Impact of inflation on Unemployment and GDP during Pandemic In India : A Short Term Analysis

DISSERTATION

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Prof. NMP VERMA
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CERTIFICATE

This is to certify that the Dissertation **"Impact of inflation on Unemployment and GDP during Pandemic In India : A Short Term Analysis"** submitted by **Naveen Linda** is an original research work and has not been previously submitted in part or full for the award of any other degree or diploma to this or any other University.

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DECLARATION

I hereby, declare that this Dissertation entitled **"Impact of inflation on Unemployment and GDP during Pandemic in India: A Short-Term Analysis"** submitted to Babasaheb Bhimrao Ambedkar University in partial fulfilment for the award of **Master of Philosophy** in **Economics** in my original work. It has not been submitted in part or full for any other diploma or degree of any other University.

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NAVEEN LINDA

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LIST OF ABBREVIATIONS

LPR	Labour Participation Rate
GDP	Gross Domestic Product
COVID -19	Coronavirus Disease
CPI	Consumer Price Index
GST	Goods and Service Tax
ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
NSSO	National Sample Survey Organisation
RBI	Reserve Bank of India
MOSPI	Ministry of Statistics and Programme Implementation
CMIE	Centre for Monitoring Indian Economy

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CHAPTER – I

INTRODUCTION

1.1 Introduction

In the world economy, inflation and unemployment are major issues in the global. Every developed and developing nation faces these issues and implements different economic reform programs to address them and maintain a low unemployment rate and stable price level. But this problem is less likely to be achieved simultaneously. In 1960, A W Phillips, the pioneer of the Phillips curve in the UK, first introduced the theory of the Phillips curve. This curve suggests a negative relationship between the rate of inflation and unemployment. The Phillips curve can be explained in two ways. The first is a short-term relationship between two variables; the second is a long-term relationship. In the short run, inflation and unemployment rate are showing a trade-off and negative relation. In the second way, there is no significant showing trade-off between inflation and employment rate and relation in the long run. So, economists should identify their relationship with inflation and unemployment rate. These two-economy problems are handled by monetary and fiscal policy.

Monetary policy aims to control the level of inflation in the economy or to maintain stable inflation by sacrificing employment. Fiscal policy, on the other hand, aims to achieve low unemployment in the economy regardless of inflation. In order to maintain an optimal level of trade-off between inflation and unemployment, it is necessary to coordinate all policies in order to maintain the non-accelerating inflation rate of unemployment, as Milton Friedman called it. A stable rate of wage inflation indicates no trade-off between unemployment and inflation.

In general, inflation is the rate at which prices rise over a given period of time. Inflation is basically a broad measure and it has impacted overall increase in prices or the increase in the cost of living in a country. But it can also be more narrowly calculated—for certain goods, such as food, or for services, such as a haircut, for example. Whatever the context, inflation represents how much more expensive the relevant set of goods and/or services has become over a certain period, most commonly a year.

The unemployment rate is the most commonly used indicator for understanding conditions in the labour market. The labour market is the term used by economists when talking about the supply of labour and demand for labour.

The Phillips Curve theory found a relationship between the rate of inflation and the rate of unemployment in the economy. This theory guides the policymakers about the stability of prices in the economy. According to the Phillips Curve, the inflation and unemployment rate expand or contract based on the liquidity of the economy. Several economists, academicians, and researchers still argue about the connection between inflation and unemployment. The Phillips Curve is one of the best known, most debatable, and most often used to examine Macroeconomic relationships. The present study is on the "Impact of inflation on unemployment and GDP during pandemic in India: A short term Analysis". The -19 pandemic has affected the economy and each and every person. It is the impacted-on inflation and unemployment. Even before the pandemic struck, consumer inflation had crossed the upper tolerance level of six percent in December 2019. India was in a tight situation with inflation higher than the mandate, but economic growth fell fast to levels of three percent, a rare low. On other hand, India's unemployment rate rose to its highest level since 1991 during 2020 as the coronavirus pandemic caused the economy to come to a screeching halt. The nation saw one of the toughest lockdowns in the world starting March 2020 and this pandemic claimed numerous lives, with stringent restrictions on mobility and economic activities across the board.

1.2 Review of literature –

Angus C. Chu, Guido Cozzi, Haichao Fan (2020) – Explore the relationship between inflation and unemployment in a monetary Schumpeterian growth model. Under the cash-in-advance (CIA) constraint on research and development (R&D), higher inflation reduces innovation and increases unemployment. Under the CIA constraint on consumption, higher inflation also reduces innovation but decreases unemployment instead.

Abdulsalam S. Ademola1 and Abdullahi Badiru (2016)-The result of the Diagnostic test indicates that data for the analysis are stationary at the level and there are 2 cointegrating equations implying that there exists a long-run relationship between RGDP, Unemployment and inflation. The results indicated that unemployment and inflation rates are positively related to economic growth.

Rubee Singh (2018) – Concludes that inflation rate is insignificantly influenced GDP and unemployment and the correlation is negative. The correlation between unemployment and inflation is positive and is insignificant at a 10% level of significance. The correlation between GDP and unemployment rate has also been found insignificant. So we concluded that inflation

has a role which influential but for GDP and unemployment , inflation is an insignificant levels in the macroeconomics factors of Indian economy.

Sunusi Yahaya Enejoh (2016) - He is to analyse the impact of inflation and unemployment rate on economic growth in Nigeria from 1970 to 2016. They have analysed the impact of inflation and unemployment rate on economic growth in Nigeria from 1970 to 2016. The variables used in this research include the log of real GDP, log of the inflation rate, log of the unemployment rate and log of foreign exchange.

Vikas Barbate, Rajesh N. Gade, Shirish S. Raibagkar (2021)- They are to assess the impact of COVID-19 on the Indian economy in the short term and the long term. They found that there is a negative impact of COVID-19 on Indian economy.

S. Mahendra Dev and Rajeswari Sengupta (2021) - we describe the state of the Indian economy in the pre-Covid-19 period and explore the potential impact of the shock on various segments of the economy. They analyse the policies that have been announced so far by the central government and the Reserve Bank of India to ameliorate the economic shock and put forward a set of policy recommendations for specific sectors.

David G. Blanchflower, David N.F. Bell, Alberto Montagnoli and Mirko Moro (2014) -
They discover that unemployment depresses well-being more than inflation. They have estimated that with European data imply that a 1 percentage point increase in the unemployment rate lowers well-being by more than five times as much as a 1 percentage point increase in the inflation rate.

Marta Fana, Sergio Torrejon Perez, Enrique Fernandez-Macias (2021) – They analysed that vaccine was the reason to reduce the COVID-19 case in all over the world.

Zîna Cioran (2014) - identifying the existing connections between the inflation rate and some important macroeconomic indicators and also on the dynamics of inflation at a national and European level. The study is to reveal the causal relation between the inflation rate and the interest rate of the monetary policy and also between the inflation rate and the unemployment rate, using regression method.

NMP Verma and Dolly Singh (2016)- proved that the negative effect of unemployment rate on inflation rate and the positive effect on real GDP. Unemployment is a continuously problem in all economies of developing countries where it is affecting highly the level of employment; price level, the living standard of people, and real GDP. The findings proved the influential relationship between unemployment and inflation rate conditions, Unemployment and Real GDP conditions, but in our economic condition, it is proved non-significant.

Dholakia (2011), in this study, the author estimates the short run aggregate supply curve for the Indian economy from 1950-51 to 2008-09. The study employs the technique of estimating adaptive expectations, constrained estimation consistent with long run equilibrium, and also introduces the extended Phillips curve.

Murphy and Robert (2013), attempted to ascertain whether the Phillips curve could explain the behaviour of inflation in the United States. They modified the traditional Phillips curve to explain time variation in its slope and showed that the modified model was more conversant a tool to analyse the recent behaviour of inflation without relying on set expectations.

Rafery et al. (2010), this study doubts the validity of the Phillips curve with the aid of dynamic model averaging. The authors‟ study aims to highlight that the existence of a systematic relation between real activity and inflation is blurred due to the failure to capture inflationary pressures, by means of a single measure of economic activity and second is the existence of a nonlinear response of inflation to the driving variable based on data for the USA and other G7 countries.

NMP Verma and Ravi Kant (2021) – They have defined the Macroeconomic Pandemic Panorama of Developing Economies and taken India in our research to analysis the effect of COVID-19 pandemic on Indian economy. It has been observed that the populated developing economies have been severely impacted due to spread of pandemic. The rising health expenditure, increasing debt, labour migration, increase in unemployment, prices, and the loss of output are the major factors to drag these economies into vulnerability.

Szomolanyi, et al. (2012), states that the Phillips curve is a basic tool to understand relations between the growth rate of money wage and unemployment rates.

NMP Verma and Partinidhi (2020) – they evident that in the pre-recession period, the volatility in price of wheat and rice has increased with high rate but the volatility on prices of wheat is higher as compared to prices of rice. This is largely due to the influence by (own shock) or due

to the past information about prices of agriculture commodities. Further, in the post-recession period, volatility on food prices of wheat and rice is largely influenced by the global financial crisis and past information about the prices of agriculture commodities.

1.3 Research problem –

According to our review of literature, we find some problem that are -

- Inflation increase the value to products which decrease the income of household and society output growth is reduced by increase value of product and Inflation reduces the real value of both monetary assets and liabilities and increase the real value of real assets. Unanticipated inflation imposes costs by generating a sense of uncertainty. People are unable to make plans for the future and as a consequence, economic decision making becomes inefficient.

- We have face problem from lower GDP and high food inflation and unemployment in India during 2016 to 2021.
- Paaritosh Nath (2020) has analysed that employment growth has been weak in many demographic groups (men, women, urban, rural) and has lagged behind population growth. In every group, the results show a decline in labour force participation and an increase in unemployment.

- We had seen demonetization and GST policy implication in 2016 to 2021 period of time.

- In year 2016 to 2021, we have seen high unemployment and negative GDP growth in Indian economy.

- COVID-19 pandemic highly impacted on Indian economy.

1.3 Research Gap –

According to our research problem, we find a research gap that is, in all previous study, we found that COVID-19 pandemic impacted the Indian economy but no study have been done in

the context how empirically COVID-19 pandemic impact on Indian economy so our objective is based on this research gap.

1.4 Objective –

On the basis of these research problems, our primary objective of this study are:

- To analysis monthly trend analysis of Inflation, Unemployment and Gross Domestic Product in India. (2016-2021)
- To analysis the impact of pre and post COVID-19 pandemic on inflation rate, unemployment rate and Gross Domestic Product in Indian economy. (2016-2021)
- To analysis the inflation rate impact on unemployment rate and Gross domestic Product during pandemic in India.

1.5 Data and methodology –

The present Study is wholly based on the secondary data. The study uses time series database, taken from authentic data source such as the published official reports and data. Following are the reference points for collecting data:

I. Report on Inflation published by the Reserve Bank of India.
II. Annual Report published by the Ministry of Labour and Employment Labor Bureau, the Government of India.
III. Ministry of Statistics and Program Implementation (MOSPI), the Government of India.
IV. Handbook of Statistics on Indian Economy via the Reserve Bank of India. 5. National Sample Survey Organization (NSSO) India.
V. Economic Political Weekly Research Foundation (EPWRF)
VI. CMIE (Centre for Monitoring Indian Economy)

We have used quantitative and time series data such as monthly, quarterly and annual data on Consumer Price Index, Gross Domestic Product and unemployment rate. The present study has taken data pertinent to the monthly time period from 2016 to 2021. This study has been divided into two sub periods.

Table 1 – Total time period divided into two period -

Pre-Pandemic Period (2018-2019)	Pandemic period (2020-2021)
We considered this period is pre-pandemic period. It shows the trends of inflation and unemployment, impact of recession on macro variables, to examine the Phillips curve relationship and output gap in this period.	We considered this period as the pandemic period. We have divided this period into two part first wave and second wave. It shows the trends of inflation and unemployment, impact of recession on macro variables.

The secondary data are used for this study period from 2016-2021. Therefore, data has sourced from CMIE which includes; data on Unemployment rate and consumer price index proxy for inflation (INF) and real gross domestic product which is taken from RBI data sources. The ordinary least square method and Bi-variate regression model of econometric approach was used in estimation. We have taken dummy model to estimate the pandemic effect on these three variables.

To study empirically on the relationship between variables we have taken different functional from in every chapter as according to our objective so our functional from are -

In the chapter 3 we have taken three functional from and find the relationship between variable and time –

UNEMP = f (TIME)

INF = f (TIME)

GDP = f (TIME)

In the chapter 4 we have taken three functional from and find the effect between variable and pre and post COVID-19 pandemic period and our functional form are as –

UNEMP =f (PANDEMIC PERIOD)

INF = f (PANDEMIC PERIOD)

GDP = f (PANMEIC PERIOD)

In the chapter 5, we have taken three functional from and find the effect between variables during pandemic time and our functional form are –

UNEMP = f (PANDEMIC PERIOD, INF)

GDP = f (PANDEMIC PERIOD, INF)

INF = f (UNEMP, PANDEMIC PERIOD)

INF = f (GDP, PANMDEIC PERIOD)

Where, UNEMP = unemployment Rate, INF = Inflation Rate, Real GDP = Real Gross Domestic Product and f = functional relationship.

The study will capture under this functional form and try evaluate the major finding as according to our objective.

1.6 Hypothesis –

- Null hypothesis (H0) – There is an insignificant effect of inflation rate, unemployment rate and GDP with time in the monthly period of 2016 to 2021.
- Null hypothesis (H0) – There is an insignificant effect of COVID-19 pandemic on inflation rate, unemployment rate and GDP.
- Null hypothesis (H0) – There is an insignificant effect of inflation rate on unemployment rate and GDP during pandemic time.

1.7 Significance of the study –

The significance of this present study is in determining how the policymakers can formulate effective strategies to ensure employment while containing inflation during pandemic. Undoubtedly, inflation and unemployment have played a central role in monetary policy. The Central banks have tried to use this relationship by influencing unemployment through their inflation policy. Theory of Phillips curve is not only strong theoretically, but is also important for political foundations. The central banks‟ objective has always been to use their monetary policies to keep inflation and unemployment low, but they could only do so at the expense of high unemployment. On the other hand, an acute knowledge of the nature or relationship of

inflation and unemployment in the short-run enables the policy makers to outline policies to minimize the harmful effects of inflation and unemployment for the society. Additional approach, the output gap is an important variable for monetary policy and it is a key source of inflationary pressures in the economy. When the demand for goods and services is high, then economy has the capacity to produce while influencing high pressures on prices. When the rate of inflation actuates higher than expected, it is typically a sign that demand for goods and services are pushing against the limits of capacity. When the rate of inflation always ends lower than expected, it is generally a sign of weak demand and of spare or unused capacity. In the pandemic period both inflation and unemployment increase at higher rate so we try to examine the monthly movement of inflation and unemployment in India to analysis the any relation happened between these variables and how much inflation and unemployment increase during pandemic and before pandemic.

1.8 Scope of the study –

The research work intends to know the unemployment and inflation situation within the Indian economy. The study will cover time period (2016-2019) and (2020-2021). This is to ensure updated information and to follow the trend. The range was chosen based on data availability and to have adequate observation for a meaningful analysis.

1.9 Chapters plan to the study –

The study is divided into following chapters.

Chapter 1 – Introduction

This chapter deals with the introduction parts enlisted in review of literature of the study, research objectives, hypothesis, data and methodology and significance.

Chapter 2 – Theoretical and conceptual framework

This chapter discusses about the conceptual and theoretical framework of inflation and unemployment with relevance to Phillips curve analysis.

Chapter 3 – Monthly trend analysis of Inflation, Unemployment and GDP in India for short run period (2016-2021)

This chapter presents the trendline analysis of inflation, Unemployment and Gross Domestic Product and find an empirical result of significant relation of time with inflation, unemployment and GDP.

Chapter 4 – Pandemic of COVID-19 impact on Inflation, Unemployment and GDP in India

This chapter presents the impact of pandemic of COVID-19 impact on Inflation, Unemployment and GDP in India by the help of dummy variable.

Chapter 5 – Impact of Inflation on Unemployment and Gross Domestic Product during Pandemic in India

This chapter presents the impact of inflation on unemployment and Gross Domestic Product during Pandemic in India and find a theoretical relation between GDP – Inflation and Phillips Curve.

Chapter 6 – Finding of the study, conclusion and recommendation

In the last chapter major finding of the study along with its implications, limitations and suggestions has been provided.

This chapter presents conclusion arrived at on the basis of the study.

CHAPTER – II

Theoretical and conceptual framework

2.1 Introduction -

Theoretical concepts for three macroeconomic variables, namely inflation, unemployment, and GDP, are presented in this chapter. With the help of a graph, it incorporates Phillip's curve notion and Okun's law, which support the theory of inflation – unemployment and GDP – unemployment link. This illustrates the trade-off between inflation-unemployment theories and other countries, as substantiated by previous research papers. It also shows the current state of the Indian economy's inflation, unemployment, and GDP (2016-21).

2.2 Inflation -

Inflation is defined as a long-term increase in the price level of vital commodities and services in the economy. "Inflation indicates an increase in the general level of prices," Samuelson says. This inflation term is used to examine price behaviour.

Inflation is commonly measured using the consumer price Index (CPI). The consumer price index measures the changes in the price level of consumer goods. It is calculated as :

$$\text{CPI} = \frac{Current\ price\ index}{Base\ price\ index} * 100$$

2.3 Theory of inflation –

2.3.1 Demand Pull inflation –

The overall price level rises when aggregate demand rises faster than aggregate supply. This is known as demand-pull inflation. Demand-pull inflation is the most common and well-known kind of inflation. It occurs when aggregate demand increases and commodity supply drops.

