Chapter-2: A study of significant macroeconomic variables of the Indian economy

2.1 Introduction

The study involves capital flows and key macroeconomic variables, and subsequently, their implications can be portrayed when the macroeconomic background of the period under consideration is analyzed correctly. The economic indicators follow widely-accepted methodologies and definitions based on the basic guidelines proposed by United Nations (UN). The conceptual framework to devise macroeconomic indicators is codified in the SNA (System of National Accounts), published and regularly updated to capture the changes in economic systems by the UN and other organizations of repute such as the OECD, the IMF, and World Bank. The SNA framework follows a synthesis of the Keynesian economic theory and the neo-classical approach. SNA framework has some limitations as far as accounting for various economic activities is concerned. It can consider only those economic activities that can be measured in value terms and translated into market transactions. An extensive range of activities, such as social and environmental phenomena that are difficult to quantify into monetary values, are beyond the purview of this accounting system.

Macroeconomic variables are an indispensable tool for understanding the working of an economy. Macroeconomic indicators are produced because there is demand for it. They have proven their genuineness over a long period and are widely accepted by different stakeholders. Our analysis considers only those economic variables which change over time and captures the changes during the specified time intervals. The indicators are statistically measurable, thereby facilitating the study of the effects of variables of interest on the functioning of the economy. Indicators describe the economy's position or level of

development. In other words, the macroeconomic indicators are a quantitative representation of an economy. It allows analysis of economic performance and predictions of future performance. Macroeconomic indicators may describe the stock or flow dimensions of a variable. The distinction between these two concepts is due to the intertemporal measurement practices. A stock variable is measured at one specific time. It represents a quantity existing at that point of time only, whereas a flow variable is calculated over an interval of time, i.e., per unit of time. Stock variables are static, whereas flow variables are dynamic and underlying characteristics.

The interrelations among the macroeconomic variables are significant for understanding its economic growth implications. Macroeconomic variables are the main signposts signaling the current behaviors of an economy. This chapter will try to understand how each macroeconomic indicator (from a selected set of variables) of the Indian economy performed over the last two decades (2000-2019) and their interrelationships therein. Given the importance of macroeconomic indicators to explain the changes in an economy during a given time, we analyzed various indicators for the Indian economy using a set of techniques discussed in detail later in the chapter. The analysis was undertaken using quarterly data series for the selected variables.

2.2 Analytical perspective

Macroeconomic data are collected at pre-specified time points and regular intervals. Exploratory analysis is a valuable tool to have an in-depth understanding of the behavior of a set of data. This chapter has taken up the following five crucial tasks for detailed analysis and discussion:

I. the macroeconomic variables considered for analysis in this thesis are pragmatic and decided based on the survey of past studies,
II. a brief discussion of general characteristics of each variable in the context of the Indian economy,
III. A macro overview of key variables through essential descriptive tools wherever necessary,
IV. discussion of simple numerical measures or descriptive statistical analysis tools suitable for analyzing time-series data,
V. Cross-correlation study between the chosen variables.

These analyses are often presented to summarize key aspects of a dataset. A macroeconomic overview and a brief description of the variables and underlying economic theory are provided before discussing descriptive statistics to explain the statistical analysis's rationale. However, graphs have an immediate visual impact and present the data's main features by looking at them. However, it is crucial to be numerically precise. For this aspect, we have used descriptive statistics to summarize the properties of each variable. A set of descriptive statistical techniques depending upon the nature of variables is considered for the analysis. Descriptive statistics help us to understand the nature and distribution of the variables. It will also provide preliminary information on how the data will behave if used in the econometric analysis in this study. For normally distributed variables, we use parametric statistics. For non-normally-distributed variables, linear transformation such as the natural log or square root depending upon variable series' nature is performed to convert it into a normal distributed variable.

Central tendency describes the tendency of the observations to cluster around a particular value or a category. The mean and standard deviation are the most common descriptive statistics, but many other statistics also exist. The mean is the widely employed,

most straightforward measure of distribution. It conveys the center of the distribution. The mean has advantages over other measures of central tendency of quantitative variables. All the observed values are used to calculate the mean. Mean is stable from sample to sample, i.e., if we take several samples from the same population, their means are less likely to vary than other measures of central tendency. When there are apparent extreme values, the median is usually used to indicate a distribution center. Mean is also the balancing point of distribution, but the mean gets affected with extreme values in the series. Therefore, we have to be cautious while selecting a measure of central tendency to analyze the data. Arithmetic mean is the center of gravity of the distribution. Median is used as a measure if there are a few extreme values observed for ungrouped data. The median provides a better result. The median is obtained by taking the average of the middle. Median is defined as the middle item of all given observations arranged in ascending order. The use of mode and median measures depends on the nature of the data and the purpose of the analysis.

