash supply represents the total amount of cash (cash, coins, and bank account balances) in circulation. Currency spread refers to currency, paper money; cash in deposit accounts, and other liquid assets. The evaluation and study of the money supply assist the economist and the politicians to formulate policies or change the current policy on the increase or decrease of the money supply. Valuation is

essential for the economy because it eventually disturbs the business cycle and therefore the economy.

There are a number of scales to measures money supply, comprising the monetary base, M1, and M2. Monetary Base: The sum of currency in circulation and reserve balances (deposits that banks and other depository institutions have in their accounts with the Federal Reserve).

M1 the amount of public currency and transaction deposits from depository institutions (whose financial institutions acquire their funds mainly through public deposits, such as commercial banks, savings and loan associations, savings banks, and credit unions). The cash supply consists of currency, demand deposits and other cash deposits, including savings deposits. M1 can be quickly converted to cash because it includes the most liquid portion of the cash supply.

M2 is the amount of the supply of cash, including cash, bank deposits, and easily convertible in to cash. M2 is a wider measure of cash supply than M1, which only consist of cash and deposit control.

Over time, measures of the cash supply have shown comparatively close links to key economic indicators, which are nominal gross domestic product (GDP) and the price level. Based in part on these connections, some economists—Milton Friedman being the most famous example—has claimed that the money supply give us important information about the economy's short-run performance and determines long-run price levels and inflation. Central banks, as well as the Federal Reserve, have sometimes used determinant of the money supply as an important indicator in directing monetary policy.

3.3.5 Oil Prices (OILP)

Oil continues to play an important role in the world economy despite constant efforts to cut its use. The use of petroleum in fuels continues to be the main factor in making it a highly sought after product around the world. Like most commodities, the fundamental driver of the price of oil is supply and demand in the market.

Oil is the one of the major item of production as well as core part of the consumer basket. Oil price have a significant effect on the consumer price index. Thus Inflation also indirectly influences by increases in oil prices through the increase in the cost of production. Thus, variation in the price of oil is reason to be change in the cost of production and the cost of services. While the rise in oil prices is having a rapid impact, while prices are not going down, vice versa. The impact of oil prices at international level through rate of production is employed to be elements of inflation. It is projected that oil price motivate domestic inflation by supply side.

3.3.6 Exchange Rate (EX)

The exchange rate is the price of one country's money relative to another's money. Each state regulates the exchange rate that will be applied to its currency. For instance, a currency can be floating, fixed, or mixed. An exchange rate of a country is "fixed" when nations use gold or another fixed standard, and each currency is worth of definite amount of the gold or some other standard. Exchange rate may be "floating" when demand and supply of currency or speculation set exchange rates of the country. If any nation imports large amount of goods or commodities then the exchange rate for that region is also rise, making imported goods additional costly for consumers from that region. As goods become more costly, demand decreases and money from that country becomes cheaper than money from other countries. So, the nation's products become cheaper for foreign consumers, demand increases, and the region's exports enhance. To control exchange rate governments can impose certain boundaries. Countries can also have a strong or a weak currency. Governments stabilize their countries' exchange rates by encouraging exports, controlling imports, or devaluing currencies.

3.4 Estimation Technique

Panel data is a collection of data obtained from numerous individuals that are collected over equal time periods and arranged chronologically. To reflect individuals

and time observation, panel data is often submitted in groups with subscript i and time as subscription t where I observed for all individuals and T for time specific. Panel data is the most common and widely used techniques for analysis in the field of finance. The reason in that, it has additional information, more flexibility, and more efficiency than pure time series and cross sectional data. It helps to reduce the problem that might occur due to merger of different groups into signal time series panel data are very useful in both situations for individual and common behavior of group. The panel data also effective for tracing and estimating the statistical effect which is pure time series and cross sectional data cannot.

The panel data has both time series and cross-sectional data dimensions. When panel data has the similar set of time observations for each cross-sectional of variable, then it is called as balanced panel. The term "unbalanced panel" refers to a panel which has a different number of temporal observations for cross sections (Gujarati, 2003).

In time series, one or more factors were investigated on one observation unit with in a specific time period. In the duration of cross-section data is the observation of various unit of observation in a signal time period. In panel data analysis, three different models are used. Each model makes different assumptions for the interception, which are given below:

1. Common effect model
2. Fixed effect model
3. Random effect model

3.4.1 Common Coefficient Model

A panel data model has a simple approach as it only links time series and cross-sectional data. First model is common coefficient model. It has constant intercept across all cross sections for the given time period. The general equation of the common effect model is:

3

$$Y_{it} = \alpha_0 + \beta(X)_{it} + \mu_{it} \tag{4}$$

Where:

Y representing the dependent variable

X representing the independent variables

3.4.2 Fixed Effect Model

The fixed effects model differs from the common effect model, but uses in the ordinary least square principal. The fixed effects model studies the consequence of variables over time, which is known as a first difference model. The model estimates the fixed effects that all variables may or may not have effects on other variables, or that there is a connection between endogenous variables and exogenous variables. Each variable has its own properties and characteristics, therefore not all independent variables need to be influenced by the dependent variable. For example, the independent variables have or do not have an effect on inflation. In the study of the fixed effect of an entity, the model does not change over time. Also in the fixed effects model, an individual entity must not be related to a property, or the fixed effects model will not be fit. The fixed effects model defines that the intercept is different for each cross section. The fixed effects model examines that varies between individuals. It explains the intercept is change for all cross sections.