Given the money supply and the level of production, monetary considerations generate demand pull inflation. This is neither an inflationary nor a deflationary condition if this price point is fair. As (Dwivedi, 2010, Pp. 467-469) effectively demonstrated, monetary expansion in excess

of actual production growth is one of the most significant drivers producing demand-pull inflation. Monetarists emphasise the role of money in demand-pull inflation, claiming that increasing the money supply in order to promote output and involvement leads to an inflationary condition inside an economy. Monetarists emphasise the role of money in demand-pull inflation, claiming that when the money supply is expanded to enhance output and involvement, an inflationary scenario is created within an economic system. Material, real, or non-monetary variables that lead demand to pull inflation, resulting in upward movements in the IS Curve, are known as demand pull inflation.

2.3.2 Cost push inflation –

The term "cost-push inflation" refers to a situation in which the supply of products or services is constrained in some way but demand stays constant, causing prices to rise. Increased labour or raw material prices, for example, lead to a reduction in supply of these commodities. While demand stays constant, commodity prices grow, resulting in an increase in the total price level. The overall price level rises when production costs rise, which is reflected in higher prices for goods and commodities that predominantly utilise these inputs. This is simply inflation caused by a reduction in supply. Cost-Push Inflation is frequently linked to an unanticipated external occurrence, such as a natural disaster or the depletion of natural resources, monopoly, government regulation, government taxes, and exchange rate fluctuations. Basically, anything that makes it difficult for a corporation to create enough of a given product to meet market demand. As a result, they are forced to raise or inflate prices.

2.3.3 Structural Inflation –

Inflation caused by changes in the structure of demand and supply is known as structural inflation. Some branches will see a rise in demand for their products as a result of changes in the structure of demand and supply, while others will see a decrease in demand. If prices and wages in branches that are cutting production are unresponsive to this reduction, while prices and wages in branches that are growing production rise, the aggregate level of both prices and wages in the economy will rise. When the supply is rigid and unable to adjust quickly to the changes taking place, the issue will become more pronounced.

Thus, structural inflation arises when producers can not adapt their production structure in an efficient manner in response to changes in the structure of the economy. These changes may concern:

1. demand for the product,
2. its production technology,
3. competition for which producers stand.

2.4 Type of inflation –

2.4.1 Creeping Inflation – When prices rise at a rate of less than 3% per year, it is called creeping or moderate inflation. Consumers expect prices to continue to rise in this type of modest inflation. This increases demand. Consumers purchase today in order to avoid greater prices in the future. Mild inflation fuels economic growth in this way.

2.4.2 Walking Inflation - This high, or damaging, inflation ranges from 3 to 10% every year. It is bad for the economy because it accelerates economic growth too quickly. People begin to buy more than they require in order to avoid paying significantly higher prices later. As a result of the increased demand, suppliers are unable to keep up. Wages, on the other hand, cannot. As a result, most individuals are unable to afford everyday goods and services.

2.4.3 Galloping Inflation - When inflation reaches 10% or above, the economy is completely destroyed. Money depreciates so quickly that earnings from businesses and employees can't keep up with rising costs and prices. Foreign investors are shying away from the country, depriving it of much-needed funds. The economy becomes unsteady, and government officials lose their authority. Inflationary spirals must be avoided at all costs.

2.4.4 Hyper Inflation - When prices rise by more than 50% in a month, it is called hyperinflation. It's really uncommon. In fact, the majority of hyperinflationary episodes occur when governments issue money to fund wars. Germany in the 1920s, Zimbabwe in the 2000s, and Venezuela in the 2010s are all examples of hyperinflation. 2 America's last bout of hyperinflation occurred during the country's civil war.

2.4.5 Perfectly Anticipated Inflation - Perfectly expected inflation occurs when inflation can be predicted. If an economy has been experiencing a specific rate of inflation for the past four years, say 6%, people will expect the rate of inflation to remain at that level. All

contracts would be based on a 6-percentage-point increase in inflation. Debtors will benefit from inflation while creditors will suffer. To avoid this, the lender raises the nominal interest rates by 6%. Long-term labour contracts would raise wages by 6% per year, while tax bands would rise by 6% per year.

2.4.6 Unanticipated Inflation – As consumers, we are all aware that items come with a price tag that we must pay in order to obtain them. While we are always on the lookout for a good deal, what if there was none to be had since the general level of goods prices continued to rise? Would you buy the goods nonetheless, or would you postpone your purchase? This is the general concept of inflation, and it is known as unanticipated inflation when it occurs suddenly.

2.5 Unemployment –

In economics literature, unemployment has no exact definition. Unemployment is defined as the percentage of the labour force that is without a job but is able, willing, and qualified to work by laymen. It is defined by economists as the percentage of the labour force that is without a job but is able, willing, and qualified to work. In other words, regardless of how unemployment is measured, the underlying philosophy is that those who should be working are not doing so (Gbosi;2004). The unemployment rate is used to calculate the level of unemployment in a country. The formula for calculating the unemployment rate is as follows:

$$\text{Unemployment rate} = \frac{Total\ number\ of\ people\ unemployed}{Total\ labour\ labour\ force} * 100$$

The National Sample Survey Organization (NSSO) defines employment and unemployment in terms of an individual's activity status:

'Employed' means working (doing something for a living).

'Unemployed' means looking for work or being available for work.

Neither looking for work nor available for it.

2.6 Type of Unemployment –

2.6.1 Disguised Unemployment- It's a situation when more individuals are working than are actually needed. Even if some are removed, production is unaffected. In other words, it refers to a situation in which there is an excess of labour and some employees have zero marginal productivity. As a result, their removal will have no effect on total output volume. The major causes of disguised unemployment in India include overcrowding in agriculture as a result of fast population increase and a lack of other job possibilities.

2.6.2 Seasonal Unemployment - It is a type of unemployment that occurs at specific times of the year. Production activities are limited in various businesses and occupations, such as agriculture, vacation resorts, ice manufacturers, and so on. As a result, they only provide employment for a limited time each year. Those who indulge in such activities may find themselves unemployed during the off-season.

2.6.3 Cyclical Unemployment - It is brought by by trade cycles that occur at regular periods. Trade cycles are a feature of most capitalist economies. Unemployment occurs from a drop in corporate activity. Normally, cyclical unemployment is a one-time occurrence.

2.6.4 Fractional Unemployment - This sort of unemployment occurs when a country's economic structure changes dramatically. These changes may have an impact on either the supply or demand for a production factor. Structural employment is a natural byproduct of economic expansion, technical improvement, and innovation, all of which are occurring at breakneck speed around the world in every area.

2.7 Measurement of Unemployment in India -

The National Sample Survey Office (NSSO), which is part of the Ministry of Statistics and Programme Implementation (MoSPI), uses the following methods to calculate unemployment in India.

2.7.1 Usual Status Approach: This method only counts people as jobless if they have been out of work for a significant period of time in the 365 days leading up to the survey date.

2.7.2 Weekly Status Approach: This method only counts people as jobless if they were out of work for more than one hour on any day of the week before the survey date.

2.7.3 The Daily Status Approach : it measures an individual's unemployment status on each day of a reference week. A person who is unemployed for one hour or more in a day is considered unemployed for that day.

The National Sample Survey Office (NSSO) has been an important governmental body in India for studying employment, unemployment, and unemployment rates through sample surveys at both the national and state levels. It does not publish employment or unemployment statistics every quarter or year, but rather once every five years. The most recent official NSSO employment and unemployment surveys and reports were done in 2004–2005, 2009–2010, and 2011–2012.

Except since 2012, India has never consistently collected monthly, quarterly, or annual employment and unemployment figures across the country. The Centre for Monitoring Indian Economy, a non-profit organisation, began sampling and releasing monthly unemployment figures in India in 2016.

2.8 Cause of unemployment –

2.8.1 Less saving and investment - In India, capital is in short supply. Above all, this money has been invested wisely. Savings are necessary for investment. Savings are insufficient. Opportunities for employment have not been established due to a scarcity of savings and investment.

2.8.2 Defective Planning - One of the leading causes of unemployment is poor planning. The supply and demand for labour are vastly different. No long-term plan for reducing unemployment had been devised by any Plan.

2.8.3 Agriculture is a Seasonal Job: Agriculture in India is undeveloped. It has a seasonal workforce. Agriculture supports a large portion of the population. Agriculture, on the other hand, is a seasonal industry that gives work for a few months. As a result, there is an increase in unemployment.

2.8.4 Slow economic growth - The Indian economy is weak, with moderate economic growth. This modest development is insufficient to give enough job opportunities for the growing population.

2.8.5 Job Specialization -Jobs in the capitalist world have become increasingly specialised, but India's education system lacks the necessary training and specialisation. As a result, many people who are willing to work are unable to find work due to a lack of skills.

2.8.6 Population growth and Technology - Industrialists and companies prefer to use machines over humans for various professions as the focus on increased productivity grows. They are less expensive than hiring labourers and generate more. However, a country with a rapidly growing population, such as India, requires labor-intensive procedures rather than capital-intensive techniques.

2.8.7 Lack of stock of physical capital- Physical capital is required to create all economic activity. A farmer need a plough, tractor, and other machinery; an industrialist requires land, machines, minerals, and other resources; and the service sector requires contemporary technologies, structures, and tools, among other things. This is all physical capital. India's capital stock has not been able to keep up with the needs of a fast growing population.

2.9 Unemployment and inflation relationship –

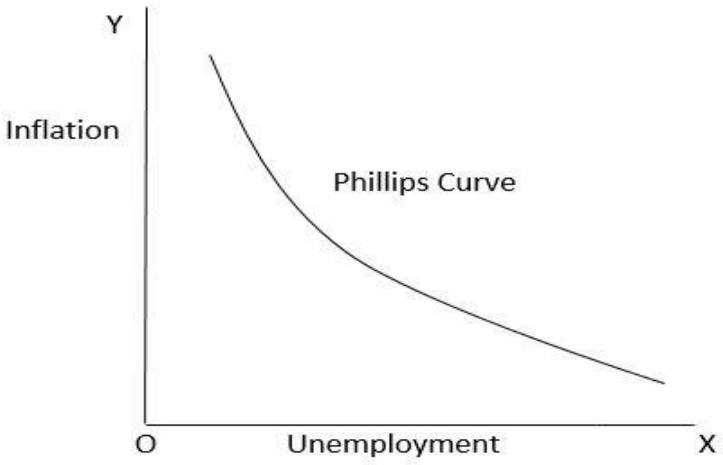
Even while unemployment is terrible for people who do not have a source of income, it is not free. In the short run, a decrease in unemployment may be offset by a rise in inflation, particularly if the economy is nearing maximum capacity and resources are virtually fully utilised. This link may be explained in two ways: one in the short run and another in the long term. In the short term, unemployment and inflation have an inverse connection (Phillips curve), however economists have noted that in the long run, the notions of unemployment and inflation are unrelated. Regulators have faced a variety of issues as a result of the arrangement.

Unemployment and inflation are two issues that are at the heart of any country's social and economic existence. Inflation and unemployment are described in the literature as twin concerns that explain the chronic character of poverty in emerging nations. Continuous productivity improvement, it has been suggested, is the surest strategy to lower inflation. Productivity growth is an important foundation for adequate supply of products and services, which improves people's well-being and promotes societal progress.

A country's monetary policy has a short-term influence on inflation and overall demand for products and services in the economy. As a result, demand for the human resources needed to generate such goods and services varies. Countries encounter difficulties controlling unemployment when monetary policy is employed to lower inflation. A.W. Phillips, an economist, defined this scenario clearly in 1958, demonstrating that when inflation is high, unemployment is low, and vice versa. The Phillips curve was named after this relationship. When an economy experiences inflation, monetary policy is employed to control it, either by decreasing the money supply or raising interest rates. Higher interest rates restrict consumer spending and investment, resulting in reduced aggregate demand while aggregate supply stays same. Inflation would be reduced as aggregate demand fell. However, if the Real GDP falls, firms will suffer.

2.10 The Phillip's Curve –

In a 1958 study report, A. W. Phillips found a negative statistical relationship between the rate of change in the money wage and the unemployment rate. It was also discovered that the rate of change of prices (i.e., inflation) and the degree of unemployment had a similar negative association. The Phillips curve is used to generalise this relationship. Phillips looked at this negative association for the first time using data from the United Kingdom from 1861 to 1957. The Phillips curve demonstrates that when unemployment grows, the rate of inflation decreases. Zero inflation can only be reached with a high positive rate of unemployment, such as 5%, or near full employment can only be obtained at the expense of a high rate of inflation. As a result, there is a trade-off between inflation and unemployment: the lower the unemployment rate, the greater the inflation rate.



Phillips curves are divided into two types: short run Phillips curves and long run Phillips curves. The short-term Phillips curve is the inverse connection between inflation and unemployment. The long-term Phillips curve occurs when unemployment remains constant but inflation fluctuates. Solow proposed an inverse link between inflation and unemployment, while Robert and Friedman proposed the long-run Phillips curve hypothesis. Monetarism adds the element of expectation to the Phillips curve and divides it into short and long-term versions.

2.10.1 Short run Phillips curve –

The inverse trade-off between inflation and unemployment is depicted by the short-run Phillips curve. The Phillips curve shows how inflation and unemployment rates are related. The short-run Phillips curve, on the other hand, is generally L-shaped to represent the inverse connection between the two variables at the outset. When unemployment rates rise, inflation falls; when unemployment rates fall, inflation rises. Consider the following example. When the unemployment rate is two percent, the inflation rate is ten percent. As unemployment falls below 1%, the rate of inflation rises to 15%. When unemployment rises to 6%, however, the inflation rate falls to 2%.

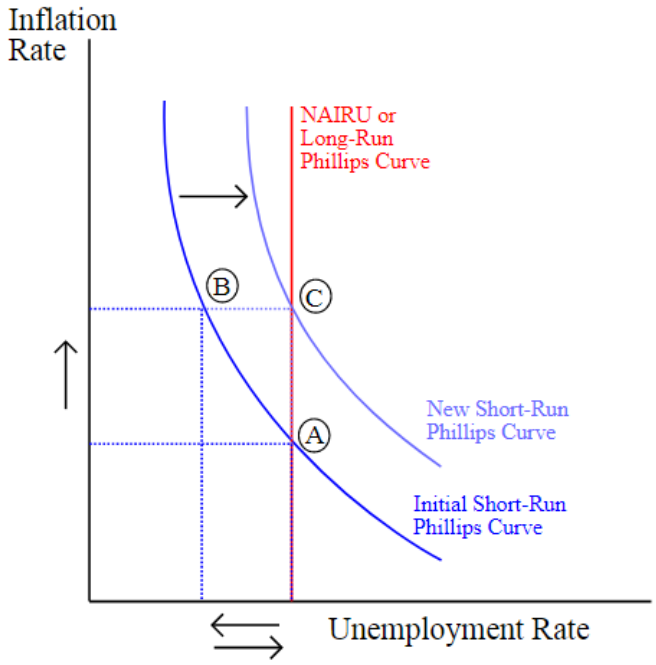
The Phillips curve gained popularity in the 1960s because it appeared to correctly reflect real-world macroeconomics. Stagflation of the 1970s, on the other hand, demolished any illusions that the Phillips curve was a reliable and predictable policy instrument. Modern economists no longer believe in a stable Phillips curve, but they do agree that there is a short-run trade-off between inflation and unemployment. Rises in aggregate demand result in increases in real production when the aggregate supply curve is stagnant. Unemployment drops as output rises. More people in the employment means more money in the economy, which leads to demand-pull inflation, which raises prices.

2.10.2 The long run Phillip's Curve –

Inflation and unemployment are unconnected in the long term because the long-run Phillips curve is a vertical line at the natural rate of unemployment. The Phillips curve depicts the trade-off between inflation and unemployment, but is this connection long-term accurate? In the long run, economists believe there can be no trade-off between inflation and unemployment. Increases in inflation can occur as unemployment falls, but only in the short term. In the long run, inflation and unemployment have nothing to do with each other. In terms of graphs, this

indicates that at the natural rate of unemployment, or the hypothetical unemployment rate if aggregate output is at its long-run level, the Phillips curve is vertical. Attempts to lower unemployment rates simply shift the economy up and down this vertical line.

Consider the example in to obtain a better understanding of the long-run Phillips curve. Assume the economy begins at point A, with an initial unemployment rate and inflation rate. Inflation will rise if the government pursues expansionary economic policies, as aggregate demand swings to the right. This is shown as a movement along the short-run Phillips curve to point B, an unstable equilibrium. As aggregate demand rises, companies will recruit more workers in order to generate more product to fulfil growing demand, lowering unemployment. Workers' expectations of future inflation alter as a result of increasing inflation, shifting the short-run Phillips curve to the right, from unstable equilibrium point B to stable equilibrium point C. At point C, unemployment has returned to its normal rate, but inflation remains greater than it was at the start.



2.11 Real GDP growth –

The real economic growth rate, often known as the real GDP growth rate, is a measure of economic growth expressed in gross domestic product (GDP), adjusted for inflation or deflation, from one period to the next. In other words, it accounts for price volatility while revealing changes in the value of all commodities and services generated by an economy—a country's economic production.

Consumer spending, corporate spending, government spending, and total exports minus total imports are all included in GDP. The following is the formula for calculating real GDP after factoring in inflation:

Real GDP = GDP / (1 + inflation since base year)

The real economic growth rate is a statistic that indicates how much a country's GDP has changed from one year to the next. The gross national product (GNP) is another economic growth indicator that is sometimes favoured when a country's economy is heavily reliant on foreign profits. Because it reflects the influence of inflation on economic statistics, the real GDP growth rate is a more meaningful indicator than the nominal GDP growth rate. The real economic growth rate is calculated on a "constant Rupee" basis, which eliminates the effects of excessive inflation or deflation and provides a more consistent statistic.

Inflation and real GDP growth have a connection in which inflation shows that prices have risen. When inflation rises, money's purchasing power decreases, limiting consumption and, as a result, GDP declines. As a result, GDP seems to have an inverse relationship with inflation.