The mode is the most common value, and the median is the middle value, i.e., the value splits the distribution into two halves. In some distributions, the mode value may not exist, and even if it does, it may not be unique. For example, for ungrouped data, we count the largest frequency of the given value. Suppose all are of the same frequency, no mode exits. If more than one value has the same largest frequency, then the mode is not unique. Importantly for symmetrically distributed data, the mean, median, and mode can be used almost interchangeably. We may conclude that data distribution is pertinent to decide which central tendency measures one can use.

Quite often, mean, median, and mode may not reflect the accurate picture of data. Hence, it is necessary to consider some measures explaining additional data distribution characteristics such as dispersion and Skewness. We may also estimate the range. The range is the difference between the two extreme values. However, the range cannot be obtained for open-ended grouped data. We may also use percentile or other related concepts. Percentile divides the data range into hundredths, while others use other basic units, such as fractiles, quartiles, deciles, etc. Percentiles are helpful in case of skewed distribution due to the presence of outliers. If the variable's distribution is skewed, the exact interval estimates for the percentiles would be better.

It is essential to understand the dispersion of the distribution. Standard deviation and variance are two widely used measures. Standard deviation is a measure of dispersion influenced by the shape of a distribution. Standard deviation also affects confidence limits. The variance is measured as a square of deviations from the mean. The coefficient of variation measures the relative importance of the series. It does not depend on the unit and can compare two samples that may differ in means. The various measures of dispersion are used depending on the context and the characteristics of the chosen variables.

Skewness and kurtosis are the two most popular measures for understanding the shape of the distribution. Skewness is a measure for direction and lack of symmetry in the distribution. It is advisable to use robust estimators such as the median and the inter-quartile range for skewed distribution. The sign of the skewness coefficient suggests the left or right-hand side tail of the distribution. Right longer tail implies that the distribution is skewed to the right, and the coefficient of skewness is positive.

Similarly, the left longer tail is interpreted as left-skewed distribution and shows a negative skewness coefficient. Kurtosis is a measure to know about the heaviness of the tails. The value of kurtosis explains how heavier the tails are compared to normal distribution.

2.2.1 Correlation and Cross-correlation analysis

Correlation is an essential way of numerically quantifying the relationship between two variables. Correlations can also be obtained from the XY plots. The upward or downward slope of the XY plots exhibits a positive or negative relationship between variables. If two variables are correlated, an XY plot against the other will also show such patterns.

Cross-correlation is a standard method for estimating the association between two-time series variables. The correlation between two variables explains how closely they are related. In contrast, the coefficient's value and the sign of the correlation coefficient determine the relation's strength and direction in linear terms. The cross-correlation function extends the concept of correlation whenever we have to deal with more than two variables. The cross-correlation function broadens the scope of the concept of correlation analysis. Here we estimate the correlation between two time-varying variables over the same time intervals, i.e., the cross-correlation goes a step beyond simple correlation and adds a time dimension to it. Consider the correlation between “x” at time “t” and “y” at a time “t + k.”Now the sign of k is important because it will have different connotations. A negative “k” represents the correlation between the present value of “x” and the past importance of “y.” A positive “k” represents the correlation between the current value of “x” and the future value of “y.” The pattern of correlations is an important observation for a set of two

variables. It informs whether "x" leads or lags (on average) "y." For calculating cross-correlations between the variables, "ccf" (cross-correlation function) provided in "R" software is used.

To calculate cross-correlation between the pair of variables X_t and $Y_{t-k,}$ denoted by r_k and called the k^{th} order cross-correlation. Here time index, k, could be either positive or negative. While calculating the correlation of missing values in the series, all the corresponding values in each series are omitted. The cross-correlation analysis performed in this section has shed light on the relation between the variables. Understanding cross-correlation between variables is of great help in designing the model during the subsequent chapters.

2.3 Output and Prices indicators

2.3.1 Gross Domestic Product (GDP)

The National Accounts Statistics of India (NAS) data series with 2011-12 as the base year and the old series with 2004-05 as the base year is used for analysis by rebasing it to the new base. The GDP series comprises all the major quantifiable economy segments at constant prices reported in `National Accounts Statistics. The datasets contain quarterly gross value added (GVA) at basic prices by industry/economic activity. GDP is based on estimates and survey data collected and maintained on predefined intervals in a country's System of National Accounts (SNA). By definition, GDP is a monetary measure that accounts in monetary terms the value of all domestically produced goods and services in a specific period. While doing accounting, one needs to be careful to avoid any duplication. It includes all goods, whether they are marketed or produced for their self-consumption.