General equation of fixed effect model:

$$Y_t = \alpha_i + \beta(X)_t + \mu_t \tag{5}$$

Where:

Y representing the dependent variable

X representing the independent variables

T stand for time

3.4.3 Random Effect Model

Other than fixed effects, random effects mode is also used. In a random effect model, the intercept is treated as an error factor that has no bearing on the cross sections.

This model explains the differences between the firms. It has the following advantages.

- As compared to the fixed effect model, the random effect model has fewer parameters to estimate.
- It allows for the insertion of more independent variables with the same amount of interpretations.

The hausman test has applied on sampled data. This test recommends that random-effect model is not appropriate but fixed effect model is appropriate. These test has been carried out which indicates this dataset has hetro skedasticity and autocorrelation problem but multi-co linearity does not exist. To check the reliability of study and validity of statistical outcomes, this study has used panel data regression to adjust the standard errors of coefficients against possible dependence in the residuals.

Robust standard errors are widely accepted and commonly relied on in case of any violation to get the valid statistical regression results.

The hausman test has applied on sampled data. This test recommend that random-effect a General equation of random effect model:

$$Y_t = \alpha_0 + \beta_1 (X)_t + \beta k\,(X)\, k_t + \,(V + \mu_t) \tag{6}$$

3.5 Diagnostic Tests

To check which of these three models is more suitable for this data, two diagnostic tests are carried out.

3.5.1 Likelihood Ratio Test

To choose from the common and fixed effect models, redundant variable test is essential. To select F-statistic and Chi-square of cross-section are both are significant or less than 0.05 then fixed effect model is employed. Whereas if the value of P is greater than 0.05, the common coefficient model is used.

3.5.2 Hausman Test

If the result of redundant variables test suggests FEM, then Hausman test is conducted to choose from FEM & REM. The Hausman test can assistance you to select whether the fixed effects is appropriate for research variable or random effect model. Fixed effect model is appropriate for the estimation of the data if the value of F statistics and the chi square of the cross section is significant, less than 0.05. Random effect model is used if the value of P is insignificant or greater than 0.05.

Chapter 4

Results and Discussion

4.1 Descriptive Statistics

Descriptive statistics shows a statistical summary that quantitatively characterize or summaries various aspects of the data. Measures of central tendency and measures of variability are two types of a descriptive statistics (spread). It help to identify the central tendency of the data include the mean, which provides the average of data, median, which splits the data set into two equal parts and is the center value of the data set, and mode, while measures of variability include minimum and maximum variables, standard deviation, variance, probability and kurtosis, which tells us about the data splines. All crucial information about variables by utilizing descriptive statistics is given in table.

4.1.1 Descriptive Statistics of Overall Countries

Table 4.1 demonstrates descriptive statistics for all the variables of Pakistan which is used in this study; the mean value of consumer price index (CPI) is 0.0016, with a standard deviation is 0.1032. CPI is dependent variable which is as proxy for inflation in this study. Meanwhile minimum and maximum value of CPI is -0.4960 and 0.7188. The Consumer Price Index tells us about the average change in price that consumers pay for a basket of goods and services over time. It is generally used as the proxy of inflation.

The mean value of covid-19 deaths is 8.01E-05. The result shows the minimum and maximum value of covid-19 death is 0.0000 and 0.0005 and the standard deviation is 0.0002 and the median and skewness is 2.69E-05 and 1.6451.

The finding reveals that the maximum value of covid-19 confirms cases are 0.00303 and minimum value of covid-19 confirms cases are 7.25E-10. The mean value is 0.0050 and the standard deviation is 0.0081. The median value of covid-19 confirms cases are 0.0012 and its skewness is 1.8663.

The mean value of money supply which is dependent variable is 13.3149 and the minimum and maximum values are 10.5559 and 17.0088 and the standard deviation is 2.6270. The median of money supply is 12.3124. The relationship between money supply and inflation is checked.

Oil price (OILP) which is used to measure the impact of cost-push inflation. It means value is 0.0278 with the maximum and minimum of 0.3981 and -0.5498. The median of oil price is 0.0665 and standard deviation of oil price is 0.1835. The effect of oil price is checked on CPI in this study.

The exchange rate which is another control variable, the study observes the impact of exchange rate on CPI have the average value 0.0567 and the minimum value of exchange rate is 0.0056 and maximum values of are 0.1570. The standard deviation of exchange rate is 0.0669 and median of exchange rate is 0.0135. It skewness is 0.7102.