On the other side the link between growth and unemployment is one of the most interesting aspects of the unemployment analysis. Given the key factors of economic growth, the basic expectation is that the unemployment rate will decrease in an economy where growth is occurring, or at the very least that the existing unemployment rate will not increase. Arthur Okun used regression analysis to look at the link between the unemployment rate and economic development in the United States from 1947 to 1960. The gap between present and full employment income fluctuates in the opposite direction with the unemployment rate, according to the derived regression equation.

2.11.1 Okun’s Law –

Okun’s law investigates the statistical relationship between a country’s unemployment rate and the growth rate of its economy. According to Okun's initial formulation of his rule, an economy sees a 1% rise in unemployment for every 3% drop in GDP from its long-run level (also called potential GDP). Similarly, a 3% rise in GDP from its long-run level is related with a 1% drop in unemployment. The level of output that can be attained when all resources (land, labour, capital, and entrepreneurial skill) are completely used is referred to as potential GDP.

Okun’s law is given by the following formula:

Okun's Law Formula -

Where:

$$\frac{y - y^*}{y^*} = -\beta(u - u^*)$$

y = Actual GDP

y* = Potential GDP

β = Okun Coefficient

u = Unemployment rate of the current year

u* = Unemployment rate of the previous year

y-y* = Output Gap

2.12 Current status of inflation –

In May 2021, a 2.1 percentage point drop in inflation to 4.2 percent was overtaken by a significant increase in price momentum covering food, gasoline, and core categories, culminating in a 2.1 percentage point increase in inflation to 6.3 percent. In June, headline inflation reached a standstill, with positive price momentum totally neutralised by a favourable base impact, which grew even stronger in July and more than countered broad-based price momentum, lowering headline inflation to 5.6 percent. In August, total price motion slowed sharply, thanks to a stable food price index, and headline inflation fell to 5.3 percent. Adverse supply shocks, asset price firming, and loose monetary circumstances led to inflationary pressures in Q1:2021-22, even as muted demand conditions contributed to a reduction of inflationary pressures. The contribution of perishables to headline inflation fell sharply in July-August, while the contributions of semi-perishables, durables, and services to headline inflation remained virtually unchanged. The increase in the contribution of imported components to headline inflation – from 0.8 percentage points in February to 1.9 percentage points in June before reducing to 1.4 percentage points in August 2021 – was due to a rise in international prices of edible oil, silver, and petroleum products. During the months of March to August 2021, food and beverage inflation stayed within a 2-6 percent range, contributing roughly 37.2 percent of overall inflation (CPI food has a weight of 45.9 per cent in the CPI basket). Food

and headline inflation would have averaged 6.3 percent and 6.5 percent, respectively, from April to August 2021, excluding vegetables, compared to an overall average rate of 4.3 percent for food and 5.5 percent for headline.

2.13 Current status of Unemployment –

The LPR has been fundamentally decreased as a result of the two pandemic shocks. At these lower levels, the downward trend has persisted. India presently has an LPR of over 40%, compared to around 43% before the epidemic. India's LPR is significantly lower than the world average. The modelled ILO projection for the world in 2020, according to the World Bank, was 58.6 percent.

2.14 Conclusion –

This chapter explain that it shows a concept theory of three macroeconomic variables, namely inflation, unemployment, and GDP, based on previous studies to support Chapter 3, which has shown secondary data of these macroeconomic variables during the study period to demonstrate the state of the Indian economy. These are three macroeconomic goals in the Indian economy that are currently critical challenges in the economy and have an impact on people's living standards in the developing country. To alleviate these issues in emerging countries and reach a higher aim, considerable political and economic action is required. The employment rate should be increased when the unemployment rate falls, resulting in a rise in per capita income. Then national output will rise, resulting in an increase in GDP. Overall, people's living conditions improve in emerging countries, and this country's economy should approach full employment. To fully fill the above statements for the Indian economy, we should have checked the status of the previous year's data on inflation, unemployment, and GDP, and show their relationship also. It also shows the correlation and regression analysis of data during the study period between the variables to see the situation of previous years. For this work, secondary data was collected for analysis and current data for the present status of the Indian economy. In the following chapter, it examines the trends in inflation, unemployment, and GDP to determine whether or not these variables are correlated and affect one another.

CHAPTER - III

Monthly trend analysis of Inflation, Unemployment and GDP in India for short run period (2016-2021)

3.1 Introduction -

Inflation and unemployment are two major issues that impact any growing country's economy. Every country's government strived for price stability and low unemployment in order to promote long-term economic growth. In the context of emerging countries, such as India, high unemployment and inflation are common. These issues are constantly complicated, posing an economic and social conundrum for the whole economy. The government's inability to provide a long-term solution to these twin challenges has created a serious dilemma for the economy, political system, and whole society.

This chapter discusses the trends in inflation, unemployment, and GDP, as well as analyse these macroeconomic variables relation with time. To uncover an empirical association between inflation, unemployment, and GDP with time, we used regression analysis. From 2016 to 2021, we've used a monthly data for short-run term. In this chapter we will study the impact of time on these three variables to evaluate the trend of these variable in the given time.

Three variables are analysed using econometric equations in order to test the hypothesis and explain the study's goal.

3.1(a) Inflation –

Inflation is defined as an increase in the price of most everyday or common goods and services, such as food, clothing, housing, recreation, transportation, consumer staples, and so on. Inflation is defined as the average change in the price of a basket of goods and services over time.

As commodities and services become more expensive, a currency unit's purchasing power declines. This has an effect on a country's cost of living. When inflation is strong, the cost of living rises along with it, resulting in a slowdown in economic growth. In order for spending to be encouraged and saving to be discouraged, a certain degree of inflation is essential in the economy.

In India, two key indices, the WPI (Wholesale Price Index) and the CPI (Consumer Price Index), are used to assess wholesale and retail price fluctuations, respectively. The CPI measures the price differential between goods and services purchased by Indian consumers, such as food, medical care, education, and gadgets.

India has traditionally utilised the Wholesale Price Index (WPI) to track inflation. However, the Reserve Bank of India changed its mind in 2014. The central bank began to take the Consumer Price Index (CPI) as a significant gauge of inflation. The concept is straightforward: inflation should be assessed by the increase in the price of a basket of inflationary items that directly affect the common person. CPI-based inflation is more accurate than WPI-based inflation in capturing this. The WPI had two flaws, according to the RBI. First, the common person deals with the Consumer Price Index (CPI), therefore it's critical to address these issues; second, the WPI includes a large number of traded manufactured items and commodity prices, all of which are established on the worldwide market.

There are six component found in CPI basket that is –

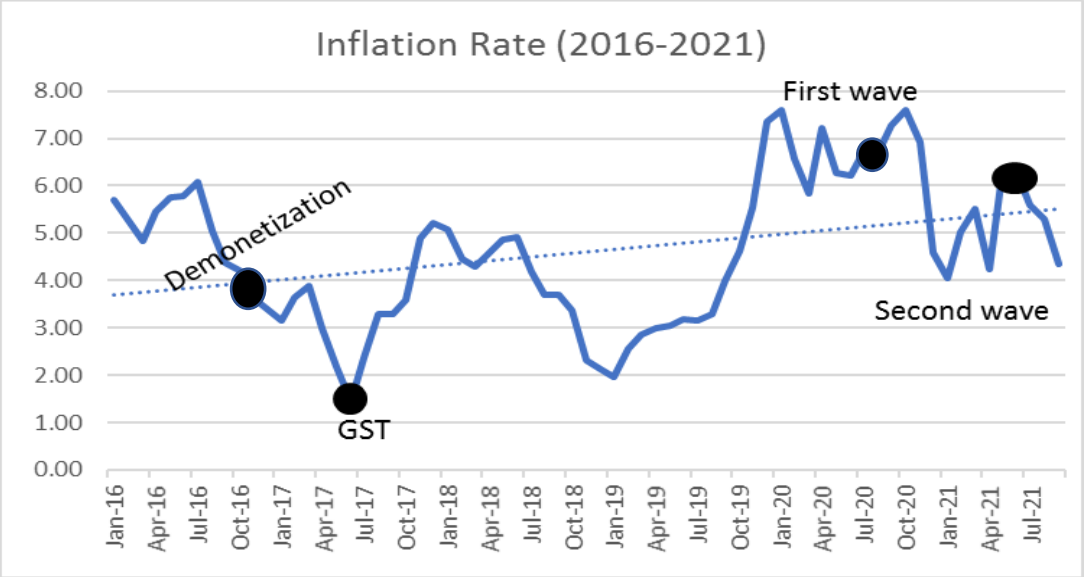
Table- 1.1 -CPI basket of items-

CPI component	weightage
Food and beverage	45.86
Pan and Tobacco	2.38
Clothes and Footwear	6.53
Housing	10.07
Fuel and Light	6.84
Miscellaneous (Household goods and services, Health, Transport and communication, Recreation and amusement, Education, Personal care and effects)	28.32
Total	100

Source – RBI data base

Inflation rate at 2016-2017

Figure – 2.1 Monthly inflation in the period (2016 – 2021).



Source -RBI

In the figure, we can clearly see that inflation rate was highly violating in the given period of time. Some previous research explore that –

Anjali Ahuja, Sakshi Anand (2017) - The move of demonetization has affected the purchasing power. This is mainly affect those assets that are used as long term investments like Real Estate, Vehicles and core sectors of cement and steel. Purchasing power of consumer is also affected due to the shortage of cash because 90% transactions taking place in cash in the Indian economy. Inflation arises due to higher liquidity in the market. Because of demonetization there is less liquidity and less cash flow in the market that's why inflation becomes down.

Madhu Bala (2018) - The proposed GST may lead to increase the price of essential products and services which are presently exempted from the taxation.

Economy survey (2018-19) revealed that the lower food inflation is the reason of lower CPI inflation in 2018-19.

Economy survey(2020-21) the average headline Consumer Price Index-Combined (CPI-C) inflation in India moderated to 5.2 per cent in 2021-22 (April-December) from 6.6 percent in the corresponding period of 2020-21 and was recorded at 5.6 per cent in December 2021. The

Consumer Price Index inflation remained range bound as food prices eased considerably due to the supply management response by the Government.

There are two main type of CPI which explore more inflation condition in the economy –

3.1(b) Core inflation –

Core inflation refers to the change in the cost of goods and services excluding the food and energy sectors. These items are not included in our estimate of inflation since their prices are significantly more unpredictable. It is most often calculated using the consumer price index (CPI), which is a measure of prices for goods and services.

3.1(c) Food inflation –

Food inflation refers to a rise in the price of food across a country. Between 2006 and 2014, India's high and persistent food inflation became a serious problem. While food inflation averaged 9% over this time, it peaked at 20% in late 2009. Given that food accounts for 45 percent of India's consumption basket, sustained high food inflation has considerable welfare implications. With 21.9 percent of the population, or around 270 million people, living in poverty and already consuming food below the subsistence level, continued high food inflation has detrimental effects. Food inflation must consequently be effectively stabilised, which necessitates a thorough understanding of its roots and consequences

3.1(d) Unemployment –

In economics literature, unemployment has no exact definition. Unemployment is defined as the percentage of the labour force that is without a job but is able, willing, and qualified to work by laymen. It is defined by economists as the percentage of the labour force that is without a job but is able, willing, and qualified to work. In other words, regardless of how unemployment is measured, the underlying philosophy is that those who should be working are not doing so (Gbosi;2004). The unemployment rate is used to calculate the level of unemployment in a country. The formula for calculating the unemployment rate is as follows:

$$Unemployment\ rate = \frac{No\ of\ people\ unemployed}{Labour\ force} \times 100$$

The National Sample Survey Organization (NSSO) defines employment and unemployment in terms of an individual's activity status:

'Employed' means working (doing something for a living).

'Unemployed' means looking for work or being available for work.

Neither looking for work nor available for it.

3.1(e) Type of Unemployment –

(a) Disguised Unemployment- It's a situation when more individuals are working than are actually needed. Even if some are removed, production is unaffected. In other words, it refers to a situation in which there is an excess of labour and some employees have zero marginal productivity. As a result, their removal will have no effect on total output volume. The major causes of disguised unemployment in India include overcrowding in agriculture as a result of fast population increase and a lack of other job possibilities.

(b) Seasonal Unemployment - It is a type of unemployment that occurs at specific times of the year. Production activities are limited in various businesses and occupations, such as agriculture, vacation resorts, ice manufacturers, and so on. As a result, they only provide employment for a limited time each year. Those who indulge in such activities may find themselves unemployed during the off-season.

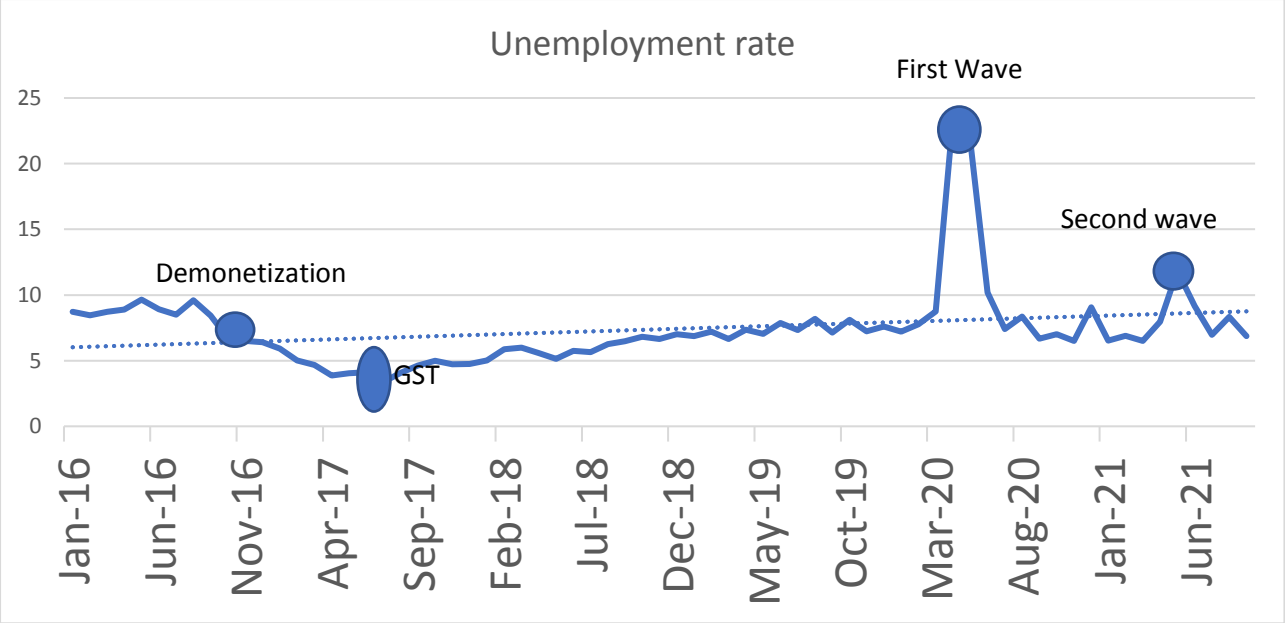
(c) Cyclical Unemployment - It is brought by by trade cycles that occur at regular periods. Trade cycles are a feature of most capitalist economies. Unemployment occurs from a drop in corporate activity. Normally, cyclical unemployment is a one-time occurrence.

(d) Fractional Unemployment - This sort of unemployment occurs when a country's economic structure changes dramatically. These changes may have an impact on either the supply or demand for a production factor. Structural employment is a natural byproduct of economic expansion, technical improvement, and innovation, all of which are occurring at breakneck speed around the world in every area.

In India, we are seeing a high unemployment rate in the period from 2011 to 2021. There are many reasons for the unemployment rate. Some previous studies have explored this direction. Bhandari and

Dubey (2019) have argued that employment rose by 23 million during this period, while Mehrotra and Parida (2019), Himanshu (2019), and Kannan and Raveendran (2019) all observe that it has fallen. However, the estimates of the fall vary from 6.2 million to 15.5 million. Paaritosh Nath (2020) has analysed that employment growth has been weak in many demographic groups (men, women, urban, rural) and has lagged behind population growth. In every g+ roup, the results show a decline in labour force participation and an increase in unemployment.

Figure – 2.2 Monthly unemployment rate in period 2016 -2021



Source – CMIE data base

In the figure, we can clearly see that in the time of COVID-19 period, we have seen a high unemployment in India but before COVID-19 period, we were still facing the problem of unemployment. Some previous research explore that –

Pawan Kumar(2017) - Employment scenario in the country is not conducive enough to face any challenge such as the demonetization' of currency.

All India Trade Union Congress (AITUC) in July found that a fifth of India's 63 million small businesses – contributing 32% to the economy and employing 111 million people – faced a 20% fall in profits since the GST rollout, and had to sack hundreds of thousands of workers.