Similarly, all services are also included, barring a few exceptions. Some non-market production, such as defense

spending, is also included in the GDP calculation. It is the most widely accepted measure of national well-being. The importance of GDP is extremely high in macroeconomic analysis because it is the most preferred macroeconomic indicator for measuring its economic size and gauging its economic health.

The GDP can be measured under any of the following three approaches: 1. Production approach, 2. income generation approach, and 3. final utilization approach. Under the production approach, the economy is divided into many economic activities. The value of output and inputs (goods or services) required for production is calculated for each sector separately using the concept of value-addition at each production level. The total production is simply the difference between the value of inputs and outputs. The monetary value paid for services received minus the input cost involved is accounted for services used in production. Income arising from production is distributed between capital and labor. In an income approach, total income by factors inputs in the domestic economy is added together. All these expenditures are accounted for in the final utilization approach.

2.3.1.1 Performance of India's GDP in the last two decades

The economic activities are classified into three broad categories-namely the primary, secondary and tertiary sectors. The structural composition of GDP has been undergoing a dramatic change over the last several years. The contribution of the primary sector in GDP at factor cost has declined continuously, which has been taken over by the tertiary sector. The structural changes in economic structure are induced through the sustained efforts of different economic agents. Primary sector share at factor cost reduced from 54.56% in 1950-51 to 27.87% in 1999-00 and further to 14.39 % in 2018-19 on the other hand share of the secondary

sector improved from 16.11% in 1950-51 to 25.98% in 1999-00 and 31.46 % in 2018-19 at 2011-12 prices. Consistent with many developed or developing countries' experience, the share of agriculture and allied sector growth is continuously decreasing. Each sector has also undergone structural changes in the last two decades as a significant drive for industrial diversification. The services sector's high-speed growth was primarily accounted for by current services, comprising financial services, communications, and the IT sectors. Technology-driven and high skill-based service sectors are getting prominence now.

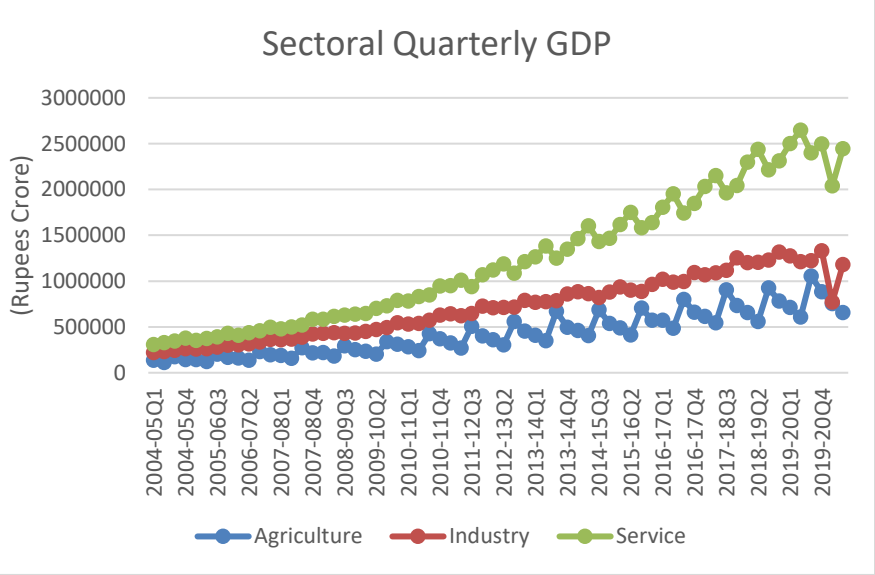

Figure 1:Sectoral composition of GDP

Data Source: *RBI handbooks of statistics on Indian economy*

In the last two decades, the growth patterns of the Indian economy were quite robust, barring substantial fluctuations in a few quarters, especially around the global economic meltdown triggered due to the subprime crisis in 2008. In this free flow of communication, even a short-term fluctuation in growth momentum generates many worried commentaries from many quarters, including media and political parties. The government of

India was also forced to provide a fiscal stimulus to contain economic downfall. During the economic crisis, the growth rate was a heated debate by the elite and ordinary citizens. This puts a lot of pressure on the government of the day to act rapidly and decisively. GDP growth numbers also figure prominently in the election campaigning and also influence the political outcomes.