TABLE 4.1: Descriptive Statics

	CPI	**COV1**	**COV2**	**M2**	**OILP**	**EX**
Mean	0.0016	8.01E-05	0.0050	13.3149	0.0278	0.0567
Median	0.0000	2.69E-05	0.0012	12.3124	0.0665	0.0135
Maximum	0.7188	0.0005	0.0303	17.0088	0.3981	0.1570
Minimum	-0.4960	0.0000	7.25E-10	10.5559	-0.5498	0.0056
Std. Dev.	0.1032	0.0002	0.0081	2.6270	0.1835	0.0669
Skewness	2.7690	1.6451	1.8663	0.5194	-1.2224	0.7102
Kurtosis	38.0592	4.6945	5.2043	1.5038	5.7561	1.5267
Jarque-Bera	4094.426	44.5172	61.0725	10.7824	44.1148	13.6125
Probability	0.0000	0.0000	0.0000	0.004556	0.000000	0.0011
Sum	0.1311	0.0062	0.3916	1038.564	2.169412	4.4254
Sum Sq. Dev.	0.8209	1.01E-06	0.0050	531.4244	2.5931	0.3450
Observations	78	78	78	78	78	78

4.1.2 Descriptive Statistics of Pakistan

Table 4.2 demonstrates descriptive statistics for all the variables of Pakistan which is used in this study; the mean value of consumer price index (CPI) is 0.0069, with a standard deviation of 0.0102.

CPI is dependent variable which is as proxy for inflation in this study. Meanwhile minimum and maximum value of CPI is -0.0120 and 0.0264.

The Consumer Price Index tells us about the average change in price that consumers pay for a basket of goods and services over time. It is generally used as the proxy of inflation.

The mean value of covid-19 deaths is 7.69E-05. The result shows the minimum and maximum value of covid-19 death is 0.0000 and 0.0004 and the standard deviation is 9.26E-05 and the median and skewness is 5.46E-05 and 2.9972.

The finding reveals that the maximum value of covid-19 confirms cases are 0.0066 and minimum value of covid-19 confirms cases are 4.53E-09. The mean value is 0.0029 and the standard deviation is 0.0022. The median value of covid-19 confirms cases are 0.0025 and its skewness is 0.1850.

The mean value of money supply which is dependent variable is 16.8915 and the minimum and maximum values are 16.7164 and 17.0088 and the standard deviation is 0.0886. The median of money supply is 16.8902. The relationship between money supply and inflation is checked.

Oil price (OILP) which is used to measure the impact of cost-push inflation. It means value is 0.0386 with the maximum and minimum of 0.3981 and -0.5498. The median of oil price is 0.0665 and standard deviation of oil price is 0.1703. The effect of oil price is checked on CPI in this study.

The exchange rate which is another control variable, the study observes the impact of exchange rate on CPI have the average value 0.0061 and the minimum value of exchange rate is 0.0056 and maximum values of are 0.0065. The standard deviation of exchange rate is 0.0002 and median of exchange rate is 0.0061. It skewness is -0.2999.

TABLE 4.2: Descriptive Statics for Pakistan

	CPI	**COV1**	**COV2**	**M2**	**OILP**	**EX**
Mean	0.0069	7.69E-05	0.0029	16.8915	0.0386	0.0061
Median	0.0048	5.46E-05	0.0025	16.8902	0.0665	0.0061
Maximum	0.0264	0.0004	0.0066	17.0088	0.3981	0.0065
Minimum	-0.0120	0.0000	4.53E-09	16.7164	-0.5498	0.0056
Std. Dev.	0.0102	9.26E-05	0.0022	0.0886	0.1703	0.0002
Skewness	0.3741	2.9972	0.1850	-0.3410	-1.2773	-0.2999
Kurtosis	2.2929	13.5589	1.6444	2.0698	7.1012	1.9585
Jarque-Bera	1.1480	159.7110	2.1391	1.4412	25.2925	1.5649
Probability	0.5632	0.0000	0.3431	0.4864	0.0003	0.45726
Sum	0.1805	0.0019	0.0762	439.1798	1.0058	0.1596
Sum Sq. Dev.	0.002614	2.14E-07	0.0001	0.1966	0.725673	1.94E-06
Observations	26	26	26	26	26	26

4.1.3 Descriptive Statistics of India

Table 4.3 demonstrates descriptive statistics for all the variables of India, which is used in this study; the mean value of consumer price index (CPI) is -0.0279 with a standard deviation of 0.1055. CPI is dependent variable which is as proxy for inflation in this study. Meanwhile minimum and maximum value of CPI is -0.4960 and 0.0000. The Consumer Price Index tells us about the average change in price that consumers pay for a basket of goods and services over time. It is generally used as the proxy of inflation.

The mean value of covid-19 deaths is 0.0002. The result shows the minimum and maximum value of covid-19 death is 7.25E-10 and 0.0004 and the standard deviation is 0.0002 and the median and skewness 0.0002 and 0.2690.

The finding reveals that the maximum value of covid-19 confirms cases are 0.0303 and minimum value of covid-19 confirms cases are 7.25E-10. The mean value is 0.0120 and the standard deviation is 0.0108. The median value of covid-19 confirms cases are 0.0078 and its skewness is 0.3186.

The mean value of money supply which is dependent variable is 10.7413 and the minimum and maximum values are 10.5559 and 10.8648 and the standard deviation is 0.0891. The median of money supply is 10.7544. The relationship between money supply and inflation is checked.

Oil price (OILP) which is used to measure the impact of cost-push inflation. It means value is 0.0223 with the maximum and minimum of 0.3981 and -0.5498. The median of oil price is 0.0665 and standard deviation of oil price is 0.1930. The effect of oil price is checked on CPI in this study.