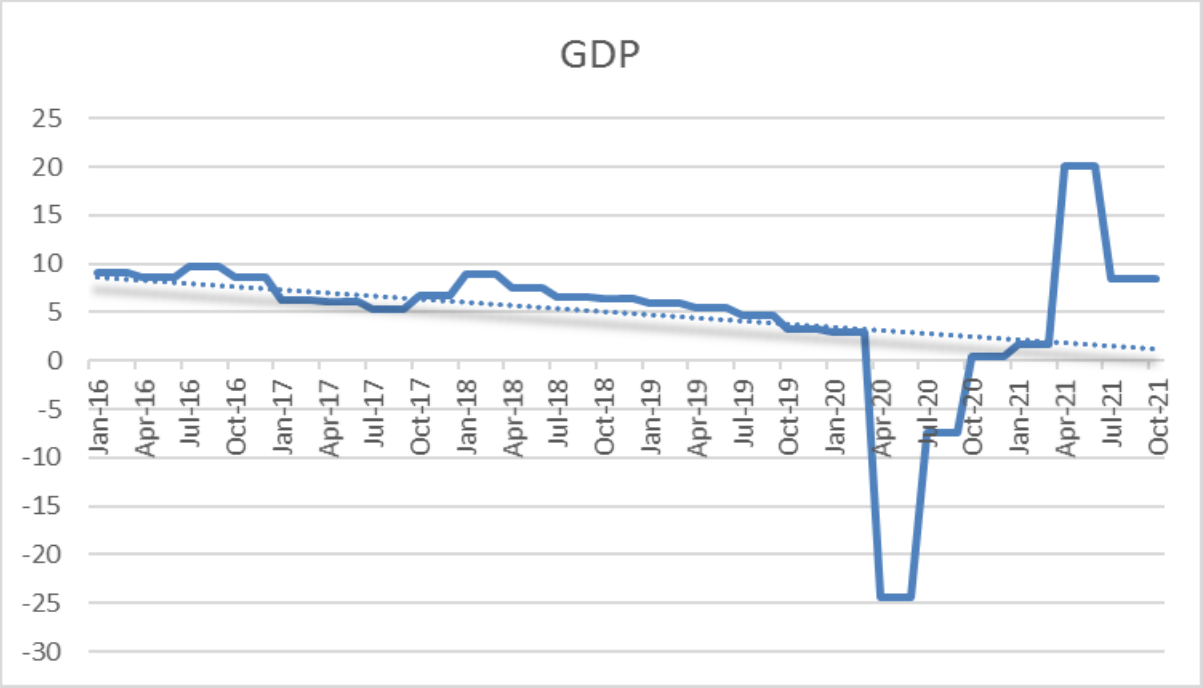
The CMIE also reported that the unemployment rate for the urban areas increased from 8.21% to 9.3%, and from 6.44% to 7.28% for the rural areas.

The All India Manufacturers' Organization (AIMO), which represents traders and small-, medium- and large-scale industries, conducted survey and has found a drop in employment of 60 per cent and loss in revenue of 55 after demonetization last year.

3.1(f) Gross Domestic Product –

Gross Domestic Product (GDP) is explain as the total market value of all final goods and services produced in the domestic territory of a country in a given period of time.

Figure -2.3 Monthly GDP(Gross Domestic Product) in the period 2016-2021



Source – RBI data base

In the given figure, we can see that in the given period of time GDP is going downward. At this period of time we have seen some policy which effects Indian economy so much like demonetization, GST. It has not only slow down India economy but also effect the major sector of the economy. We can see in the figure that we was facing the problem of lower GDP before COVID-19 pandemic but after pandemic we have seen negative GDP in the economy and our study try to find out the effect of time in this period so that we can explore the reason and solution.

3.2 Objective –

To analysis the trend of unemployment, inflation and Gross Domestic Product in Indian economy.

3.3 Hypothesis –

According to our objective we have created three hypothesis to explain our objective that is –

- There is insignificant relation between trend and inflation rate in India.
- There is insignificant relation between trend and unemployment rate in India.
- There is insignificant relation between trend and Gross Domestic Product in India.

3.4 Methodology –

We have taken data from RBI , CMIE and MOSPI monthly from period 2016 to 2021.

Definition of trend line –

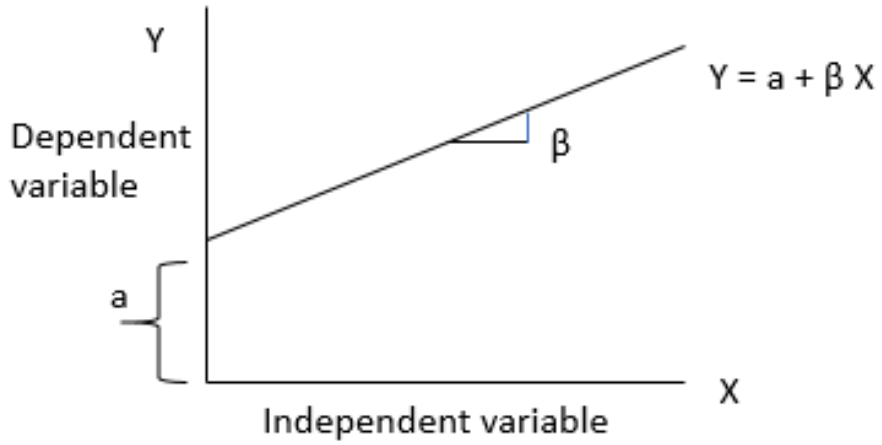
Analyst draws trendlines on charts to link a series of events or to show the best fit of data. The generated line is then used to provide the analyst a good idea of how a variable's value could change in the future.

The present study use least square method to estimate the secular trend. The reason for using this method are :

This is the most significant method of trend estimation.

It gives the best fit line and provides the linear regression equation.

Linear equation line - $Y = a + \beta X$, where Y = dependent variable, a = intercept, β = slope, X= independent variable

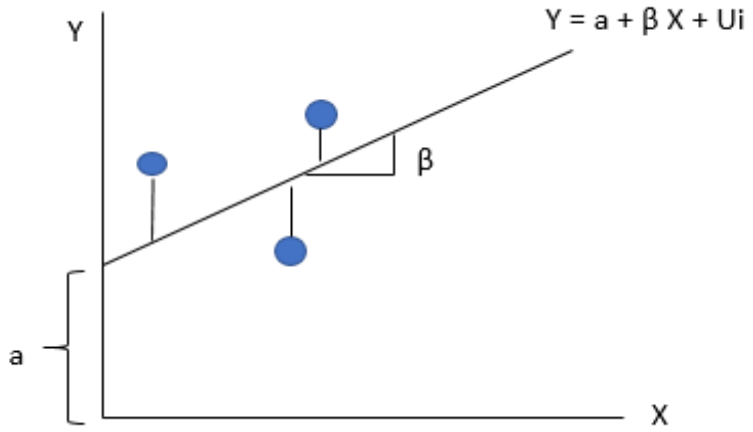


Least Square method equation –

$$Y = a + \beta Xi + Ui$$

where Y = dependent variable, a = intercept, β = slope,

Xi= independent variable, Ui = residual



3.4(a) Econometrics equation used in variables –

In order to investigate empirically the link between trend and these three variables (inflation, unemployment and GDP)

In the first model, inflation rate will be regressed on time to determine the explanatory variable's influence on the explained variable.

In the second model, unemployment rate will be regressed on time to determine the explanatory variable's influence on the explained variable.

In both models, we will look at whether or not there is a link between inflation and unemployment with time.

In the third model, GDP will be regressed on time to determine the explanatory variable's influence on the explained variable.

3.4(b) Functional form of model –

First model - INF = f(time) Second model – UNEMP=f(time)

Where , INF= Inflation Rate UNEMP= Unemployment rate f = functional relationship

Third model – GDP = f(time)

Where , UNEMP= Unemployment Rate GDP= Gross Domestic Product f = functional relationship

3.4(c) Econometrics model –

First model - $INF = \beta 0 + \beta 1time + Ut$…….. eq1

Second model - $UNEMP = \beta 0 + \beta 1time + Ut$…… eq2

Third model - $GDP = \beta 0 + \beta 1time + Ut$…….. eq3

Where INF = Inflation rate

UNEMP = Unemployment rate

GDP = Gross Domestic Product

$\beta 0$ = It is intercept depicting explained variable when explanatory variables are equal to zero.

$\beta 1$ = Co-efficient or parameters attached to the explanatory variable

Ut = Stochastic or error term (capture the impact of other variables that are not included in the model

3.4 (d) Statistics work (descriptive work)

3.4(d)1 Evaluation based on Statistical Criteria –

(a) R2(Coefficient of determination) –

R2 is a coefficient of determination that is used to determine how differences in one variable may be explained by variations in another. R-squared calculates the percentage of variance in y(explained variable) that can be explained by x(explanatory variable). 0 to 1 is the range (i.e. 0 percent to 100 percent of the variation in y can be explained by the x-variables).

(b) The t-test (Student t):

A t-test is an inferential statistic that is used to see if there is a significant difference between the means of two variables that are connected in some way. A two-tail test is conducted at 5% level of significance, under n-k degrees of freedom. Where n is the number of observation and k is the number of samples.

(c) The F test –

When you do an ANOVA test or a regression analysis to see if the means of two populations are substantially different, you get a F statistic. A T-test will tell you if a single variable is statistically significant, while a F test will tell you if a combination of variables is jointly significant.

We are using secondary time series data,

Table 1.2 Annual Distribution of Unemployment rate, Inflation rate and GDP

Variable	Minimum	Maximum	Mean	Std.Deviation
Unemployment Rate	3.37	23.52	7.392571	3.104368
Inflation Rate	1.46	7.61	4.603143	1.506687
GDP	-24.42831	20.13039	4.856021	7.802505

The descriptive data regarding unemployment rate, inflation rate, and GDP are provided in the table above. The unemployment rate has a minimum value of 3.37, whereas the inflation rate and GDP have minimum values of —1.46 and -24.4. In addition, based on the above table, GDP has the lowest value when compared to other variables, while inflation rate has the greatest minimum value when compared to other variables.

Unemployment rate has a maximum value of 23.52, inflation rate has a maximum value of 7.61, and GDP has a maximum value of 20.13 percent. As a result, GDP has the largest possible value, whilst inflation rate has the lowest maximum value. The unemployment rate has a mean value of 7.39, inflation has a mean value of 4.6, and GDP has a mean value of 4.85, according to the data. In comparison to other variables, the unemployment rate has the greatest mean value while inflation has the lowest mean value.

The unemployment rate standard deviation is 3.10 SD, the GDP is 7.80 SD, and the inflation rate is 1.50 SD. In comparison to other variables, GDP has the largest SD value, while inflation rate has the lowest. Among variables, there is the highest fluctuation seen in GDP.

3.5 BI- variants regression analysis result –

3.5 (a) First model –

$$INF = \beta 0 + \beta 1 time + Ut$$

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 1.3 Distribution of interpretation of Regression Statistics (INF-time)

		Explanation
Multiple R	0.18	R=square root of R2
R square	0.1125	R2
Adjusted R square	0.1024	Adjusted R2 used more than one variables
Standard error	1.42	This is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

Multiple R shows the correlation between the Explained variable (inflation rate) and explanatory variable(time). The value is 0.18 and it's means in first equation model ,there is lower correlation find in inflation rate and time.

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.1125 explain that model is not overall goodness of fit measure.

Adjusted R square for explanatory variable (time) is 0.1024 which means that explanatory variable is insignificance.

Standard error estimate the standard deviation of the error term.

(b) Interpretation of ANOVA -

Table 1.4 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	1	18.077	18.077	8.87	0.004*
Residual	68	138.56	2.037		
Total	69	156.63			

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01 > 0.004 ,we reject H0 at significance level 0.01.

(c) Analysis of Regression Coefficient –

Table 1.5 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	3.710286	.3449178	2.98	0.00	3.022013	4.398559
Time	.0251509	.0084441	10.76	0.004	0.008301	0.0420008

INF (Inflation rate) denotes the regress and coefficient of the regressor (intercept,time)

Column “coefficient” gives the least square estimate of time

Column “standard error” gives the standard error (i.e. the estimate standard deviation) of the least squared estimate $\beta 0$.

Column “t stat” gives the computed t statistic for H0: INF = 0 against Ha: INF ≠ 0.

Column “p-value” gives the p-value for test of H0: INF = 0 against Ha: INF ≠ 0.

This equals the Pr{|t| > t statistics } where t is a t- distributed random variable with n-k degrees of freedom and t-statistics is the computed value of the t-statistics given in the previous column.

Column “Lower 95% “and “Upper 95%” values define a 95% confidence interval for time

The above output value is put in the equation (1), we get,

$$INF = \beta 0 + \beta 1 timeP + Ut \ldots\ldots\ldots\ldots\ldots \text{eq1}$$

$$INF = 3.71 + \beta 1(0.025)$$

$$(0.00)^* \qquad (0.004)^*$$

(d) Confidence Intervals for Slope Coefficient –

95% confidence interval for slope coefficient $\beta 1$ is from Stata out shown,

. $\beta 1 = (.008301, .0420008)$

Testing of Hypothesis of zero slope coefficient (Test of statistical significance)

The coefficient of time has estimated standard error of. 1.72 , t statistic 2.98 and p-value 0..It is statistically significant at significance level $\alpha = 0.00$ as $p < 0.01$.

There are 70 observation and 2 regressor (intercept and time)

Testing of Hypothesis on a Regression Parameter

Here we test whether INF has coefficient $\beta 1 = 0$

Example: H0: $\beta 1 = 0$ against Ha: $\beta 1 \neq 0$ at significance level $\alpha = 0.01$.

Then

$$t = \frac{(\text{b1} - \text{H0 value of } \beta 1)}{(\text{standard error of b1})} = \frac{(.0251509 - 0)}{(0.00844)} = 2.98$$

(e) Using critical value approach –

t = 2.98

the critical value is t = 0.05(1) =2.37 [Here n =69 and k=2 so n-k =67]

Thus null hypothesis is rejected at level 0.05 since t = 2.98 > 2.2.

Overall testing of significance of the regression parameters –

We test H0 : $\beta 1 = 0$ versus Ha: $\beta 1 \neq 0$

From the ANOVA table the F test statistic is 8.87 with p-value 0.004*. Since p-value is greater than 0.01*, null hypothesis should reject, the regression parameter is 0.025 at significance level 0.01. It concludes that parameter is statistically significant at significance level 0.01*.

3.5 (b) Second model -

UNEMP = β0 + β1time+ Ut…….eq 2

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 1.6 Distribution of interpretation of Regression Statistics (UNEMP-time)

		Explanation
Multiple R	0.256	R=square root of R2
R square	0.0654	R2
Adjusted R square	0.0516	Adjusted R2 used more than one variables
Standard error	3.02	This is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

Multiple R shows the correlation between the Explained variable (Unemployment rate) and explanatory variable (time). The value is 0.256 and it's means in second equation model, there is lower correlation find in unemployment rate and time.

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.0654 explain that model is not overall goodness of fit measure.

Adjusted R square for explanatory variable (time) is 0.0516 which means that explanatory variable is insignificance.

Standard error estimates the standard deviation of the error term.

(b) Interpretation of ANOVA

Table 1.7 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	1	43.4771051	43.4771051	4.76	0.0326*
Residual	68	621.483037	9.13945642		
Total	69	664.960142			

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression (inflation rate) sum of square.

The above table, column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since $0.03<0.05$, we reject H0 at significance level 0.05.

(c) Analysis of Regression Coefficient –

Table 1.8 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	6.007901	.7304848	8.22	0.00	4.550241	7.46556
Time	.0390048	.0178833	2.18	0.03	0.0033192	0.0746904

UNEMP(Unemployment rate)denotes the regress and coefficient of the regressor (intercept, time)

Column "coefficient" gives the least square estimate of time

Column "standard error" gives the standard error(i.e. the estimate standard deviation) of the least squared estimate $\beta 0$.

Column "t stat" gives the computed t statistic for H0: UNEMP = 0 against Ha: UNEMP $\neq$ 0.

Column "p-value" gives the p-value for test of H0: UNEMP= 0 against Ha: UNEMP $\neq$ 0.

This equals the Pr{|t| > t statistics } where t is a t- distributed random variable with n-k degrees of freedom and t-statistics is the computed value of the t-statistics given in the previous column.

Column "Lower 95% " and "Upper 95%" values define a 95% confidence interval for time

The above output value is put in the equation (2), we get,

$$UNEMP = \beta 0 + \beta 1 time + Ut \ldots\ldots\ldots\ldots\ldots \text{ eq2}$$

$$UNEMP = 6.007901 + \beta 1\ (0.0390048)$$

$$(0.00)^* \qquad (0.03)^*$$

(d) Confidence Intervals for Slope Coefficient –

95% confidence interval for slope coefficient β1 is from Stata out shown,

. β1 = (0.0033192, .0746904)

Testing of Hypothesis of zero slope coefficient (Test of statistical significance)

The coefficient of INF has estimated standard error of 0.0178, t statistic 2.18 and p-value 0.03*. It is statistically significant at significance level $\alpha = 0.05$ as $p < 0.05$.

There are 68 observation and 2 regressor (intercept and time)

Testing of Hypothesis on a Regression Parameter

Here we test whether UNEMP has coefficient $\beta 1 = 0$

Example: H0: $\beta 1 = 0$ against Ha: $\beta 1 \neq 0$ at significance level $\alpha = 0.05$.