GDP is a widely used data by a diversified set of stakeholders. Policymakers, government officials, businesses, economists, and the public rely on GDP and related statistics to help assess the economy's well-being and make informed decisions. It explains the importance of economic growth and its sustainability for an economy. This section examines these fluctuations for the last two decades using quarterly data from 2001 to 2016. The descriptive analysis of the growth rate is conducted to study the pattern of economic growth and development.

India's growth rate picked up from 2003-04 and hovered between average annual rates above 7 percent and 8 percent. The growth momentum starts to taper after the second quarter of 2011-12. It is losing and regaining the steam. Good growth is the outcome of various factors, domestic as well as external. The sudden drop in the growth momentum in 2008-09 may be attributed more to external factors beyond the government's control. The household saving rate also shows a consistent declining trend from 2013-14 onwards, observed in the gross fixed capital formation. The domestic savings, which had clocked 33.9 percent in 2006-07, had reduced to 29.8 percent in 2016-17 (figure.2). The declining domestic saving rates are also reflected in the slowing domestic investment rate- a must to attain a growth rate.

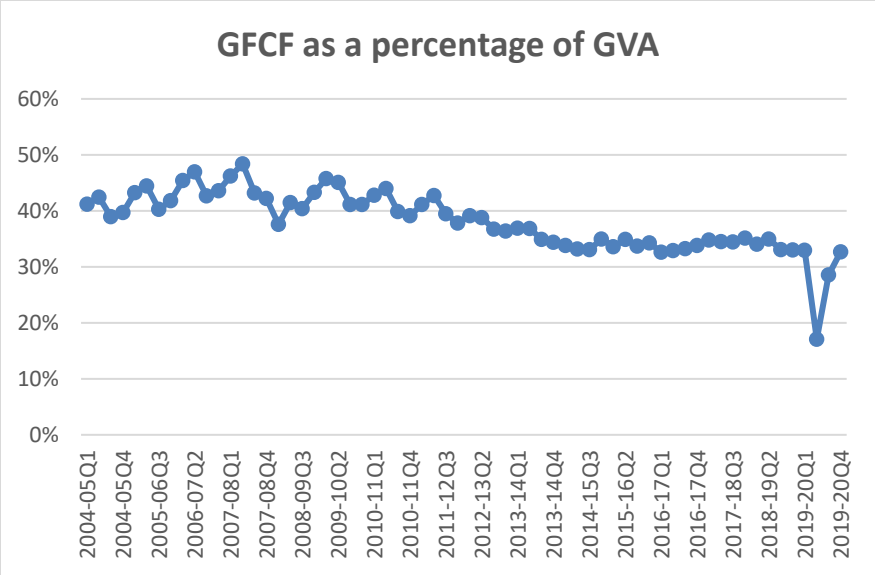

Figure 2:Gross fixed capital formation as a percentage of GVA

Data Source: RBI handbooks of statistics on Indian economy

To understand the relation between saving, investment, and economic growth, we have listed these three growth rates in table 2. Looking at the table, one can infer that economic growth depends on investment, which means a high investment rate is always accompanied by a higher GDP growth rate and vice versa. The rate of investment, on the other hand, is highly dependent upon the level of savings. It is believed that increased savings will increase the national capacity for investment and production. Simultaneously, a severe constraint to sustainable economic growth can result from a low rate of savings.

Table 1: India's annual GDP growth rate, investment rate, and savings rate

Year	Annual GDP growth rate	Investment rate	Savings rate
2000–01	**4.1**	**24.3**	**23.9**
2001–02	**5.4**	**24.2**	**25.5**
2002–03	**3.9**	**24.8**	**27.5**
2003–04	**8**	**26.8**	**24.2**
2004–05	**7.1**	**32.8**	**32**
2005–06	**9.5**	**34.7**	**33.2**

2006–07	**9.6**	**35.7**	**33.9**
2007–08	**9.3**	**38.1**	**32.5**
2008–09	**6.7**	**34.3**	**32**
2009–10	**8.6**	**36.5**	**33.7**
2010–11	**8.9**	**36.5**	**32.7**
2011–12	**5.2**	**35.5**	**32.9**
2012–13	**5.4**	**39**	**32.1**
2013–14	**6.4**	**38.7**	**31.4**
2014–15	**7.4**	**33.8**	**30.8**
2015–16	**8.0**	**34.4**	**30.1**
2016–17	**8.2**	**33.3**	**29.8**
2017–18	**6.8**	**32.0**	**31.3**
2018–19	**6.5**	**30.6**	**32.0**
2019–20	**4.0**	**28.4**	**30.5**

Source: Economic Survey 2020–21, Government of India, 20211.