The exchange rate which is another control variable, the study observes the impact of exchange rate on CPI have the average value 0.0135 and the minimum value of exchange rate is 0.0132 and maximum values of are 0.0139. The standard deviation of exchange rate is 0.0002 and median of exchange rate is 0.0135. It skewness is -0.2557.

TABLE 4.3: Descriptive Statics for India

	CPI	**COV1**	**COV2**	**M2**	**OILP**	**EX**
Mean	-0.0279	0.0002	0.0120	10.7413	0.0223	0.0135
Median	0.0000	0.0002	0.0078	10.7544	0.0665	0.0135
Maximum	0.0000	0.0004	0.0303	10.8648	0.3981	0.0139
Minimum	-0.4960	7.25E-10	7.25E-10	10.5559	-0.5498	0.0132
Std. Dev.	0.1055	0.0002	0.0108	0.0891	0.1930	0.0002
Skewness	-3.8228	0.2690	0.3186	-0.4520	-1.1811	0.2557
Kurtosis	16.6357	1.4351	1.4986	2.1335	5.2332	2.6128
Jarque-Bera	264.7571	2.9665	2.8819	1.6987	11.4480	0.4458
Probability	0.0000	0.2268	0.2367	0.4276	0.0032	0.8001
Sum	-0.7261	0.0042	0.3130	279.2755	0.5817	0.3516
Sum Sq. Dev.	0.2787	4.75E-07	0.0029	0.1987	0.9314	7.18E-07
Observations	26	26	26	26	26	26

4.1.4 Descriptive Statistics of China

Table 4.4 demonstrates descriptive statistics for all the variables of China, which is used in this study; the mean value of consumer price index (CPI) is 0.0260 with a standard deviation of 0.1415.

CPI is dependent variable which is as proxy for inflation in this study. Meanwhile minimum and maximum value of CPI is -0.0160 and 0.7188.

The Consumer Price Index tells us about the average change in price that consumers pay for a basket of goods and services over time. It is generally used as the proxy of inflation.

The mean value of covid-19 deaths is 3.09E-06. The result shows the minimum and maximum value of covid-19 death is 6.95E-10 and 3.36E-06 and the standard deviation is 7.11E-07 and the median and skewness 3.33E-06 and -3.5511.

The finding reveals that the maximum value of covid-19 confirms cases are 0.0007 and minimum value of covid-19 confirms cases are 2.26E-07. The mean value is 9.09E-05 and the standard deviation is 0.0002. The median value of covid-19 confirms cases are 6.95E-05 and its skewness is 4.6926.

The mean value of money supply which is dependent variable is 12.3118 and the minimum and maximum values are 12.2175and 12.4055 and the standard deviation is 0.0537. The median of money supply is 12.3124. The relationship between money supply and inflation is checked.

Oil price (OILP) which is used to measure the impact of cost-push inflation. It means value is 0.0223 with the maximum and minimum of 0.3981 and -0.5498. The median of oil price is 0.0665 and standard deviation of oil price is 0.1930. The effect of oil price is checked on CPI in this study.

The exchange rate which is another control variable, the study observes the impact of exchange rate on CPI have the average value 0.1505 and the minimum value of exchange rate is 0.1362 and maximum values of are 0.1570.

The standard deviation of exchange rate is 0.0065 and median of exchange rate is 0.1536. It skewness is -0.8425.

TABLE 4.4: Descriptive Statics for China

	CPI	**COV1**	**COV2**	**M2**	**OILP**	**EX**
Mean	0.0260	3.09E-06	9.09E-05	12.3118	0.0223	0.1505
Median	0.0005	3.33E-06	6.95E-05	12.3124	0.0665	0.1536
Maximum	0.7188	3.36E-06	0.0007	12.4055	0.3981	0.1570
Minimum	-0.0160	6.95E-10	2.26E-07	12.2175	-0.5498	0.1362
Std. Dev.	0.1415	7.11E-07	0.0002	0.0537	0.1930	0.0065
Skewness	4.7774	-3.5511	4.6926	-0.0082	-1.1811	-0.8425
Kurtosis	23.9020	15.2687	23.4182	1.9726	5.2332	2.3249
Jarque-Bera	572.2079	217.7122	547.0742	1.1436	11.4480	3.5697
Probability	0.0000	0.0000	0.0000	0.5644	0.0033	0.1678
Sum	0.6772	8.05E-05	0.0023	320.1090	0.5817	3.9142
Sum Sq. Dev.	0.5006	1.26E-11	4.36E-07	0.0723	0.9314	0.0011
Observations	26	26	26	26	26	26

4.2 Correlation Analysis

The degree of strength among variables is captured through correlation analysis which is given in below table. This tool additionally considers the direction of a variable's association. The correlation analysis of variables reveals both positive and negative relationships between them. The sign of correlation coefficient show the direction of the association. It has a range of -1 to +1. High correlations suggest a high likelihood of multi-co-linearity, whereas low correlations between two variables imply a low likelihood of multi-co-linearity. Table 4.2 shows the level of relationship among variables. Pearson correlation test used to explain direction and strength of relationship.