Then

$$t = \frac{(b1 - \text{H0 value of } \beta 1)}{(\text{standard error of b1})} = \frac{(.0390048 - 0)}{(0.017883)} = 2.18$$

(e)Using critical value approach –

t = 2

the critical value is t = 0.05(1) = 2. [Here n =68 and k=1 so n-k =67]

Thus null hypothesis is rejected at level 0.05 since t = 2 < 2.18

Overall testing of significance of the regression parameters –

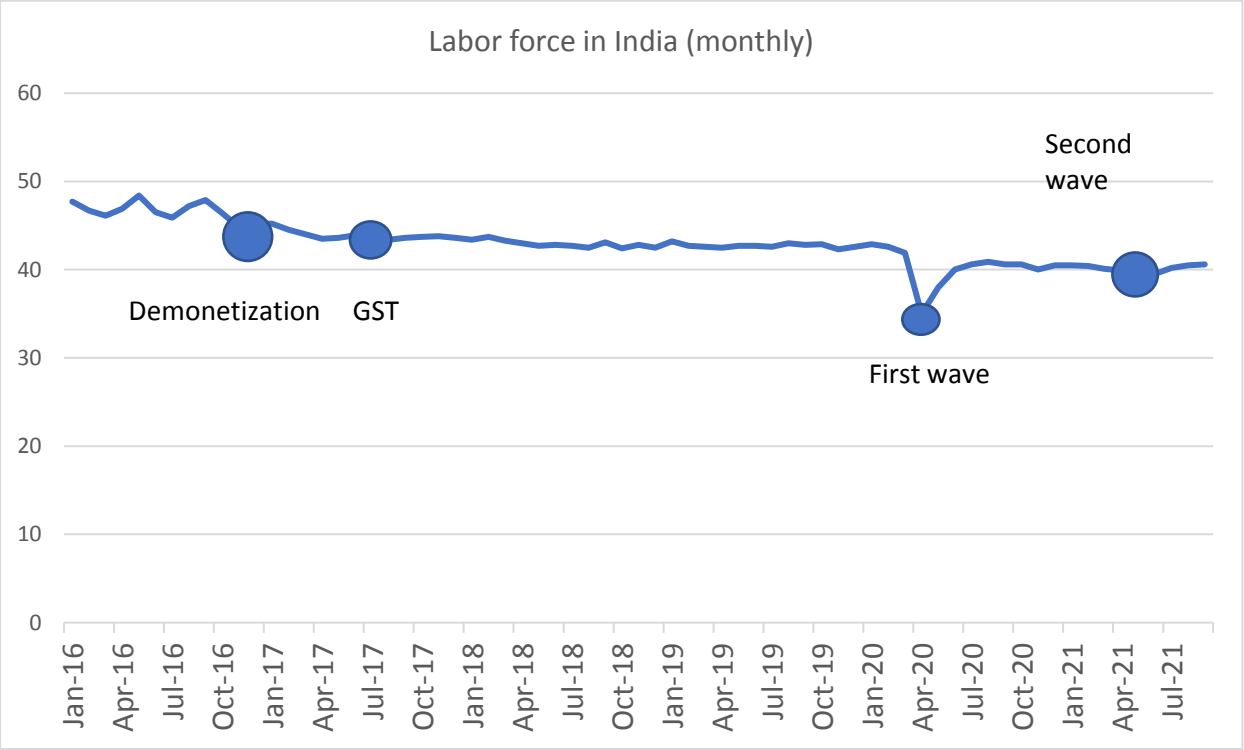
We test H0 : $\beta 1 = 0$ versus Ha: $\beta 1 \neq 0$

From the ANOVA table the F test statistic is 4.76 with p-value 0.03*. Since p-value is greater than 0.05, null hypothesis should rejected, the regression parameter are 0.03 at significance level 0.05. It conclude that parameter are statistically significant at significance level 0.05.

In the empirical analysis, we have clearly seen that in the given period of time, trend line of unemployment rate is going upward. There are some other major proof that gives a evidence that in this given period of time India are highly facing a problem of unemployment. Some of the evidence are these –

- **Decreasing labour force in India-**

Figure 2.4 Monthly labour force in the period 2016-2021

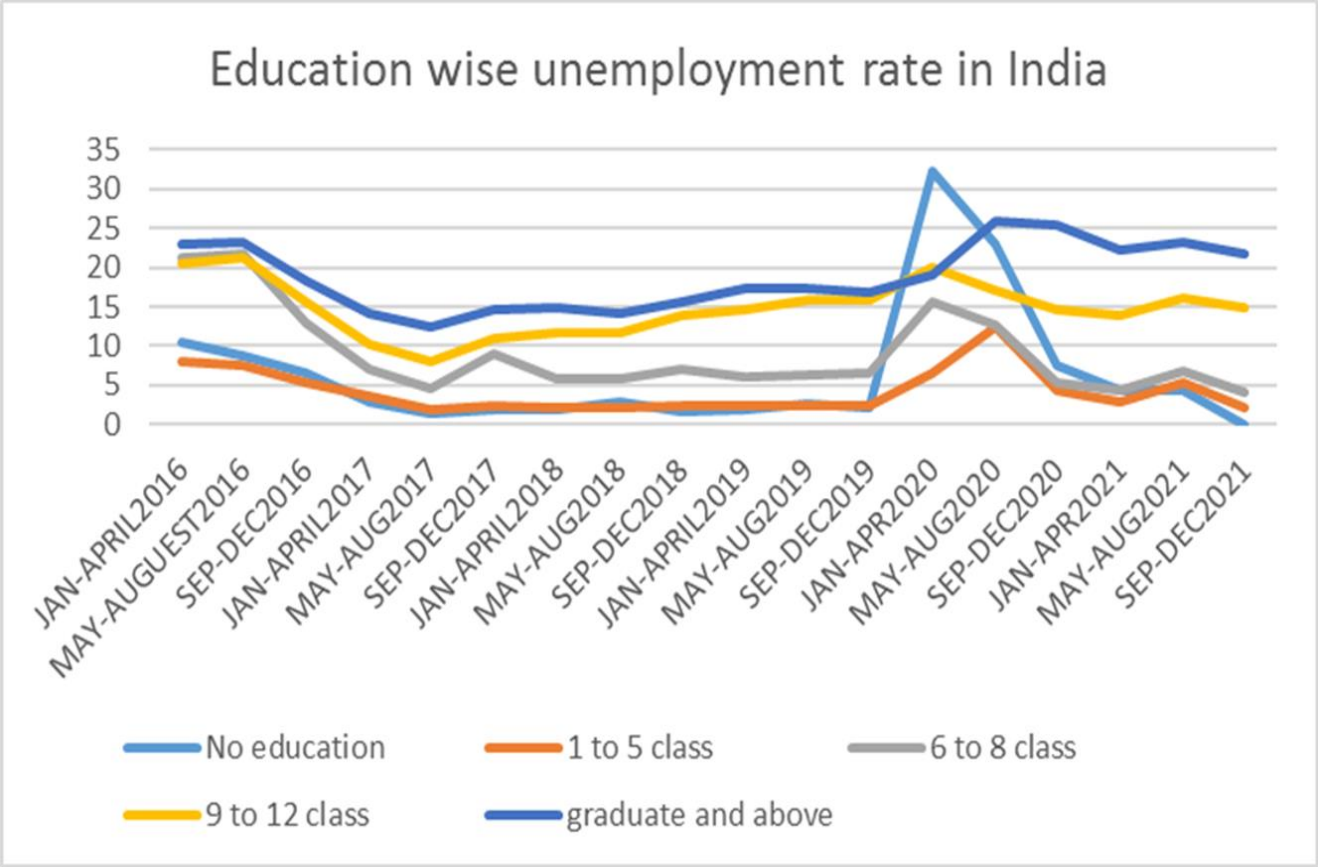


Source – CMIE data base

In the given figure, we can see that in the given period of time India labour force is decline and this is not a good sign for the country economy. COVID-19 pandemic is affect the unemployment rate but before COVID-19 pandemic India still facing the problem of unemployment and some policy like demonetization and GST have impacted the labour force but we have to analysis the problem of declining labour force in India.

- **Education wise unemployment rate in India –**

Figure-2.5 Quarterly wise education wise unemployment rate



Source- CMIE data base

In the figure, we see that graduate and above labours are highly unemployment as we compare to other education category and that give us clear fact that in Indian economy, we are not providing demand labour labour-force, which is demanded by firms and company. Our supply is not fulfilling the demand of labour which want in the economy. This situation clearly show the reason of skill gap that is increasing. COVID-19 also has affected the unemployment rate but we cannot give full blame to pandemic, before pandemic, we were still facing the problem of unemployment in India and skill gap is a major reason of unemployment in India. That is the main reason of unemployment.

- **Age wise unemployment rate –**

India knows as the highest youth population in the world. But still it is facing the problem of demanded labour force. India demographic dividend is very high but country is not getting a advantage of demographic dividend. CMIE data shows that in all age group, youth age population (15-29) is the highest unemployment rate in India.

Table – 1.9 Age population wise unemployment rate and LPR

2017	Age	%population	% labour force	%LPR	Unemployment	out of labour force
	15-29	0.35	0.26	0.32	0.14	0.06
	30-44	0.29	0.37	0.55	0.01	0.01
	45-59	0.24	0.31	0.56	0.01	0.01
	60>=	0.11	0.07	0.27	0.01	0.02
2018						
	15-29	0.35	0.26	0.32	0.20	0.06
	30-44	0.29	0.37	0.54	0.01	0.01
	45-59	0.25	0.32	0.56	0.00	0.00
	60>=	0.11	0.05	0.21	0.01	0.00
2019						
	15-29	0.35	0.26	0.32	0.26	0.07
	30-44	0.28	0.35	0.53	0.01	0.02
	45-59	0.26	0.34	0.56	0.00	0.01
	60>=	0.11	0.05	0.19	0.00	0.01
2020						
	15-29	0.34	0.24	0.28	0.29	0.12
	30-44	0.28	0.35	0.51	0.04	0.04
	45-59	0.27	0.37	0.54	0.03	0.03
	60>=	0.11	0.05	0.18	0.04	0.04

Source – CMIE data base

In the figure, in all age category, youth unemployment(15-29,according to national youth policy,2013) is facing a highest unemployment rate at this given period of time and according to Niti-Aayog , we have a highest demographic dividend advantage but data show that we are not utilizing the demographic dividend.

3.5 (c) Third model –

GDP= β0 + β1time +Ut…….. eq3

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 1.10 Distribution of interpretation of Regression Statistics (-GDP – time)

		Explanation
Multiple R	0.28	R=square root of R2
R square	0.0831	R2
Adjusted R square	0.0697	Adjusted R2 used more than one variables

Standard error	7.5071	This is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

Multiple R shows the correlation between the Explained variable (GDP) and explanatory variable(time). The value is 0.28 and it's means in third equation model ,there is correlation find in GDP and time.

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.0831 explain that model is overall goodness of fit measure.

Adjusted R square for explanatory variable (time) is 0.0697 which means that explanatory variable is insignificance.

Standard error estimate the standard deviation of the error term

(b) Interpretation of ANOVA

Table 1.11 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	1	347.478326	347.478326	6.17	0.0155*
Residual	67	3832.22108	56.3561924		
Total	68	4179.69941			

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.02< 0.05 ,we can reject H0 at significance level 0.05.

(c) Analysis of Regression Coefficient –

Table 1.12 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	8.731677	1.813935	4.81	0.00*	5.112025	12.52
time	-0.110268	0.0444077	-2.48	0.015*	-0.19888	-0.0216543

GDP(Gross Domestic Product) denotes the regress and coefficient of the regressor (intercept, time)

Column "coefficient" gives the least square estimate of time

Column "standard error" gives the standard error(i.e. the estimate standard deviation) of the least squared estimate β0.

Column "t stat" gives the computed t statistic for H0: GDP = 0 against Ha: GDP ≠ 0.

Column "p-value" gives the p-value for test of H0: GDP = 0 against Ha: GDP ≠ 0.

This equals the Pr{|t| > t statistics } where t is a t- distributed random variable with n-k degrees of freedom and t-statistics is the computed value of the t-statistics given in the previous column.

Column "Lower 95% " and "Upper 95%" values define a 95% confidence interval for time

The above output value is put in the equation (3), we get,

$$GDP = \beta 0 + \beta 1 time + Ut \ldots\ldots\ldots\ldots\ldots \text{ eq3}$$

$$GDP = 8.73 - (0.1102)\ time$$

(d) Confidence Intervals for Slope Coefficient –

95% confidence interval for slope coefficient β1 is from Stata out shown,

$$. \beta 1 = (-0.1988828 \quad -0.0216543)$$

Testing of Hypothesis of zero slope coefficient (Test of statistical significance)

The coefficient of time has estimated standard error of 0.044 , t statistic -2.48 and p-value 0.015* .It is statistically significant at significance level $\alpha = 0.05$ as $p < 0.05$.

There are 69 observation and 2 regressor (intercept and time)

Testing of Hypothesis on a Regression Parameter

Here we test whether GDP has coefficient β1 =0

Example: H0: $\beta 1 = 0$ against Ha: $\beta 1 \neq 0$ at significance level $\alpha = 0.05$.

Then

$$t = \left| \frac{(b1 - \text{H0 value of } \beta 1)}{(\text{standard error of } b1)} \right| = \frac{(-0.1102 - 0)}{(0.044)} = 2.48$$

(e) Using critical value approach –

t = 1.99

the critical value is t = 0.05(1) = 1.99[Here n =68 and k=1 so n-k =67]

Thus null hypothesis is rejected at level 0.05 since t = 2.48 > 1.99

Overall testing of significance of the regression parameters –

We test H0 : $\beta 1 = 0$ versus Ha: $\beta 1 \neq 0$

From the ANOVA table the F test statistic is 6.17 with p-value 0.015*. Since p-value is less than 0.05, null hypothesis should rejected, the regression parameter are -0.1102 at significance level 0.05. Aslo constant is significant at 0.01 level of significance so It conclude that parameter are statistically significant at significance level 0.05.

Predicted value of Unemployment given GDP-

One unit increase in time will decrease GDP by 0.1102 unit if all variable are constant .

Consider in case where time is 4 so our Unemployment will be –

GDP = (-0.1102) * 4

GDP = 0.4408

- We will not take intercept value because it is insignificant at 0.05 level of significance

3.6 Conclusion of the econometric model –

3.6(a) First model –

$INF = \beta 0 + \beta 1 time + Ut$…… eq1

Null hypothesis H0 : There is a insignificant relationship between inflation and unemployment.

Alternative hypothesis Ha : There is a significant relationship between inflation and unemployment

INF = 3.71 + β1(0.025)

(0.00)* (0.004)* [significance level which less than 0.01]

Yes, There is a significant relationship between inflation and time t.so null hypothesis is false.

Multiple R - Multiple R shows the correlation between the Explained variable (inflation rate) and explanatory variable(unemployment rate). The value is 0.34 and it's means in first equation model ,there is lower correlation find between inflation and time in India
R square - R square measure the overall goodness of fit and result 0.1154 explain that model is overall goodness of fit measure
Adjusted R square - Adjusted R square for explanatory variable (time) is 0.1024 which shows 0.1024 variation in dependent variable is explained by the independent variable when degree of freedom is taken care off.

INF = 3.71 + β1(0.025)

(0.00)* (0.004) * [significance level which less than 0.01]

There is a positive relation between time and inflation rate.

The intercept of Inflation rate when explanatory variables (time) are held constant at 3.71 but it is significant at the 5% level of significance so the intercept is effect inflation rate .

The coefficient of time explain - when there is one unit increase in time ,inflation rate will be increased by 0.025 unit and it is significant at the 5% level of significance so the time has positive relationship with inflation rate and it is effect inflation rate.

3.6(b) Second model -

UNEMP = β0 + β1time + Ut……..eq2

Null hypothesis H0 : There is a insignificant relationship between unemployment rate and time.

Alternative hypothesis Ha : There is a significant relationship between unemployment rate and Time.

UNEMP = 6.007901 + β1 (0.0390048)

(0.00)* (0.03) [significance level which less than 0.05]**

Yes, There is a significant relationship between unemployment and time.so null hypothesis is false.

Multiple R - Multiple R shows the correlation between the Explained variable (unemployment rate) and explanatory variable(time). The value is 0.26 and it's means in second equation model ,there is lower correlation find in unemployment rate and time.
R square - R square measure the overall goodness of fit and result 0.0654 explain that model is not overall goodness of fit measure
Adjusted R square - Adjusted R square for explanatory variable (time) is 0.0516-which shows 0.0516 variation in dependent variable is explained by the independent variable when degree of freedom is taken care off.

UNEMP = 6.007901 + β1 (0.0390048)

(0.00)* (0.03) [significance level which less than 0.05]**

There is a positive relation between unemployment rate and time.

The intercept of Unemployment rate when explanatory variables (time) are held constant 6.007 and it is significant at the 5% level of significance so the intercept is effect unemployment rate.

The coefficient of inflation rate explain - when there is one unit increase time, unemployment rate will be increased by 0.039 unit and it is significant at the 5% level of significance so the time has positive relationship with unemployment rate and it is effect unemployment rate.

3.6(c) Third model –

GDP = β0 + β1time +Ut…….. eq3

Null hypothesis H0 : There is a insignificant relationship between GDP and time.

Alternative hypothesis Ha : There is a significant relationship between GDP and time.

GDP = β0 + β1time +Ut …….. eq3

GDP = 8.73 - (0.1102) time

[intercept value is significant at 1% level of Significance]

[time coefficient is significant at 5% level of significance]

Yes, There is a significant relationship between GDP and time .so null hypothesis is false.

Multiple R - Multiple R shows the correlation between the Explained variable (GDP) and explanatory variable(time). The value is 0.29 and it's means in first equation model ,there is lower correlation find in GDP and time.
R square - R square measure the overall goodness of fit and result 0.0831 explain that model is overall goodness of fit measure.
Adjusted R square - Adjusted R square for explanatory variable (time) is which shows 0.0697 variation in dependent variable is explained by the independent variable when degree of freedom is taken care off.

GDP = 8.73 - (0.1102) time

(0.00)* (0.015)**

[intercept value is significant at 1% level of Significance]

[time coefficient is significant at 5% level of significance]

There is a negative relation between GDP and time.

The intercept of GDP when explanatory variables (time) are held constant at 8.73 and it is significant at the 1% level of significance so the intercept is effect GDP.

The coefficient of time explain - when there is one unit increase time ,GDP will be decreased by 0.1102 unit ,keep other variable constant . it is significant at the 5% level of significance so the GDP has negative relationship with time and it is effect GDP.

3.7 Conclusion –

We've looked at trend and regression analysis of inflation and unemployment rates, as well as GDP with time, in this chapter. In the trend analysis, we see that there is relation between inflation with time and unemployment with time in developing countries like India, and with the help of regression analysis, we see that there is a positive relation of inflation with time and positive relation of unemployment with time. On the other hand we see that according to time, country GDP growth rate is declining. So this is clear the evidence that we are suffering the problem of stagflation.