Given that this section focuses on GDP and growth, we have categorized the GDP based on the growth experienced during the study period to understand the growth pattern more minutely. We have divided the GDP data into three periods. Period 1 ranges from 2000-01 Q1 to 2007-08 Q4. India experienced sustained high growth during this period. The growth momentum reversed due to the global financial crisis of 2008. Following the global financial crisis, India's growth also enters into a new trajectory. Period two ranges from 2008-09 Q1 to 2015-16 Q4. The growth rate recovered from the sudden shock but was broadly resilient during this period. Period 3 consists of 2016-17 Q1 to 2019-20 Q1. Even after achieving sustained high growth, this period has experienced continued economic deceleration. Since the discussion in this thesis centered around GDP; therefore, while analyzing all other

1Notes: The GDP growth before 2011 shown is at factor cost, at constant prices, with 2004–05 as base. The GDP growth after 2011 shown is at factor cost, at constant prices, with 2011–12 as base; and Investment Rate refers to gross capital formation as a percentage of GDP.

macroeconomic indicators, we categorized them in the periods used for GDP analysis to understand their relationship with GDP growth rate.

We have done a descriptive analysis of GDP during these three periods to understand the periodic growth patterns. There is a wide variation in the average growth during the three periods considered for the analysis. The average growth during the entire period under consideration is 7.12 percent. During the first period, the average gain was 4.46 percent. In the second period, it was 8.46 percent, and in the third period, it was 6.65 percent. The improvement from period 1 to period 2has been remarkable, but the growth momentum did not seem sustainable in period 3 (Table 3).

Table 2: Estimates of descriptive statistical parameters for quarterly GDP series

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**11,922**	**7,443**	**13,896**	**19,947**
Standard Deviation	**4,617**	**1,408**	**2,421**	**779**
Coefficient of Variation	**38.7**	**18.9**	**17.4**	**3.9**
Skewness	**0.4**	**0.5**	**0.2**	**(0.1)**
Kurtosis	**(1.0)**	**(0.6)**	**(0.9)**	**(1.1)**

Data Source: Author calculation

Standard deviation is a more common measure of dispersion. We found that period one and period three exhibit less dispersion than period two. The high fluctuation could explain the increased dispersion in the period 2growth data. Skewness and Kurtosis measure the lack of symmetry in the data distribution. It differentiates extreme values in one versus the other tail. The skewness of the GDP series for the overall period and the three compartmentalized periods is less than 0.5 but more than 0. It explains that all these series are approximately symmetric. The

skewness values are positive, implying that the data are positively skewed or skewed right, meaning that the distribution's right tail is relatively longer than the left. The distributions are almost symmetric, and then the next question is about the central peak. To understand the peakedness of the data series, we calculated the kurtosis of the series and found that their peakedness is almost the same.

2.3.2 Inflation

Inflation is one of the most widely used macroeconomic variables. It is measured through price levels and has a wide ramification affecting almost all the stakeholders in an economy. The relationship between inflation and other macroeconomic indicators has been widely discussed and perceived with caution since the evolution of economic theory. Despite the years of research and many theories, inflation is still an area of contemporary research. A number of factors are influencing the price level. The Quantity Theory of Money propounded by Milton Friedman explains inflation as a monetary phenomenon resulting from disequilibrium between money supply and output supply in an economy. If the supply of output falls short of the collection of money, then inflation rises. The cost-push theory advocates that an increase in the production cost also pushes the price level up. Similarly, the demand-pull theory postulates that price-level rise is the result of a demand-supply mismatch.

Myrdal, Streeten, and other economists also advocated the structural theory of inflation. The structural approach assumes that matching supply with demand will not be possible in the short run due to structural rigidities such as supply bottlenecks and sudden rise in demand, etc. Other factors like crop demand led to food shortages or external factors like the increased price of import-

dependent products. The prevailing economic situation in the country also determines the general price level.

2.3.2.1 Inflation indices used for analysis

Price indices capture changes in the normalized price of a basket of goods and services with reference to a base price fixed at a certain point in time. The prices are captured at a fixed, regular interval. We have two readily available data series for price indices: WPI(Whole Price Index) and CPI (Consumer price index).

The analysis has used WPI by converting the monthly Wholesale Price Index (WPI) as per the base (2004-05) with 697 items in the commodities basket. Data is collected each month with 15 days lag period. Laspeyres index formula is used for compilation where value weights for each commodity are used. The price index series is a dynamic list of goods and services updated regularly to reflect the changing consumption pattern of the people. A quarterly series; therefore, aggregates monthly WPI for three months. Both WPI and CPI series of data have their limitations and drawbacks to use for analysis. WPI data are collected from diverse sources such as farm gate price, factory gate price, primary markets price, secondary markets price, wholesale markets, retail markets price, etc.