Table 4.5 illustrates the correlation between the main variables of the study. Correlation between Consumer Price Index and covid-19 death is negative. It means

both variables move in opposite direction. Both variables are negatively correlated to each other. Correlation between Consumer Price Index and covid-19 confirmed cases are neg- ative. It means both variables move in opposite direction. Both are inversely related to each other, which indicate that Consumer Price Index increase covid-19 confirmed cases decrease and vice versa. Correlation between Consumer Price Index and money supply is positive, which shows that consumer Price Index and money supply move in same direction. Both variables are positive correlated to each other. Correlation between Consumer Price Index and oil price is also negative. It means both variables move in opposite direction. Both variables are negatively correlated to each other. Correlation shown between Consumer Price Index and exchange rate is negative. Both variable are move in opposite direction.

Covid-19 death cases shows positive correlation with Covid-19 confirms cases. Covid-19 shows positive correlation with money supply, which show that both variables move in same direction. Covid-19 death shows positive correlation with oil price. Covid-19 death shows negative correlation with exchange rate.

Covid-19 confirms cases show negative relationship with money supply. But covid-19 shows positive correlation with oil price, which show that both variables move in some direction. Covid-19 also shows negative correlation with exchange rate. Money supply shows positive correlation with exchange rate, which show that both variable moves in same direction. Money supply also shows negative correlation with exchange rate. Oil price shows positive correlation with exchange rate, which implies that, both variable moves in same direction. It means that if oil price is increase then exchange rate also increases and vice versa.

Table 4.5: Correlation

	CPI	**COV1**	**COV2**	**M2**	**OILP**	**EX**
CPI	1.0000					
COV1	-0.2944	1.0000				
COV2	-0.4979	0.9163	1.0000			
M2	0.8900	0.0101	-0.1701	1.0000		
OILP	-0.0041	0.5405	0.4824	0.0515	1.0000	
EX	-0.1203	-0.4642	-0.4106	-0.5291	0.0265	1.0000

4.3 Result of Unit Root Test

Because of the huge number of observations in the panel data set, the presence of unit root might lead to skewed findings. The unit root test is predicated on the premise that data series are not restricted. In this study, research employed a variety of methods to find the data set's unit root. Im, Pesran, and Shin (2002), as well as Levin, Lin, and Chu (2002), were utilized. The findings of unit root test are summarized in Table 4.6. Results show that there is no unit root in any variable and that series are stationary at level.

Table 4.6: Unit Root Test

Panel unit root test: Summary

Series: D(CPI,2)

Date: 06/15/22 Time: 02:06

Sample: 2020M01 2022M02

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	**Statistic**	**Prob.****	**Cross sections**	**Obs**
Null: Unit root (assumes common unit root process				
Levin, Lin & Chu t*	-5.45527	0.0000	2	44
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.26044	0.0000	2	44
ADF - Fisher Chi-square	35.6612	0.0000	2	44
PP - Fisher Chi-square	213.398	0.0000	2	46

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality

4.4 Results of Diagnostic Tests

4.4.1 Results of Redundant Variables Test

The result show the F-stat and chi-square of cross-section is less than 0.05 here fixed effect model is appropriate. The P-value is significant which also reject common coefficient model. In light of these result for this study the fixed effect model is appropriate.

Table 4.7: Likelihood Ratio Test

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	11.526506	(2,70)	0.0000
Cross-section Chi-square	22.204580	2	0.0000

4.4.2 Results of Hausman Test

The hausman test is applied to select among fixed effect and random effect model. But in this study hausman test not applied because Random effects test needs number of cross sections should be greater than number of coefficient for between estimators for assess of Random Effects innovation variance. In this study number of variable is greater than number of selected countries.

4.5 Results of Estimated Models

4.5.1 Impact of COVID-19 Deaths on Inflation Equation 02

Table 4.8 explains the relationship between independent and dependent vari- ables. The independent variable covid-19 deaths has negative coefficient. Its value is -25926.72 and it is statistically highly significant as its p-value is 0.0037 which is

less than 0.01, which means that result is opposite in direction to what hypothesized. However, the most significant relationship is the one that indicates covid-19 deaths has influence on consumer price index but in opposite directions. It goes against the hypothesis but probably the reason could be that impact of covid-19 on aggregate demand may be greater than its impact on aggregate supply. In other words covid-19 had certainly decrease production and aggregated supply but also causes even a greater decrease in consumer demands and thus it can be concluded that the Hypothesis 01 is rejected.

The other variable money supply having symbol M2 have coefficient value 3.37E-06 and p-value is 0.0000 which is less the 0.01, hence it is significant. So hypothesis 03 is proved. It demonstrations that there is significant positive relationship between CPI and money supply which indicates that if Money supply of the country increases then CPI will also increase. It confirms hypothesis number 03. This shows that demand push is prominent factor in these countries. That shows the aggregate demand exceeds then total supply due to growth in money supply. Thus inflation is also increase in these countries in this model.

Reason may be that more funds are available to invest, due to higher money supply in the economy, as the result investment is increased in the economy, chance of employment will be increased, total demand will also rise, and in return the price of consumer price index is increase. It controls price level by mean of demand side. This result confirms pervious literature Qayyum (2006), state that money supply in the economy are 90 percent responsible for the inflation in region which show that the monetary element is the key indicator of inflation. Findings of the study are consistent with previous results of Lim and Papi (1997), Liu and Adedeji (2000), Laryea and Sumaila (2001), Mosayed and Mohammad (2009), Kuijs (1998), Abdullah and Kalim (2009) and Khan and Gill (2010).