Chapter - IV

Pandemic of COVID-19 impact on Inflation, Unemployment and GDP in India

4.1 Introduction –

In March 2020, the World Health Organization (WHO) proclaimed the CORONA (COVID-19) outbreak a pandemic. It has been a significant impact on the global economy from 2020 to 2021. As a result of the epidemic, every country's GDP has suffered, and most nations labour force has shrunk. Both developed and poor countries are affected. In the case of India, it has a significant influence on the Indian economy. In the years 2020 to 2021, we saw the highest unemployment and inflation rates. The year (2020-21), GDP, which is a measure of growth rate, has been negative as seen in this period. Before 2020, India was still dealing with unemployment and inflation, but the epidemic had exacerbated the problem. So, on behalf of this scenario, the goal of this chapter is to assess the impact of COVID-19 on unemployment, inflation rates and GDP in the Indian economy in the short-term period.

4.1(a) Covid-19 in India-

The COVID-19 pandemic has resulted in a significant loss of human life throughout the world, and it poses an unprecedented threat to public health, food systems, and the workplace. The pandemic's economic and social effects are devastating: tens of millions of people are at risk of sliding into severe poverty, and the number of people who are undernourished, which is presently estimated to be around 690 million, might rise to 132 million by the end of the year.

The COVID-19 pandemic in India is part of the global coronavirus disease pandemic of (COVID-19), which is caused by the coronavirus 2 that causes severe acute respiratory syndrome (SARS-CoV-2). According to World health organisation estimates, India has the world's second-highest number of confirmed cases of COVID-19 infection (after the United States) and the third-highest number of COVID-19 deaths (after the United States and Brazil) with 476,869 deaths.

In India we have seen two wave of covid-19 pandemic and according to compare both of them we find that the economic impact of the second wave has been less severe than the first wave due to less limitations on social movement during the second wave compared to the first wave's lockdown measures. When compared to the first wave, socioeconomic indices such as power

demand, labour participation, and railway freight traffic declined less during the second wave. Despite the severity of the second wave, the first wave has built domestic economic resilience, which is noticeable throughout the second wave. "Economic activity has learned to run 'with Covid,'" the Indian Finance Ministry noted in its Monthly Economic Review for April 2021, which was issued on 7 May 2021. Poverty has risen in India since the start of the epidemic, and livelihoods have been impacted. But we compare to social impact of both wave, it will effect harmlessly in India. Second wave of covid 19 have a higher mortality rate as compare to first wave. In graph of trend line we have seen how covid 19 cases has increased drastically.

4.1(b) Inflation rate –

Inflation is defined as a long-term increase in the price level of vital commodities and services in the economy. "Inflation indicates an increase in the general level of prices," Samuelson says. This inflation term is used to examine price behaviour.

Inflation is commonly measured using the consumer price Index (CPI). The consumer price index measures the changes in the price level of consumer goods. It is calculated as :

$$CPI = \frac{current\ price\ index}{Base\ price\ index} * 100$$

4.1(c) Unemployment rate –

Unemployment has no exact definition. Unemployment is defined as the percentage of the labour force that is without a job but is able, willing, and qualified to work by laymen. It is defined by economists as the percentage of the labour force that is without a job but is able, willing, and qualified to work. In other words, regardless of how unemployment is measured, the underlying philosophy is that those who should be working are not doing so (Gbosi;2004). The unemployment rate is used to calculate the level of unemployment in a country. The formula for calculating the unemployment rate is as follows:

$$\text{Unemployment rate} = \frac{\text{Number of people unemployed}}{\text{Labour force}} * 100$$

4.1(d) Measurement of Unemployment in India -

The National Sample Survey Office (NSSO), which is part of the Ministry of Statistics and Programme Implementation (MOSPI), uses the following methods to calculate unemployment in India.

(a) Usual Status Approach: This method only counts people as jobless if they have been out of work for a significant period of time in the 365 days leading up to the survey date.

(b) Weekly Status Approach: This method only counts people as jobless if they were out of work for more than one hour on any day of the week before the survey date.

(c) The Daily Status Approach: it measures an individual's unemployment status on each day of a reference week. A person who is unemployed for one hour or more in a day is considered unemployed for that day.

The National Sample Survey Office (NSSO) has been an important governmental body in India for studying employment, unemployment, and unemployment rates through sample surveys at both the national and state levels. It does not publish employment or unemployment statistics every quarter or year, but rather once every five years. The most recent official NSSO employment and unemployment surveys and reports were done in 2004–2005, 2009–2010, and 2011–2012.

Except since 2012, India has never consistently collected monthly, quarterly, or annual employment and unemployment figures across the country. The Centre for Monitoring Indian Economy, a non-profit organisation, began sampling and releasing monthly unemployment figures in India in 2016.

4.2 Objective –

To study the impact of pandemic in Gross Domestic Product, inflation and unemployment in Indian economy.

4.3 Hypothesis –

Ho - There is a insignificant effect of COVID 19 pandemic on inflation.

Ho - There is a insignificant effect of COVID 19 pandemic on unemployment.

Ho – There is a insignificant effect of COVID 19 pandemic on Gross Domestic Product.

4.4 Methodology –

To analysis the effect of COVID-19 on inflation, unemployment and GDP, we have used secondary monthly data from 2016 to 2021 and taken data from CMIE (Centre for Monitoring Indian Economy), RBI (Reserve Bank of India), MOSPI (Ministry of Statistics and Programme Implementation). we use dummy model and empirically analysis of GDP, unemployment and inflation with shock of COVID-19. Dummy model which is a extend model of regression model. The reason of the using this model is that we are dealing with time series data and to define a COVID-19 variable, we have changed the variable in qualitative variable BECAUSE COVID-19 pandemic is a tracking unique or unexpected event. To derive the COVID-19 pandemic impact on Inflation, unemployment and GDP, we categorised two time period that are Pre-Pandemic Period (2016-2019) and Pandemic period (2020-2022). Due to categorization of COVID-19 pandemic, we have used dummy model.

Pre-Pandemic Period (2016-2019)	Pandemic period (2020-2022)
We considered this to be a pre-pandemic period because there were no cases of COVID-19 in India.	We considered this to be a pandemic period because there were COVID-19 cases in India during this time. We have done sub-category this pandemic period into two part -first wave and second wave

To analysis the result of inflation, unemployment and covid 19 case we have assume following hypothesis –

Null hypothesis H0 : there is a insignificant effect of covid 19 pandemic on inflation, if $\beta1=0$ and $\beta2 = 0$.

Alternative hypothesis Ha: there is a significant effect of covid-19 pandemic on inflation, if $\beta1=1$ and . $\beta2 =1$

Null Hypothesis H0 : There is a insignificant effect of covid-19 pandemic on unemployment, if $\beta1=0$ and $\beta2 = 0$

Alternative hypothesis H1 : There is a significant effect of covid-19 pandemic on unemployment, if $\beta1=1$ and $\beta2 =1$

Null hypothesis H0 : There is a insignificant effect of covid-19 pandemic on GDP, if $\beta 1=0$ and $\beta 2 =0$

Alternative hypothesis H1 : There is a significant effect of covid-19 pandemic on GDP, if $\beta 1=1$ and $\beta=1$

4.4(a) Dummy model –

In regression analysis, a dummy variable is a numerical variable that represents subgroups of the sample in your study. A dummy variable is frequently employed in research design to distinguish between treatment groups. In the most basic scenario, a 0,1-dummy variable would be used, with a person receiving a value of 0 if they were in the control group and a value of 1 if they were in the treatment group. Dummy variables are useful because they allow us to represent many groups using a single regression equation. This eliminates the need to create individual equation models for each subgroup. The dummy variables operate as 'switches,' turning certain parameters in an equation on and off. Another advantage of a 0,1 dummy-coded variable is that, despite being nominal, it can be statistically treated as an interval-level variable (if this made no sense to you, you probably should refresh your memory on levels of measurement). The proportion of 1s in the distribution, for example, can be calculated by taking the average of a 0,1 variable.

4.4(b) Equation of the Dummy model –

1 Dummy equation –

$Yi = \beta 0 + \beta 1Di + Ui$ ……eq1

Where -

- Y_i is dependent variable
- β_0 is coefficient for the *intercept*,
- β_1 is coefficient for the *slope*,
- D_i is:
    - 1 if the i^{th} unit is in the treatment group;
    - 0 if the i^{th} unit is in the control group;

- e_i is residual for the i^{th} unit.

To illustrate dummy variables, consider the simple regression model for a posttest-only two-group randomized experiment. This model is essentially the same as conducting a t-test on the post-test means for two groups or conducting a one-way Analysis of Variance (ANOVA). The key term in the model is β1, the estimate of the difference between the groups. To see how dummy variables, work, we'll use this simple model to show you how to use them to pull out the separate sub-equations for each subgroup. Then we'll show how you estimate the difference between the subgroups by subtracting their respective equations. You'll see that we can pack an enormous amount of information into a single equation using dummy variables. All we want to show here is that β1 is the difference between the treatment and control groups.

4.4(c) Equation of Dummy variables –

In order to investigate empirically the link between covid-19 and inflation as well as unemployment and covid-19 and covid-19 and GDP. We will construct a regression model based on our data.

In the first model, we will take covid-19 as dummy variable, where we will define 0 = covid-19 cases had not happened and 1 = covid-19 cases had happened and regress inflation on covid-19 variable to determine the explanatory variable's influence on the explained variable.

In the second model, we will take covid-19 as dummy variable, where we will define 0 = covid-19 cases had not happened and 1 = covid-19 cases had happened and regress unemployment on covid-19 variable to determine the explanatory variable's influence on the explained variable.

In the third model, we will take covid-19 as dummy variable, where we will define 0 = covid-19 cases had not happened and 1 = covid-19 cases had happened and regress GDP on covid-19 variable to determine the explanatory variable's influence on the explained variable.

(a) Functional form of model –

First model – INF =f (covid-19)

Second model – UNEMP = f (covid-19)

Third model – GDP = f (covid-19)

Where, INF = Inflation rate, UNEMP= Unemployment rate, GDP = Gross domestic product

F = functional relationship

(b) Econometrics model –

First model – INF = β0 + β1D1 + β2D2 + Ui ……..eq 1

D1= first wave covid-19 cases, 1= covid-19 cases , 0 = non covid-19 cases

D2 = second wave covid-19 case, 1= covid-19 case, 0 = not covid-19 case

Second model – UNEMP = β0 + β1 D1 + β2D2 + Ui…….eq 2

D1 = first wave covid-19 cases, 1= covid-19 cases , 0 = non covid-19 cases

D2 = second wave covid-19 case, 1= covid-19 cases, 0= non covid-19 case

Third model - GDP = β0 + β1 D1 + β2D2 + Ui……. Eq 3

D1 = first wave covid-19 cases, 1= covid-19 cases , 0 = non covid-19 cases

D2 = second wave covid-19 case, 1= covid-19 case, 0 = non covid-19 case

(c) Statistics work (descriptive work)

c(1) Evaluation based on Statistical Criteria –

c(1)(A) R2(Coefficient of determination) –

R2 is a coefficient of determination that is used to determine how differences in one variable may be explained by variations in another. R-squared calculates the percentage of variance in y(explained variable) that can be explained by x(explanatory variable). 0 to 1 is the range (i.e. 0 percent to 100 percent of the variation in y can be explained by the x-variables).

3.1(b) The t-test (Student t):

A t-test is an inferential statistic that is used to see if there is a significant difference between the means of two variables that are connected in some way. A two-tail test is conducted at 5% level of significance, under n-k degrees of freedom. Where n is the number of observation and k is the number of samples.

3.1(c) The F test –

When you do an ANOVA test or a regression analysis to see if the means of two populations are substantially different, you get a F statistic. A T-test will tell you if a single variable is statistically significant, while a F test will tell you if a combination of variables is jointly significant.

4.5 Result -

Dummy regression model analysis result –

4.5(a) First model –

$$INF = \beta 0 + \beta 1D1 + \beta 2D2 + Ui \quad \text{……..eq 1}$$

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 2.1 Distribution of interpretation of Regression Statistics (INF-Covid-19 cases)

		Explanation
Multiple R	0.65	R=square root of R2
R square	0.424	R2
Adjusted R square	0.4068	Adjusted R2 used more than one variables
Standard error	1.1604	This is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

Multiple R shows the correlation between the Explained variable (inflation rate) and explanatory(qualitative) variable(COVID-19 Case). The value is 0.60 and it's means in first equation model ,there is higher correlation find in inflation rate and COVID-19 case.

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.424 explain that model is overall goodness of fit measure.

Adjusted R square for explanatory variable (inflation rate) is 0.4068 which means that explanatory variable is insignificance.

(b) Interpretation of ANOVA

Table 2.2 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	2	66.4193204	33.209660	24.66	0.00*
Residual	67	90.2179912	1.34653718		
Total	69	156.637312	2.27010596		

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01> 0.0*,we reject H0 at significance level 0.01.

(c) Analysis of Regression Coefficient –

Table 2.3 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	3.990625	0.1674899	23.83	0.00*	3.656314	4.324936
Covid -19 First wave	2.722708	0.4215069	6.46	0.00*	1.881377	3.56404
Covid-19 second wave	-1.309487	0.5031849	-2.60	0.011	-2.31384	-.3051259

INF (Inflation rate) denotes the regress and coefficient of the regressor (intercept, covid 19 cases first wave , Covid-19 case second wave)

Column “coefficient” gives the least square estimate of covid-19 cases

Column “standard error” gives the standard error (i.e. the estimate standard deviation) of the least squared estimate β0.

Column “t stat” gives the computed t statistic for H0: INF = 0 against Ha: INF ≠ 0.

Column “p-value” gives the p-value for test of H0: INF = 0 against Ha: INF ≠ 0.

This equals the Pr{|t| > t statistics } where t is a t- distributed random variable with n-k degrees of freedom and t-statistics is the computed value of the t-statistics given in the previous column.

The above output value is put in the equation (1), we get,

INF = β0 + β1D1 + β2D2 Ut …….. eq1

where:

- INF is outcome score of i^{th} unit,
- β_0 is coefficient for the *intercept*,
- β_1 is coefficient for the *slope*,
- D1(first wave) is:

  1 if the ith unit is in the treatment group,covid 19 happen;

  0 if the ith unit is in the control group,covid 19 not happen;
- B2 is coefficient for the slope,
- D2(second wave) is :

  1 if the ith unit is in the treatment group,covid 19 happen;

  0 if the ith unit is in the control group,covid 19 not happen;

e_i is residual for the i^{th} unit

So ,

INF = 3.990625 + 2.722708 D1 - 1.309487D2

Se = (0.1674899) (0.4215069) (0.5031849)

t = (23.83) (6.46) (-2.60)

(0.00)* (0.00)* (0.01)*

Where * denotes the p values

In this regression, which category is the benchmark category ? It is covid 19 case happen category, In the other words, covid -19 cases had not happened, are the omitted category. Therefore, all comparisons are made in relation to this group. The mean inflation rate in this benchmark is about 3.990625 Compared with this average inflation rate in first wave covid 19 period is higher by about 2.7227, for an actual average inflation rate of (3.990625 +2.7227) = 6.71. The mean inflation rate in this benchmark is about 3.990625 compared with this average inflation rate in second wave covid-19 period is lower by about 1.3094,for an actual average inflation rate of (3.990625 + 2.7227 – 1.309487) = 5.403838

4.5(b) Second model –

$$UNEMP = \beta 0 + \beta 1D1 + \beta 2D2 + Ui \quad \text{……..eq 2}$$

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 2.4 Distribution of interpretation of Regression Statistics (UNEMP-Covid-19 cases)

		Explanation
Multiple R	0.5096	R=square root of R2
R square	0.2597	R2
Adjusted R square	0.2376	Adjusted R2 used more than one variables
Standard error	2.7107	This is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

Multiple R shows the correlation between the Explained variable (inflation rate) and dummy variable . The value is 0.51 and it's means in first equation model ,there is a correlation find in inflation rate and dummy variable.

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.2597 explain that model is overall goodness of fit measure.

Adjusted R square for explanatory variable (unemployment rate) is 0.2376 which means that explanatory variable is insignificance.

(b) Interpretation of ANOVA

Table 2.5 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	2	172.661629	86.3308143	11.75	0.000*
Residual	67	492.298513	7.347739		
Total	69	664.960142	9.6371035		

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01 >0.000*, we reject H0 at significance level 0.01.

(c) Analysis of Regression Coefficient –

Table 2.6 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%

Intercept	6.551667	0.3912517	16.75	0.00*	5.770725	7.332608
Covid -19 First wave	4.736111	0.9846285	4.81	0.00*	2.770784	6.701438
Covid-19 second wave	-3.487009	1.175426	-2.97	0.004*	-5.833169	-1.140849

UNEMP(unemployment rate) denotes the regress and coefficient of the regressor (intercept, first wave covid 19 cases, Second wave covid-19 case)

Column “coefficient” gives the least square estimate of covid-19 cases

Column “standard error” gives the standard error (i.e. the estimate standard deviation) of the least squared estimate β0.

Column “t stat” gives the computed t statistic for H0: UNEMP = 0 against Ha: UNEMP ≠ 0.

Column “p-value” gives the p-value for test of H0: UNEMP = 0 against Ha: UNEMP ≠ 0.

This equals the Pr{|t| > t statistics } where t is a t- distributed random variable with n-k degrees of freedom and t-statistics is the computed value of the t-statistics given in the previous column.