Technically, CPI captures both demand-side factors and supply agents' expectations. The CPI series has different sets of drawbacks as it overestimates inflation which inhibits the use of CPI. It was observed that CPI might overestimate inflation ranging between 0.6 to 1.5 percentage points annually (Shapiro and Wilcox, 1996). Apart from overestimation, CPI uses older base years. The more senior base year compromises the efficacy of indicators to capture the true extent of the price rise. It may exclude some critical items that have entered the consumption

basket lately. With the increasing per capita income, the consumption basket of a majority of consumers will also change. Hence, the true price index will get updated regularly to reflect the changing tastes and preferences truly.

Given both the series' merits and demerits to measure the inflation, the analysis considered WPI for all commodities. Historically, WPI is a commonly used price index for inflation. Earlier, RBI used WPI as a measure of inflation for monetary policies. However, WPI has been replaced by the CPI index for monetary policy decisions in recent years. According to NSC, 2001 (National Statistical Commission), "in many cases, these prices correspond to farm-gate, factory-gate or mine-head prices; and, they refer to prices at the level of primary markets, secondary markets or other wholesale or retail markets" Srinivasan (2008).

2.3.3.2 Inflation measured through quarterly WPI series

At a point in time, inflation in India could be accredited to both prevailing microeconomic and macroeconomic factors of the economy. Microeconomic factors are mainly related to supply shocks. It is implausible to increase the supply of goods by domestic producers in the short run as various macroeconomic factors influence the effectiveness of demand management through fiscal and monetary policy measures. Supply shocks refer to cost-push inflation, which could be a structural or temporary disruption in production. For agricultural commodities- price, crop failure, export and import policy of the particular crop, availability in the global market, among others, may be the source of an adverse supply shock. An expansionary fiscal policy or liberal monetary stance may create a demand-side management challenge.

India has experienced high inflation in the past. The average annual inflation rate increased from 6.4% in the 1960s to

9.0% in the 1970s. Later on, it started tapering marginally to 8.0% in 1980. The logarithmic trend line of WPI suggests that the economy witnessed a gradual transition from a period of high and variable to a period of a moderate and more stable level of inflation. The average inflation during the study period was 4.4 percent. The first-period average was 2.3 percent, which jumped to an average of 5 percent in the second period and later moderated a bit in the third period to 4.5 percent. A study of the quarter-on-quarter inflation found that overall, during the study period barring a few quarters of unusually high inflation of more than 10 percent, the inflation during the study period was generally muted. There were many quarters when we observed a deflationary trend,i.e., inflation was in the negative zone. The deflationary episode was followed in the Q3 of 2014 onwards. The high inflation phase started from Q1 2006 and lasted till Q1 2014. The average inflation during this period was close to 7 percent. In a few quarters of 2008-09 and 2009-10, we observed an unusually high inflation rate of more than 10 percent. However, inflation was moderated in the recent years of the study period.

The data analysis points out that the inflation rate was high in period three compared to period 1and period 2. Simultaneously, variation in the inflation rate was high during period two compared to the other two study periods as observed by the standard deviation. Period 1 observed a moderate variation in inflation. The WPI data are positively skewed if we consider the whole analysis period, but in period 3, data are negatively skewed, i.e., the distributions of data sets are not symmetrical. The tail of the distribution is to the left, and the mode is located to the mean's right during period 3. The shape of the inflation distribution curve

is flat, i.e., platykurtic in all the periods, but the curve's flatness varies during the different periods (table 4).

Table 3: Estimates of descriptive statistical parameters for quarterly WPI series

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**139**	**103**	**160**	**185**
Standard Deviation	**35**	**8**	**20**	**5**
Coefficient of Variation	**24.8**	**7.3**	**12.5**	**2.4**
Skewness	**0.1**	**0.8**	**(0.6)**	**(0.3)**
Kurtosis	**(1.7)**	**(0.3)**	**(1.2)**	**(1.4)**

Data Source: Author calculation

2.4 Money and Banking sector Indicators

2.4.1 Call Money Rate

Call money markets are an inter-bank market to facilitate banks and financial institutions to meet their short-term demand for funds during their day-to-day operations. It is an unsecured market as there is no provision of collateral against borrowed funds and transactions are mostly bilateral. Bilateral settlements between concerned institutions are carried out using the current account maintained by the institutions with the RBI. The sole purpose of market participants is liquidity management for the short run – overnight to fortnight (14 days). Overnight transactions are called “Call money,” and fortnightly transactions are called 'Notice money. Transactions for more than 15 days but less than one year are called term money.' The call market traditionally helps commercial banks in maintaining statutory reserve requirements. A widespread emerging consensus among the call money market participants is that the call market meets short-term fund

mismatches rather than the traditional means of financing banks' lending operations (Nath and Ghosh, 2017).