Another variable oil price coefficient value is 0.0333 and its p-value is 0.0004 that is less than 0.01, which shows that oil price and CPI are positively related to each other, as suggested by cost-push theory. It shows that there is significant positive association between oil price and CPI. Results show that if oil price of the country increases then CPI will also increases and vice versa. It supports hypothesis number 04. This shows that cost-push factor is prominent in these countries. Oil

is use as intermediated in input almost in every industry of the country therefore an increase in oil prices raises cost of production and thus inflation.

The results of the study are consistent with pervious literature Daniel and Nuhu (2015); conclude that exchange rate, money supply, oil-price, and interest rate are the major variable of inflation in Nigeria. Romer, 1993; Durevall, 1998; Hanif, 2012; and Samimi et al., 2012 also Evidences that there exist a several other indicators that control inflation levels in country which are exchange rate, trade openness, food prices, oil prices, and growth rate of the economy.

The exchange rate coefficient value is 198.2469 and p-value is 0.0000 which is less at the level of 0.01. It indication that there is significant positive relationship between CPI and exchange rate which indicates that if exchange rate of the country increases then CPI will also increase and vice versa. Exchange rate shows positive relation with inflation, which support the imported inflation theory. It also explains that hypothesis 05 is accepted. It means that imported inflation theory applies in these countries and increase in exchange rate implies inflation in each country in the model. This result confirms pervious literature by Egwaikhide et al. (1994) for Nigeria, Kia (2006) for Iran and Jalil et al. (2014) for Pakistan that a depreciation of the domestic currency against a major foreign currency, leads to an increase in the price level. The higher the cost of imports; consequently, leading to imported inflation.

The adjusted R-squared value is 0.9705 which express the data represent 97% of results; value of R-squared is 0.9721 and the value of darban watson state is 0.3276.

The empirical results reveal that Covid-19 deaths have negatively linked to the CPI, 1% rise in the covid-19 deaths are cause -25926.72 decreases in the CPI.

Result also shows that CPI and money supply have positive relationship, specifically 1% increase in money supply leads to about 3.37E-06 increases in CPI respectively. Similarly there is positive association between CPI and oil price, as the results of which 1% rising in oil price in the countries cause to increase about 0.0333 in consumer price index respectively. But there is positive bonding between CPI and exchange, as the result of which 1% increase in exchange rate lead to 198.2469 raise in consumer price index.

TABLE 4.8: Impact of COVID-19 Deaths on Inflation Equation 02

Cross-section fixed effects test equation:

Dependent Variable: CPI

Method: Panel Least Squares

Date: 06/15/22 Time: 01:54

Sample: 2020M01 2022M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	73.1256	2.0997	34.8255	0.0000
COV1	-25926.72	8641.409	-3.0002	0.0037
M2	3.37E-06	7.85E-08	42.8601	0.0000
OILP	0.0333	0.042082	-0.7928	0.0004
EX	198.2469	14.69707	13.4888	0.0000
R-squared	0.9721	Mean dependent var		105.0128
Adjusted R-squared	0.9705	S.D. dependent var		31.0398
S.E. of regression	5.3241	Akaike info criterion		6.2443
Sum squared resid	2069.290	Schwarz criterion		6.3954
Log likelihood	-238.5290	Hannan-Quinn criter.		6.3048
F-statistic	636.0408	Durbin-Watson stat		0.3276
Prob(F-statistic)	0.0000			

4.5.2 Impact of COVID-19 Confirmed Cases on Inflation Equation 03

Table 4.9 explains the relationship between independent and dependent vari- ables. The independent variable covid-19 confirmed cases have negative coefficient. Its value is -696.4163 and it is statistically highly significant as its p-value is 0.0000 which is less than 0.01, which means that results is opposite in direction to what we hypothesized. However, the most significant relationship is the one that indicates covid-19 confirmed cases has influence on consumer price index but in opposite directions. It goes against the hypothesis but probably the reason could be that impact of covid-19 on aggregate demand may be greater than its impact on aggregate supply. In other words covid-19 had certainly decrease production and

aggregated supply but also causes even a greater decrease in consumer demands and thus it can be concluded that the Hypothesis 02 is rejected.

The other variable money supply symbol M2 has coefficient value 3.15E-06 and p-value is 0.0000 which is less the 0.01, hence it is significant. So hypothesis 03 is proved. It shows that there is significant positive relationship between CPI and M2 which indicates that if Money supply of the country increases then CPI will also increase. It confirms hypothesis number 03. This shows that demand push is prominent in these countries. That shows the aggregate demand exceeds then total supply due to growth in money supply. Thus inflation is also increase in these countries in the model.

Reasons could be that more funds are available to invest, due to higher money supply in the economy, as the result investment is increase in the economy, chance of employment will be increased, total demand will also rise, and in return the price of consumer price index is increase. It controls price level by mean of demand side. This result confirms pervious literature Qayyum (2006), state that money supply in the economy are 90 percent responsible for the inflation in region which show that the monetary elements are the key indicator of inflation. Findings of the study are consistent with previous results of Lim and Papi (1997), Liu and Adedeji (2000), Kuijs (1998), Laryea and Sumaila (2001), Mosayed and Mohammad (2009), Abdullah and Kalim (2009) and Khan and Gill (2010).