The above output value is put in the equation (2), we get,

UNEMP = β0 + β1D1 - β2D2 + Ut …….. eq2

where:

- UNEMP is outcome score of i^{th} unit,
- β_0 is coefficient for the *intercept*,
- β_1 is coefficient for the *slope*,
- D_1 (first wave covid-19 case) is:
    - 1 if the i^{th} unit is in the treatment group,covid 19 happen;
    - 0 if the i^{th} unit is in the control group,covid 19 not happen;
- D2(second wave covid-19 case) is :

- 1 if the ith unit is in the treatment group,covid 19 happen;
- 0 if the ith unit is in the control group,covid 19 not happen;

e_i is residual for the i^{th} unit

So , UNEMP = 6.551667 + 4.736111 D1 - 3.487009 D2

Se = (0.3912517) (0.9846285) (1.175426)

t = (16.75) (4.81) (-2.97)

(0.00)* (0.00)* (0.01)*

Where * denotes the p values

In this regression , which category is the benchmark category ? It is covid 19 case happen category, In the other words, covid -19 cases had not happened, are the omitted category. Therefore, all comparisons are made in relation to this group. The mean unemployment rate in this benchmark is about 6.551667. Compared with this average unemployment rate in covid 19 period is higher by about 4.76611. for an actual average unemployment rate of (6.551667 +4.73611) = 11.287. The mean unemployment rate in this benchmark is about 3.990625 compared with this average unemployment rate in second wave covid-19 period is lower by about 3.487 ,for an actual average unemployment rate of (3.990625 + 4.73611 – 3.487009) = 7.800768.

4.5(c) Third model –

GDP = β0 + β1D1 + β2D2+ Ui ……..eq 1

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 2.7 Distribution of interpretation of Regression Statistics (GDP-Covid-19 cases)

		Explanation
Multiple R	0.7188	R=square root of R2
R square	0.5147	R2

Adjusted R square	0.5002	Adjusted R2 used more than one variables
Standard error	5.5021	This is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

Multiple R shows the correlation between the Explained variable (GDP) and dummy variable(covid-19 case). The value is 0.71and it's means in first equation model ,there is a correlation find in GDP and dummy variables.

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.51 explain that model is overall goodness of fit measure.

Adjusted R square for explanatory variable (covid-19) is 0.502 which means that explanatory variable is insignificance.

(b) Interpretation of ANOVA

Table 2.8 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	2	2151.37634	1075.68817	35.53	0.00*
Residual	67	2028.32307	30.2734787		
Total	69	4179.69941	60.5753538		

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01>0.0016*,we reject H0 at significance level 0.01.

(c)Analysis of Regression Coefficient –

Table 2.9 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	6.8	.7941646	8.56	0.00*	5.214841	8.385159
Covid-19 First wave	-16.4	1.998604	-8.21	0.00*	-20.38923	-12.41077
Covid-19 second wave	17.07692	2.385885	7.16	0.00*	12.3146	21.83917

GDP (gross domestic product) denotes the regress and coefficient of the regressor (intercept, covid 19 cases in first wave, covid-19 case in second wave)

Column “coefficient” gives the least square estimate of covid-19 cases

Column “standard error” gives the standard error (i.e. the estimate standard deviation) of the least squared estimate β0.

Column “t stat” gives the computed t statistic for H0: GDP = 0 against Ha: GDP ≠ 0.

Column “p-value” gives the p-value for test of H0: GDP = 0 against Ha: GDP ≠ 0.

This equals the Pr{|t| > t statistics } where t is a t- distributed random variable with n-k degrees of freedom and t-statistics is the computed value of the t-statistics given in the previous column.

The above output value is put in the equation (3), we get,

GDP = β0 - β1D1 + β2D2 +Ut …….. eq3

where:

- GDP is outcome score of i^{th} unit,

- β_0 is coefficient for the *intercept*,
- β_1 is coefficient for the *slope*,
- D_1 (covid-19 first wave) is:
    - 1 if the i^{th} unit is in the treatment group,covid 19 happen;
    - 0 if the i^{th} unit is in the control group,covid 19 not happen;
- B2 is coefficient for the slope,
- D2(Covid-19 second wave) is:
    - 1 if the ith unit is in the treatment group,covid 19 happen;
    - 0 if the ith unit is in the control group,covid 19 not happen;

e_i is residual for the i^{th} unit

So , GDP = 6.8 - 16.4D1 + 17.07692D2

Se = (7941646) (1.998604) (2.385885)

t = (8.56) (8.21) (7.16)

(0.00)* (0.00)* (0.00)*

Where * denotes the p values

In this regression , which category is the benchmark category ? It is covid 19 case happen category, In the other words, covid -19 cases had not happened, are the omitted category. Therefore, all comparisons are made in relation to this group. The mean GDP in this benchmark is about 6.8. Compared with this average GDP in first wave covid 19 period is lower by about 16.4 for an actual average GDP rate of (6.8 – 16.4) = -9.6. The mean GDP in this benchmark is about 6.8. Compared with this average GDP in second wave covid 19 period is higher by about 17.07 for an actual average GDP rate of (6.8 – 16.4 + 17.07) = 7.4.

4.6 Conclusion –

The three equation was taken for the regression to shown the result of –

COVID-19 impact on inflation

COVID-19 impact on unemployment

COVID-19 impact on GDP

The equation are –

INF = β0 + β1D1 + β2D2 + ut ……eq1

UNEMP = β0 + β1D1 + β2D2 + ut…….eq2

GDP = β0 + β1D1 + β2D2 + ut…….eq3

Result of these equation are –

Eq(1) - Regression result between inflation and COVID-19 Pandemic

Variables	Co-efficient	Std Error	t- test	Significant level
Constant	3.990625	0.1674899	23.83	0.000*
COVID-19 pandemic in first wave	2.722708	0.4215069	6.46	0.000*
COVID-19 pandemic in second wave	-1.309487	0.5031849	-2.60	0.01*

Eq(2) - Regression result between Unemployment and COVID-19 Pandemic

Variables	Co-efficient	Std. Error	t – test	Significant level
Constant	6.551667	0.3912517	16.75	0.00*
COVID-19 Pandemic in first wave	4.736111	0.9846285	4.81	0.00*
COVID-19 Pandemic in second wave	-3.487009	1.175426	-2.97	0.004*

Eq(3) - Regression result between GDP and COVID-19 Pandemic

Variables	Co-efficient	Std. Error	t – test	Significance level
Constant	6.8	0.7941646	8.56	0.00*
COVID-19 Pandemic in first wave	-16.4	1.998604	-8.21	0.00*
COVID-19 Pandemic in second wave	17.07692	2.385885	7.16	0.00*

In the first equation – we accept the alternative hypothesis at level of 1% level of significance so we can say that there is a significant effect of covid-19 pandemic on inflation.

Explanation of the equation - The mean inflation rate in this benchmark is about 3.990625 Compared with this average inflation rate in first wave covid 19 period is higher by about 2.7227, for an actual average inflation rate of (3.990625 +2.7227) = 6.71. The mean inflation rate in this benchmark is about 3.990625 compared with this average inflation rate in second wave covid-19 period is lower by about 1.3094,for an actual average inflation rate of (3.990625 + 2.7227 – 1.309487) = 5.403838

According to the result we can conclude that at the period of pre-covid-19(2016-19) our monthly inflation was at rate of 3.99% but in the period of covid-19 our monthly inflation is at the rate of 5.93% which means that our monthly inflation is increased by 1.94% in the first wave COVID-19 pandemic period. In the second wave, an actual average inflation rate of (3.990625 + 2.7227 – 1.309487) = 5.403838 which is lower for first wave by -1.31%.

In the second equation – we accept the alternative hypothesis at the level of 5% level of significance so we can say that there is a significant effect of COVID-19 pandemic on Unemployment.

Explanation of the equation - In this regression, which category is the benchmark category? It is covid 19 case happen category, In the other words, covid -19 cases had not happened, are the omitted category. Therefore, all comparisons are made in relation to this group. . The mean unemployment rate in this benchmark is about 6.551667. Compared with this average unemployment rate in covid 19 period is higher by about 4.76611. for an actual average unemployment rate of (6.551667 +4.73611) = 11.287. The mean unemployment rate in this benchmark is about 3.990625 compared with this average unemployment rate in second wave covid-19 period is lower by about 3.487 ,for an actual average unemployment rate of (3.990625 + 4.73611 – 3.487009) = 7.800768.

According to the result we can conclude that at the period of pre-covid-19(2016-19) our monthly unemployment rate was at rate of 6.55% but in the period of covid-19 in first wave our monthly unemployment is at the rate of 9.22% which means that our monthly unemployment rate is increased by 2.67% in the COVID-19 pandemic period. In the second wave our monthly average unemployment is 7.80% which is lower by first wave is -3.48%.

In the third equation -we accept the alternative hypothesis at the level of 5% level of significance so we can say that there is a significant effect of COVID-19 pandemic on GDP.

Explanation of the equation - In this regression , which category is the benchmark category ? It is covid 19 case happen category, In the other words, covid -19 cases had not happened, are the omitted category. Therefore, all comparisons are made in relation to this group.. The mean GDP in this benchmark is about 6.8. Compared with this average GDP in first wave covid 19 period is lower by about 16.4 for an actual average GDP rate of (6.8 – 16.4) = -9.6. The mean GDP in this benchmark is about 6.8. Compared with this average GDP in second wave covid 19 period is higher by about 17.07 for an actual average GDP rate of (6.8 – 16.4 + 17.07) = 7.4.

According to the result we can conclude that at the period of pre-covid-19(2016-19) our monthly GDP was at rate of 6.79% but in the period of covid-19 our monthly GDP is at the rate of 0.62% which means that our monthly GDP is decreased by 6.17% in the first wave COVID-19 pandemic period. In the second wave average GDP in second wave covid 19 period is higher by about 17.07 for an actual average GDP rate of (6.8 – 16.4 + 17.07) = 7.4.

CHAPTER – V

Impact of Inflation on Unemployment and GDP in India during pandemic time –

5.1 Introduction –

During the COVID-19 period, all country was facing recession and till now we don't get relief from the COVID-19 pandemic. It has affected every country's economy and vaccination has given relief but still, COVID-19 mutation is creating a pandemic problem in every country. From 2020 to 2021, we have seen many waves in every country's economy and due to this global economy has been highly affected by this COVID-19 pandemic. In India, we have seen two waves of pandemics and still, we are facing this problem. All major macro variables (inflation, GDP, etc) have been highly affected by this pandemic. According to IMF (International Monetary Fund), they have produced a world Economic Outlook report where they said that in the year 2020, we have recorded a negative -3% world growth rate. In India, we also saw a negative growth rate, and other macro variables were highly influenced by this pandemic. From 2020 to 2021, We have seen the highest unemployment rate and inflation rate in India. On the other side, we have seen a negative growth rate in India. So this chapter discusses the relationship between three major variables that highly give information about every country's economy. Inflation, Unemployment, and GDP are major macro variables that give information about every country's economy. From 2020 to 2021, we have seen a high inflation rate and unemployment rate, and a negative GDP growth rate. But this chapter finds out a relation between these variables and if there is any relationship found then which policy is required to manage this problem in India.

5.2 Objective –

According to the chapter, our objectives are finding out the relation between these macro variables. So our objectives are as fellows-

- To study the impact of Inflation on Unemployment and Gross Domestic Product during Pandemic in India.
- To study the impact of unemployment and Gross Domestic Product on Inflation during pandemic in India.

5.3 Hypothesis –

According to our objective our hypothesis is as fellows -

H0: There is a insignificant effect of inflation on unemployment in pandemic.

H0: There is a insignificant effect of inflation on GDP in pandemic.

H0: There is a insignificant effect of unemployment on inflation in Pandemic.

H0: There is a insignificant effect of GDP on inflation in Pandemic.

5.4 Methodology –

To analysis the impact of inflation on unemployment and GDP during pandemic and impact of unemployment and GDP on inflation during pandemic. We use ANCOVA model because in hypothesis we take two independent variable – one variable is Quantitative and another one is Qualitative variable.

Regression model containing an admixture of quantitative and qualitative variables are called analysis of covariance (ANCOVA). Analysis of covariance (ANCOVA) is a method for comparing sets of data that consist of two variables (treatment and effect, with the effect variable being called the variate), when a third variable (called the covariate) exists that can be measured but not controlled and that has a definite effect on the variable of interest.

Equation of ANCOVA model is –

$$Yi = \beta0 + \beta1D1 + \beta2Xi + Ut$$

Where - Yi = dependent variable.

Xi = quantitative independent variable

D1 = 1 if the event is happen

= 0 otherwise

$\beta0$ = coefficient for the intercept,

$\beta1$= coefficient for the slope

β2 = coefficient for the slope

Ut = standard error

There are two type of ANOCVA model, we have taken that is –

First type assumption – Responsiveness of mean dependent variable(wage) with respect to independent variable(education) is same across category(gender).

$$Yi = \beta0 + \beta1Di + \beta2Xi + Ui \quad \text{where Di = 1 if male , Di = 0 if female}$$

$$E(\text{ wage/Di=1}) = (\beta0 + \beta1) + \beta2Xi + Ui \quad \text{(mean wage of male)}$$

$$E(\text{wage/Di=0}) = \beta0 + \beta2Xi + Ui \quad \text{(mean wage of female)}$$

Second type assumption – Responsiveness of mean dependent variable(wage) with respect to independent variable(education) is Different across category(gender).

$$Yi = \beta0 + \beta1Di + \beta2Xi + \beta3(Di*Xi) + Ui \quad \text{where Di = 1 if male , Di = 0 if female}$$

$$E(\text{ wage/Di=1}) = (\beta0 + \beta1) + (\beta2 + \beta3)Xi + Ui \quad \text{(mean wage of male)}$$

$$E(\text{wage/Di=0}) = \beta0 + \beta2Xi + Ui \quad \text{(mean wage of female)}$$

In our analysis, we have used second assumption model to test the hypothesis. So based on this our model equation is as fellow –

5.4(a) First model –

$$\mathbf{Yi = \beta0 + \beta1Di + \beta2Xi + \beta3(Di*Xi) + Ui \ldots\ldots\ldots\ldots..(1)}$$

where Di = 1 if COVID-19 case , Di = 0 if not COCID-19 case

$$E(\text{Unemployment/Di=1}) = (\beta0 + \beta1) + (\beta2 + \beta3)Xi + Ui$$

(means – Is the Unemployment effected by inflation in COVID-19 period)

$$E(\text{Unemployment/Di=0}) = \beta0 + \beta2Xi + Ui$$

(means- Is the Unemployment effect by inflation before COVID-19 period)

Yi = Unemployment rate Xi = inflation rate Ui= error

5.4(b) Second model –

$$\mathbf{Yi = \beta 0 + \beta 1Di + \beta 2Xi + \beta 3(Di*Xi) + Ui\ldots\ldots\ldots\ldots\ldots\ldots(2)}$$

where Di = 1 if COVID-19 case , Di = 0 if not COVID-19 case

$$E(\ GDP/Di=1) = (\beta 0 + \beta 1)\ + (\beta 2 + \beta 3)Xi + Ui$$

(means – Is the GDP effected by inflation in COVID-19 period)

$$E(GDP/Di=0)\ =\ \beta 0\ +\ \beta 2Xi + Ui$$

(means – Is the GDP effected by inflation before COVID-19 period)

Yi = GDP Xi = inflation rate Ui= error

5.4(c) Third model –

$$\mathbf{Yi = \beta 0 + \beta 1Di + \beta 2Xi + \beta 3(Di*Xi) + Ui\ldots\ldots\ldots\ldots\ldots\ldots.(3)}$$

where Di = 1 if COVID-19 case, Di = 0 if not COCID-19 case

$$E(Inflation/Di=1) = (\beta 0 + \beta 1)\ + (\beta 2 + \beta 3)Xi + Ui$$

(means – Is the inflation effected by unemployment in COVID-19 period)

$$E(inflation/Di=0)\ =\ \beta 0\ +\ \beta 2Xi + Ui$$

(means – Is the inflation effected by unemployment before COVID-19 period)

Yi = Inflation rate Xi = unemployment rate Ui= error

5.4(d) Fourth model –

$$\mathbf{Yi = \beta 0 + \beta 1Di + \beta 2Xi + \beta 3(Di*Xi) + Ui\ldots\ldots\ldots\ldots\ldots\ldots..(4)}$$

where Di = 1 if COVID-19 case , Di = 0 if not COVID-19 case

$$E(\ inflation/Di=1) = (\beta 0 + \beta 1)\ + (\beta 2 + \beta 3)Xi + Ui$$

(means – Is the inflation effected by GDP in COVID-19 period)

$$E(inflation/Di=0)\ =\ \beta 0\ +\ \beta 2Xi + Ui$$

(means – Is the inflation effected by GDP before COVID-19 period)

Yi = inflation, Xi = GDP, Ui= error

5.5 Result –

5.5(a) First model –

$$Yi = \beta0 + \beta1Di + \beta2Xi + \beta3(Di*Xi) + Ui$$

where Di = 1 if COVID-19 case , Di = 0 if not COCID-19 case

$$E(Unemployment/Di=1) = (\beta0 + \beta1) + (\beta2 + \beta3)Xi + Ui$$

(means – Is the Unemployment effected by inflation in COVID-19 period)

$$E(Unemployment/Di=0) = \beta0 + \beta2Xi + Ui$$

(means- Is the Unemployment effect by inflation before COVID-19 period)

Yi = Unemployment rate Xi = inflation rate Ui= error

(a)Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 3.1 Distribution of interpretation of Regression Statistics (UNEMP - INF)

		Explanation
Multiple R	0.48	R=square root of R2
R square	0.24	R2
Adjusted R square	0.20	Adjusted R2 used more than one variables
Standard error	2.77	This is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.24 explain that 0.24 variance in unemployment is explained by inflation.

Adjusted R square for explanatory variable (inflation rate) is 0.20 which means that explanatory variable is insignificance.

(b)Interpretation of ANOVA

Table 3.2 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	3	157.73	52.58	6.84	0.0004*
Residual	66	507.23	7.69		
Total	69	664.96	9.64		

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01> 0.0*,we reject H0 at significance level 0.01.