The weighted average rate for borrowing and lending between the financial institutions is called CMR. The call money market's interest rate is purely market-based, determined by the demand and supply of short-term funds in the market at the given point in time. More recently, the market experienced an unusually high rate owing to a severe asset-liability mismatch during a terminal period of the financial year. The RBI regularly examines the development in these markets and also regulates it. In this context, the Narasimhan Committee - II has provided clearly defined prudent guidelines.

The money market is the first and most crucial stage in the chain of monetary policy transmission. It provides an effective tool for monetary policy operations. CMR and other short-term money market instruments (certificate of deposits and commercial paper) have an inverse relation. A rise in CMR makes other finance sources, such as commercial paper and deposit certificates, cheaper for banks to raise funds. Das (2015) studied the monetary policy transmission to bank interest rates in India. She used a stepwise-estimation process of the vector error correction model. She found a long-run elasticity between the repo rate and the WACMR (Weighted Average Call Money Rate) of 1.43, whereas CRR was not found to have a significant relationship with WACMR. The long-run elasticity of WACMR concerning the reverse repo rate was 0.48, and the elasticity concerning the repo rate was 0.99.

2.4.1.1 Analysis of call money rate for India

Historically, India's call money rate (CMR) has exhibited significant volatility, whereas the bank rate appeared non-varying. Therefore, this can intuitively be opted in analyzing the link

between the rate of interest and other macroeconomic variables. Call money rates vary with the demand and supply for money, reflecting real market dynamics of money demand in the short run. Political developments, either in domestic or in foreign countries, can also influence CMR. For example, in 1999, during the Kargil war, RBI had to intervene in money markets. The intervention by RBI was not perceived well by the markets. Call money rates moved sharply upward for the inter-bank market. This was also reflected in the rise in the foreign exchange forward rates (Bhatt and Virmani, 2005).

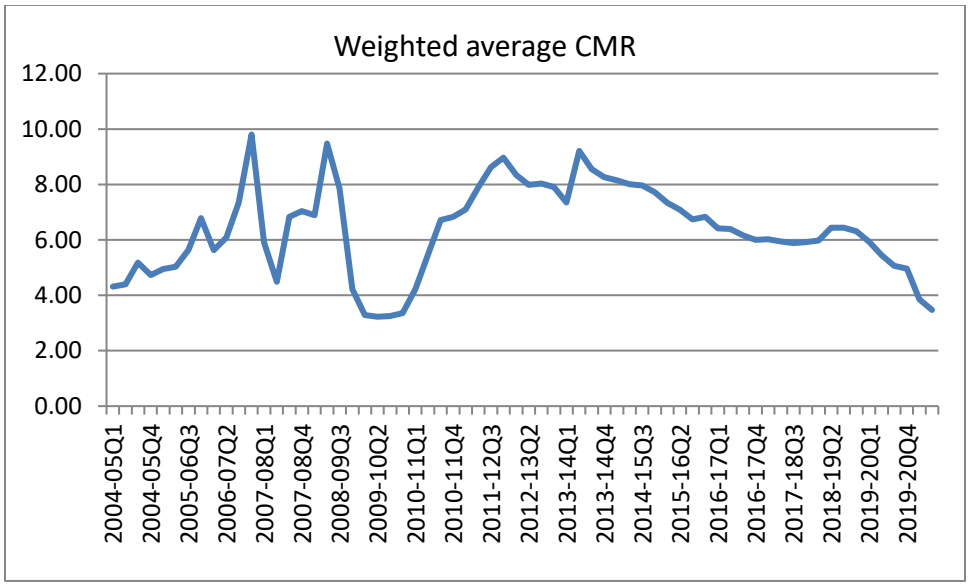

Figure 3: Call money rate average for the quarter

Data Source: RBI handbooks of statistics on Indian economy

The call money rate in India during the study period was mainly range-bound (figure 3). However, the rate range was occasionally breached. The breach happens at both the lower and higher ends of the spectrum, but it generally stabilizes within a brief period. Call money rates are very susceptible to any changes in monetary policy. Overnight call rates used to be very volatile. In the short run, the bank's asset-liability mismatches fuel the demand for

short-term funds, thus increasing the rates. The rates marked a distinctive peak in the third quarter of 2014 and remained high for the subsequent three quarters, but it returned to the corridor. The money market has been reasonably stable in the recent past as the overall liquidity situation in the system was stable