Another variable oil price coefficient value is 0.0333 and its p-value is 0.0004 that is less than 0.01, which demonstrations that oil price and CPI are positively related to each other, as suggested by cost-push theory. It reveals that there is significant positive association among oil price and CPI. Results show that if oil price of the country increases then CPI will also increases and vice versa. It supports hypothesis number 04. This shows that cost-push factor is prominent in these countries. Oil is use as intermediated in input almost in every industry of the country therefore an increase in oil prices raises cost of production and thus inflation.

The results of the study are consistent with previous literature Daniel and Nuhu (2015); conclude that money supply, interest rate, exchange rate, and oil-price are the core variable of inflation in Nigeria. Romer, 1993; Durevall, 1998; Hanif, 2012;

and Samimi et al., 2012 also Evidences that there exist a several other indicators that control inflation levels in country which are exchange rate, trade openness, food prices, oil prices, and growth rate of the economy.

The exchange rate coefficient value is 198.2469 and p-value is 0.0000 which is less at the level of 0.01. It indication that there is significant positive relationship be-tween CPI and exchange rate which indicates that if exchange rate of the country increases then CPI will also increase and vice versa. Exchange rate shows positive relation with inflation, which support the imported inflation theory. It also explains that hypothesis 05 is accepted. It means that imported inflation theory applies in these countries and increase in exchange rate implies inflation in each country in the model. This result confirms previous literature by Egwaikhide et al. (1994) for Nigeria, Kia (2006) for Iran and Jalil et al. (2014) for Pakistan that a devaluation of the home currency as compared to foreign currency, which cause to increase in the price level. The higher the cost of imports; subsequently, causing to imported inflation.

The adjusted R-squared value is 0.9789 which means the data represent 97% of results; value of R-squared is 0.9800 and the value of darban watson state is 0.3585.

The empirical results reveal that Covid-19 deaths have negatively related to the CPI, 1% increase in the covid-19 confirms cases are cause -696.4163 decreases in the CPI. Result also shows that there is a positive relationship between CPI and money supply specifically 1% increase in money supply leads to about 3.15E-06 increases in CPI respectively. Similarly there is positive relationship between CPI and oil price, as the result of which 1% increase in oil price in the countries lead to increase about 0.0316 in consumer price index respectively. But there is positive relationship between CPI and exchange, as the result of which 1% increase in exchange rate lead to 166.3515 increases in consumer price index.

Table 4.9: Impact of COVID-19 Cases on Inflation Equation 03

Cross-section fixed effects test equation:
Dependent Variable: CPI
Method: Panel Least Squares
Date: 06/15/22 Time: 01:58

Sample: 2020M01 2022M02

Periods included: 26

Cross-sections included: 3

Total panel (balanced) observations: 78

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	74.03804	1.7716	41.7896	0.0000
COV2	-696.4163	108.2644	-6.4325	0.0000
M2	3.15E-06	7.72E-08	40.8221	0.0000
OILP	0.0316	0.0350	0.9032	0.0044
EX	166.3515	13.2431	12.5613	0.0000
R-squared	0.9800	Mean dependent var		105.0128
Adjusted R-squared	0.9789	S.D. dependent var		31.0398
S.E. of regression	4.5080	Akaike info criterion		5.9115
Sum squared resid	1483.552	Schwarz criterion		6.0626
Log likelihood	-225.5512	Hannan-Quinn criter.		5.9720
F-statistic	894.3684	Durbin-Watson stat		0.3585
Prob(F-statistic)	0.0000			

Chapter 5

Discussion and Conclusion

Central intention of this investigation is to explaining the major elements of inflation in Pakistan, India and China. The main objective of current paper is to identifying the factors of inflation in Pakistan, India and China for the period (2020-2022). The consumer price index (CPI) was taken as dependent variable and covid-19 deaths (COV1), covid-19 confirms cases (COV2), money supply (M2), the oil prices (OIP), and exchange rate (EX) was considered as independent variables.

The main drive of the study is finding the influence of covid-19 on inflation. The previous studies explained inflation but mostly focused on demand pull inflation. But the current paper focuses on cost push inflation, the impact of decrease in production because of covid-19. The influence of covid-19 on inflation has not been explored yet. Therefore, current paper examined the outcome of influence of covid-19 on inflation in Pakistan, India and China. And also find suitable proxies to capture the effect of covid-19 on reduced production and thus on inflation. The results of this research show that covid-19 has strongly negative impact on inflation though expected positive impact. The results remain same weather study takes covid-19 deaths or covid-19 cases. That covid-19 and inflation are move in opposite direction and also rejected proposed hypothesis.

Covid-19 has strongly impact on inflation but in opposite direction according to the result. Thus it is conclude that due to covid-19 most of people lose their job and bear loses in business. As the result of which people spend low and try to save, so demand of commodities is decrease. In other words covid-19 had certainly

decrease production and aggregate supply but also causes even a greater decrease in consumer demands.