(c) Analysis of Regression Coefficient –

Table 3.3 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	4.21	1.36	3.11	0.003*	1.50295	6.916945
Covid -19 Case happen Di=1	-0.72	3.53	-0.20	0.839	-7.764237	6.327905
Inflation	0.59	0.33	1.81	0.075*	-0.613203	1.234931
Inflation happen in COVID -19	0.38	0.63	0.60	0.549	-0.8782129	1.635892

The above output value is put in the equation (1), we get,

$$Yi = 4.21 - 0.72Di + 0.59Xi + 0.39(Di*Xi)$$
$$(0.03)* \quad (0.84) \quad (0.075)* \quad (0.54)$$

where Di = 1 if COVID-19 case , Di = 0 if not COCID-19 case

So according to our equation the results are -

E (Unemployment/Di=1) = (3.49) + (0.98)Xi

(means – Unemployment is affected by the inflation in COVID-19 period)

E(Unemployment/Di=0) = 4.21 + 0.59Xi

(means – Unemployment is affected by the inflation before COVID-19 period)

Yi = Unemployment rate, Xi = inflation rate, Ui= error

According to our assumption, we have to use f test joint significance test because our assumption is based on that -

Joint significance test -

F(2, 66) = 1.29

Prob > F = 0.2817

Can't reject the null hypothesis - H0 : there is a insignificant effect of inflation on unemployment in pandemic if Di=1. (B0 =B3=0)

The result shows if inflation has explanatory variable and unemployment has dependent variable, inflation will insignificantly effect on unemployment during pandemic period.

5.5(b) Second model –

$$Yi = \beta0 + \beta1Di + \beta2Xi + \beta3(Di*Xi) + Ui$$

where Di = 1 if COVID-19 case , Di = 0 if not COVID-19 case

$$E(\ GDP/Di=1) = (\beta0 + \beta1) + (\beta2 + \beta3)Xi + Ui$$

(means – Is the GDP effected by inflation in COVID-19 period)

$$E(GDP/Di=0) = \beta0 + \beta2Xi + Ui$$

(means – Is the GDP effected by inflation before COVID-19 period)

Yi = GDP Xi = inflation rate Ui= error

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 3.4 Distribution of interpretation of Regression Statistics (GDP - INF)

		Explanation
Multiple R	0.52	R=square root of R2
R square	0.27	R2
Adjusted R square	0.24	Adjusted R2 used more than one variables
Standard error	6.80	is is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.27 explain that 0.27 variance in GDP is explained by inflation.

Adjusted R square for explanatory variable (inflation rate) is 0.24 which means that explanatory variable is insignificance.

(b) Interpretation of ANOVA

Table 3.5 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	3	1125.65	375.22	8.11	0.0001*
Residual	66	3054.05	46.27		
Total	69	4179.70	60.58		

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression (inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01> 0.0*,we reject H0 at significance level 0.01.

(c) Analysis of Regression Coefficient –

Table 3.6 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	4.83	3.33	1.45	0.151	-1.807994	11.4768
Covid -19 Case happen Di=1	21.69	8.66	2.51	0.015**	4.404454	38.98357
Inflation	0.49	0.80	0.62	0.538	-1.097808	2.082916
Inflation happen in COVID -19	-4.87	1.54	-3.16	0.002*	-7.960847	-1.791768

$$Yi = 4.83 + 21.69Di + 0.49Xi - 4.87(Di*Xi)$$

$$(0.15) \quad (0.015)^{**} \quad (0.58) \quad (0.002)^{*}$$

$$se = (3.32) \quad (8.65) \quad (0.79) \quad (1.54)$$

where Di = 1 if COVID-19 case , Di = 0 if not COVID-19 case

$$E(GDP/Di=1) = (26.52) - (4.38)Xi$$

(means- Is GDP effected by inflation in COVID-19 period)

$$E(GDP/Di=0) = 4.83 + 0.49Xi$$

(means – Is GDP effected by inflation before COVID-19 period)

Yi = GDP, Xi = inflation rate, Ui= error

According to our assumption, we have to use f test joint significance test because our assumption is based on that -

Joint significance test –

$$F(2,66) = 7.31$$

$$Prob > F = 0.0014$$

H0 -there is a significant effect of inflation on GDP in pandemic if Di=1 (reject null hypothesis)

The result shows if inflation has explanatory variable and GDP has dependent variable, inflation will significantly effect on GDP during pandemic period.

5.5(c) Third model –

$$Yi = \beta0 + \beta1Di + \beta2Xi + \beta3(Di*Xi) + Ui$$

where Di = 1 if COVID-19 case, Di = 0 if not COCID-19 case

$$E(Inflation/Di=1) = (\beta0 + \beta1) + (\beta2 + \beta3)Xi + Ui$$

(means – Is the inflation effected by unemployment in COVID-19 period)

$$E(inflation/Di=0) = \beta0 + \beta2Xi + Ui$$

(means – Is the inflation effected by unemployment before COVID-19 period)

Yi = Inflation rate Xi = unemployment rate Ui= error

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 3.7 Distribution of interpretation of Regression Statistics (INF-UNEMP)

		Explanation
Multiple R	0.69	R=square root of R2
R square	0.47	R2
Adjusted R square	0.44	Adjusted R2 used more than one variables
Standard error	1.12	is is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.47 explain that 0.47 variance in inflation is explained by unemployment.

Adjusted R square for explanatory variable (unemployment) is 0.44 which means that explanatory variable is insignificance.

(b) Interpretation of ANOVA

Table 3.8 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	3	73.59	24.52	19.49	0.000*
Residual	66	83.05	1.25		
Total	69	156.64	2.27		

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01> 0.0*,we reject H0 at significance level 0.01.

(c) Analysis of Regression Coefficient –

Table 3.9 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	1.72	0.68	2.54	0.013*	0.3695229	3.084494
Covid -19 Case happen Di=1	3.67	0.88	4.19	0.000*	1.92086	5.42
UNEMP	0.35	0.10	3.43	0.001*	0.1442662	0.5467387
UNEMP happen in COVID -19	-0.29	0.11	-2.51	0.015*	-0.5148298	-0.0584185

$$Yi = \beta 0 + \beta 1Di + \beta 2Xi + \beta 3(Di*Xi) + Ui$$

$$Yi = 1.73 + 3.67Di + 0.35Xi - 0.29(Di*Xi)$$

$$(0.013)* \quad (0.00)* \quad (0.001)* \quad (0.015)*$$

where Di = 1 if COVID-19 case , Di = 0 if not COCID-19 case

$$E(\text{ Inflation/Di=1}) = (5.40) + (0.06)Xi$$

(mean inflation in COVID-19 period)

$$E(\text{inflation/Di=0}) = 1.73 + 0.35Xi + Ui$$

(mean inflation before COVID-19 period)

Yi = Inflation rate Xi = unemployment rate Ui= error

Joint significance test –

F(2, 66) = 16.33

Prob > F = 0.0000

H0: There is a significant effect of unemployment on inflation in Pandemic, If Di=1 (reject null hypothesis.

The result shows if unemployment has explanatory variable and inflation has dependent variable, unemployment will significantly positive effect on inflation during pandemic period. This shows the situation of stagflation.

5.5(d) Fourth model -

$$Yi = \beta0 + \beta1Di + \beta2Xi + \beta3(Di*Xi) + Ui$$

$$Yi = 1.73 + 3.67Di + 0.35Xi - 0.29(Di*Xi)$$

$$(0.013)* \quad (0.00)* \quad (0.001)* \quad (0.015)*$$

where Di = 1 if COVID-19 case , Di = 0 if not COCID-19 case

$$E(\text{ Inflation/Di=1}) = (5.40) + (0.06)Xi$$

(means – Is the inflation effected by unemployment in COVID-19 period)

$$E(\text{inflation/Di=0}) = 1.73 + 0.35Xi + Ui$$

(means – Is the inflation effected by unemployment before COVID-19 period)

Yi = Inflation rate Xi = unemployment rate Ui= error

According to our assumption, we have to use f test joint significance test because our assumption is based on that -

Joint significance test –

F(2, 66) = 16.33

Prob > F = 0.0000

H0 : There is a significant effect of unemployment on inflation in Pandemic, If Di=1 (reject null hypothesis

(a) Interpretation of regression statistics –

The output of stata work for above equation of greatest interest of R square is given –

Table 3.10 Distribution of interpretation of Regression Statistics (INF-GDP)

		Explanation
Multiple R	0.67	R=square root of R2
R square	0.45	R2
Adjusted R square	0.42	Adjusted R2 used more than one variables
Standard error	1.14	is is the sample estimate of the standard deviation of error term ut
Observation	70	Number of observation used in the above regression(n)

R square (co-efficient of determination), the overall goodness of fit measure, R2 and this result is 0.45 explain that 0.45 variance in inflation is explained by GDP.

Adjusted R square for explanatory variable (GDP) is 0.42 which means that explanatory variable is insignificance.

(b) Interpretation of ANOVA

Table 3.11 Distribution of interpretation ANOVA –

	df	SS	MS	F	Significance F
Regression	3	70.05	23.34	17.80	0.000*
Residual	66	86.59	1.311		
Total	69	156.64	2.27		

The ANOVA (analysis of variance) table splits the sum of squares into its components.

Total sum of square = Residual (error term) sum of square + Regression(inflation rate) sum of square.

The above table , column labelled F gives the overall F test of H0: $\beta 1=0$ versus Ha: at least one of $\beta 1$ does not equal zero.

Significance F has associated p value. Since 0.01> 0.0*,we reject H0 at significance level 0.01.

(c) Analysis of Regression Coefficient –

Table 3.12 The regression output of most interest is the following table of coefficient and associated output :

	Coefficient	Standard Error	t stat	P- value	Lower 95%	Upper 95%
Intercept	2.32	0.67	3.48	0.001*	0.9867087	3.645171
Covid -19 Case happen Di=1	3.64	0.71	5.13	0.000*	2.2242	5.056116
GDP	0.25	0.094	2.60	0.012*	0.0569249	0.4356296
GDP happen in COVID -19	-0.28	0.096	-2.59	0.005*	-0.473327	-0.0866618

$$Yi = \beta 0 + \beta 1Di + \beta 2Xi + \beta 3(Di*Xi) + Ui$$

$$Yi = 2.32 + 3.64Di + 0.25Xi - 0.28(Di*Xi)$$

$$(0.001)* \quad (0.00)* \quad (0.012)* \quad (0.005)*$$

where Di = 1 if COVID-19 case , Di = 0 if not COVID-19 case

$$E(\text{ inflation/Di=1}) = (5.96) - (0.03)Xi$$

(means – Is the inflation effected by GDP in COVID-19 period)

E(inflation/Di=0) = 2.32 + 0.25Xi

(means – Is the inflation effected by GDP before COVID-19 period)

Yi = inflation, Xi = GDP, Ui= error

According to our assumption, we have to use f test joint significance test because our assumption is based on that -

Joint test significance –

F(2, 66) = 20.28

Prob > F = 0.0000

H0 : There is a significant effect of GDP on inflation in Pandemic, if Di=1.(reject null hypothesis)

The result shows if GDP has explanatory variable and inflation has dependent variable, GDP will significantly negative effect on inflation during pandemic period.

5.6 Conclusion –

Major finding of this chapter is that there is an insignificant effect of inflation on unemployment if we take inflation as an independent variable and unemployment as a dependent variable, this result will show that during pandemic inflation did not affect the unemployment during pandemic period. On the other hand, if we take inflation as a dependent variable and unemployment as an independent variable, this result will show that during a pandemic unemployment significantly effects on inflation and that effect is positive, which gives a clear sign of stagflation. Other models where inflation and GDP take as variables, find that in both models inflation and GDP significantly affect each other and that the relation is negative during the pandemic, which is the reason for COVID-19 pandemic situation.

Chapter – VI

Finding of the study, Conclusion and Recommendation

6.1 Introduction -

The study is in the context of the impact of inflation on unemployment and GDP during the pandemic in India. In the COVID-19 period, we have seen a high inflation and unemployment rate and negative GDP growth rate. Before COVID-19 situation, India was still facing the problem of inflation, unemployment and lower GDP growth rate. This COVID-19 pandemic had increased these problems more and, as a result, huge unemployment, negative GDP growth rate and higher inflation rate, we have seen in this period of time. Our analysis is based on these problems as how much the COVID-19 pandemic impacted on these macro variables, so according to that we have created a chapter and found out the impact of COVID-19 pandemic and analysis that there is any relationship found between these variables or not. The result shows that the COVID-19 pandemic effect on inflation, unemployment and lower GDP in India. According to time, we are facing the problem of inflation, unemployment and lower GDP. We have found some relationship according to which some variables affect each other. Further, the COVID-19 pandemic has put lots of stress to people income, employment and livelihood. The present study examines the impact of inflation on unemployment and GDP during the pandemic in India – a short term analysis using the secondary data.

6.2 Objective –

- Monthly trend analysis of Inflation, Unemployment and Gross Domestic Product in India.
- Monthly trend analysis of Inflation, Unemployment and Gross Domestic Product in India.
- Monthly trend analysis of Inflation, Unemployment and Gross Domestic Product in India.

6.3 Hypothesis –

- There is an insignificant relationship time with inflation, unemployment and GDP.
- There is an insignificant effect of COVID-19 pandemic on inflation, unemployment and GDP.

- There is an insignificant impact of inflation on unemployment and GDP.

6.4 Finding of the study –

The study has been classified into six chapter. First chapter introduction of the study. The review of literature, objective, hypothesis is included in chapter I. Chapter second is conceptual and theoretical framework. It discusses major theories of inflation, unemployment and GDP and various concepts used in the study. The major finding from chapter three to five are presented below:

In the third chapter, our research problem was related to increase unemployment, inflation and lower GDP in this study period of time. The major finding of this chapter is as below:

We have run a regression model on time with these macro variables and found that there is a significant relationship between time and these three variables (inflation, unemployment, GDP). We created three models and found there is a positive relation between time with inflation and unemployment and in the case of GDP, we found a negative relation between time and GDP. We found some reason in this period of time. We have seen demonetization, food inflation, GST implementation and the COVID-19 pandemic. They came in this period of time and created so much uncertainty. Because of this uncertainty, all economic macro variables are affected and, because of this, we have seen high inflation and high unemployment rates in India. At this period of time, we have seen negative GDP growth rate. We found some reason that because of the food inflation and supply chain disruption in the COVID-19 pandemic are the main reason of increasing inflation at this period of time, decreasing labour participation rate and skill gap is a main reason of raising unemployment in India.

In the fourth chapter, our research problem was related to impact of COVID-19 pandemic on inflation, unemployment and GDP on monthly period of time. The major finding of this chapter is as below:

We have run dummy regression model to find out the impact of COVID-19 pandemic on inflation unemployment and GDP. We found there is a significant impact of COVID-19 pandemic on inflation, unemployment and GDP in this period of time. We have created three category- one category - before COVID-19 pandemic, second category -first wave of COVID-19 and third category -second wave of COVID-19 pandemic in India. In monthly analysis, we found that COVID-19 pandemic highly impact on these variables and between first and second wave, COVID-19 pandemic highly economic impact on first wave and less in the second wave

because of the lockdown policy in the first wave during to which we had to faced supply chain disruption and highly labour migration in the first wave.

In the fifth chapter, our research problem was related to impact of inflation on unemployment and GDP on monthly period of time. The major finding of this chapter is as below:

In this chapter we have found the impact of inflation on unemployment and GDP in India and the impact of unemployment and GDP on inflation. We have taken inflation as a dependent variable in two regression models and also as an independent variable in models of other regression models. To find out our research problem, we have taken the ANCOVA model to analyse - is the inflation impact on unemployment and GDP during the COVID-19 pandemic or not. We found that inflation has an insignificant impact on unemployment during a pandemic and a significant impact on GDP during a pandemic in India. The other regression models where we analyse the impact of unemployment and GDP on inflation. The result shows that there is a significant impact of unemployment and GDP on inflation during the pandemic in India. In the pandemic, unemployment and GDP were highly impacted by inflation. These models explain that the Philips curve does not exist in this short run monthly period of time and there is a positive relationship found between inflation and unemployment during a pandemic which shows that stagflation conditions prevail in the economy. On the other hand, one model shows that there is a negative relationship between GDP growth rate and inflation. Theory suggests that there is a positive relation between inflation and GDP growth, but due to the pandemic situation these relations become negative in short run period.

6.5 Conclusion –

During the pandemic, we saw the highest unemployment and inflation rates, GDP growth rate was negative and all the global economy saw lower GDP growth rate problems. Our analysis shows that the COVID-19 pandemic highly impacted on the Indian economy. In this COVID-19 period, we have seen the highest labour migration in the Indian economy. Raising inflation because of the supply chain block due to lockdown. Negative GDP growth rate because in the pandemic, all sectors' growth rates were negative and only the agriculture sector had a positive growth rate and we all know that in GDP growth , agriculture sector participation in GDP growth rate is only 17.8% (2019-20 economy survey) and the rest sectors contribute more than 80% participation in the GDP growth rate. So, in the pandemic, these 80% contribution sectors were in negative or lower growth, so it had a direct impact on the country's GDP growth rate and at that period of time, we were at negative growth rate.

6.6 Recommendation –

According to our research result, some major recommendations are –

- Skill gap reduce
- Increase female participation in labour force
- Youth employment policy
- Reduce cost of production
- Increase employment elasticity in all there sector
- There is a need for National Employment Policy (NEP) that would encompass a set of multidimensional interventions covering a whole range of social and economic issues affecting many policy spheres and not just the areas of labour and employment.

6.7 Government Initiative –

Some of the government initiative are going to solve this problem. Some major initiative are as follow –

- Mahila Samridhi Yojana
- Pradhan mantri kaushal vikas yojana
- Deendayal Antyodaya Yojana - National Urban Livelihoods Mission
- Pradhan Mantri Mudra Yojana
- Monetary policy committee
- Deen Dayal Upadhyaya Grameen Kaushalya Yojana

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