The empirical results show that money supply has positive impact on inflation as suggested by demand pull theory. Both variable moves in same direction and also support hypothesis.

Similarly oil price shows a significant positive impact on inflation as suggested by cost-push theory. Oil price and inflation are move in same direction and also support hypothesis. Reason may be that oil is use as intermediated in input all most in very industry of the country therefore an increase in oil prices raises cost of production and thus inflation.

Exchange rate shows negative impact with inflation; it is against the imported inflation theory. It indicates that both variable are move in opposite direction and also rejected hypothesis. Probably reason could be that trade balance of the two countries included in the data China and India has been mostly positive so for.

It is concluded that the major determinants of inflation is money supply and oil price in Pakistan, India and China. These findings indicate that money supply positively and significantly linked to change in CPI, which theoretically supported as increase in money supply in the country puts an upward force on inflation. Money supply is a demand side element, as money supply is increase, leads to more investment causing higher aggregate demand so consequences raise price the good and service in economy.

This result also shows that oil price positively significantly impact to growth of CPI, this judgment is theoretically supported as the result of changes in oil price also influence the price of other product in the country. The speedy impression of effect of oil prices on inflation is generally due to the oil is use as intermediated in input almost in very industry of the country. On the other hand a negative consequence has been observed in case of exchange rate and inflation rate. It means that a growing in imports and having current account surplus affect country's exchange rate in opposite direction. An unstable currency encourage exports and makes imports more costly. So Pakistan trade balance is deficit but China and India trade balance is surplus. Therefore result show negative influence of exchange rate on inflation.

In light of these results, the study recommends to implement a tight monetary policy, stimulate import and export, and reallocating resources and budgets towards the production and agriculture sector substitutes to regulate inflation in Pakistan, India and China.

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5.1 Major Findings

The intention of the study is to discover the determinants of inflation in Pakistan, India and China. The result of current study tells about the relationship between inflation and covid-19, hence it proved significant but in opposite direction therefore this rejected hypothesis. It is clear from the results that there is a significant negative relation between the main variables. This proves that hypothesis number 01 and 02 are rejected. The result of this study tells about the relationship between inflation and money supply, as suggested by demand-pull theory. There is positively significant relation between them. It is clear from the results that money supply has positive impact inflation. This proves that hypothesis number 03 accepted. The result of this study tells about the relationship between inflation and oil price as suggested by cost-push theory. There is positively significant relation between them. It is clear from the results that there is a significant positive linked between the main variables. This proves that hypothesis 04 is accepted.

The result of this study tells about the negative bonding between inflation and exchange rate, hence it rejects hypothesis number 05. There is negatively significant relation between them. It is clear from the results that there is a significant

negative relation between the main variables. This proves that hypothesis number 05 is rejected.

5.2 Policy Recommendations

As the results show that major cause of inflation in Pakistan, India and China are money supply and oil price. Therefore it is recommended that government should control money supply in the country to control inflation. Inflation could be controlled by the effective use of monetary measures. The government also needs to raise the productive volume of the economy, particularly the agricultural area, to accelerate the total stock of food products in the economy so that prices fall and, accordingly, the rate of inflation is reduced.

Also the result show that oil price is major factor of inflation in these countries, so therefore it is advisable to search for some alternative energy sources such as solar energy, water energy or wind energy. It is recommended that The State Bank and government have taken a number of steps, e.g. nominal increase in financial charges, tightening of consumer credit control and imposing regulatory tariffs on some non - essential imports to mitigate aggregate demand to mitigate risks. But these actions are unlikely to have a significant impact on the prices of the majority of goods and services consumed by low-middle-income segments as long as international energy markets continue to grow and we remain a net importer of food.

5.3 Limitations of the Study and Future Directions

The generalizability of the results of this study is subject to certain limitations. The current study has some limitations and unobserved factor. Current research is solely based on secondary sources of data and systematic review approach is used. There is a chance of any other important indicators and other important areas that need to be addressed. For instance, this analysis exclusively considers

Pakistan, India and China economy and provides financial data on monthly basis. Additionally, research was confined to jan-2020 to feb-2022; the first cases of the epidemic were identified in China, in December 2019. So the time span is very short as the result of which collect data into monthly and also consider countries Pakistan, China and India. Findings cannot apply to all countries in world.

Because of the ongoing scenario, all the data were collected comes from secondary sources and this data varies from minute to minute. Also, in recent years, many countries, including those in South Asia, have entered the fourth or fifth wave of covid-19 pandemic. Thus, the outcomes of analysis are only approximations of the first to fourth waves between January 2020 and January 2022. Therefore, further studies on the impact of the fourth and fifth waves on economic sectors and indicators in economies are needed.

This research is limited to a few Asian countries like Pakistan, India and China. Many additional nations should be considered for investigate the determinants of inflation. The study analyses monthly data but for further study can use yearly data.

It suggested extending the deadline to cover a longer period from the start of the COVID-19 pandemic. And also consider various developing countries from Europe and Asia for comparative study for a sample period which includes both the global financial crisis and the COVID-19 pandemic. This study is solely focus to Pakistan, India, and China, for more rigorous conclusion extension is needed in the study. The analysis could also be extended to various measures of inflation, such as domestic product (GDP), import prices, the interest rate, producer prices, and the currency in general.

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