Table 4: Estimates of descriptive statistical parameters for quarterly CMR series

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**7**	**7**	**7**	**6**
Standard Deviation	**0**	**0**	**0**	**0**
Coefficient of Variation	**4.7**	**2.0**	**4.9**	**3.3**
Skewness	**0.1**	**(0.3)**	**1.1**	**0.9**
Kurtosis	**1.8**	**0.3**	**2.4**	**(1.2)**

Data Source: Author calculation

The average call money rate was 6.653 percent during the study period. It had a maximum value of 7.610 percent and a minimum value of 6.150 percent. The average call money rate was highest during period one, but the maximum and minimum rate was 3. It means the rate variation was highest during period three and was more stable during period 1. A stable CMR is better to transmit the policy rate. The CMR curve distribution was left-skewed during period two, whereas right-skewed during period1and period 2. The curve is platykurtic during periods one and leptokurtic during periods 2 and 3.

2.4.2 Money Supply (M3)

Money Supply is one of the strategic variables from the output, employment, and income generation perspectives. Money as a medium of exchange supports facilitating the transactions between any two agents of an economy. The proposal to stimulate economic growth through cash injections is a concept of the past

economic practice. The stable money demand, i.e., changes in the money stock, contributes to output growth with price stability.

An appropriate definition of money is still an unsettled debate even though the economic theory has not provided a clear-cut, unequivocal definition. In our view, the purpose of money keeps changing with the state of new developments in the economy and economic activities. Innovations in financial instruments, practices, and institutions are contemporary, for example, the recent invention of ledger money (crypto-currency). These innovations may have their implications on the very definitions of money also. The economic theory also addresses it in a piecemeal approach; for example, Transaction Theories explain the medium of exchange function of money, whereas Asset Theories extend it further to store value.

The First Working Group (1961) on money supply appointed by RBI regarded "narrow" money as India's appropriate official money supply measure. The group used the term money for representing currency, demand deposits, and other deposits with banks (represented in equation (1) below). Additional assets were included in the measure of quasi-money.

M (Money Supply) = C (Currency held by Public) + DD (Net demand deposit of Banks) + OD (other deposits of the RBI).....(2.1)

The Second Working Group (1977) acknowledged that using a single measure of money stock for monetary analysis and policy would be inadequate and misleading. Therefore, it proposed the four measures of the money stock- namely the M1, M2, M3, and M4 measures. The degree of liquidity is the principal distinguishing feature of these four definitions of money stocks.

RBI keeps on proposing and revising the definitions of the money supply from time to time, available in its different working groups' propositions. More recently, given the development in financial institutions and monetary instruments, the Third Working Group (1998) proposes revisions in the monetary aggregates and frequency of data collection about these aggregates. The four different measures of money stocks are there to serve other purposes. For our analysis, we have used M3 as a stock of money supply. Broad money (M3) would be the most appropriate measure to study the interrelationship between money and other macroeconomic indicators. The review committee on the working of the Indian Monetary System recommended setting up M3 as a monetary policy instrument.

2.4.2.1 Economic theory of money supply

The classical theory of money postulates that money demand is independent of interest rate, i.e., interest rate does not affect money demand. Fischer's Quantity Theory of Money proposes the relation MV = PY, where M is money supply and V is the velocity of money. The product of these two is equal to nominal income. The speed of money is measured as what people use to buy their goods. In the short run speed of money does not get affected much. If V and Y are constant at the full employment level, then an increase in money supply will simply lead to an increase in price only. However, the Cambridge Approach using the same equation used by Fischer argued differently. They argued that the level of money is proportional to wealth, i.e., when the wealth with the public increases, they also tend to hold more money. Based on this hypothesis, the demand for money equation is revised to M = KxPY to include wealth held by the people as a factor influencing the demand for money.

In contrast to Classical and Fischer, Keynes proposes the Liquidity Preference Theory of money. The theory argued that the exogenous variation in money stimulates the Velocity of money (V). Therefore, increasing the money supply would lower the interest rate by stimulating investment growth, adversely affecting the velocity. It rejected the hypothesis of a constant speed of money and propounded the speed of money to be dynamic depending on exogenous factors.

The quantity Theory of Kaldor and Moore discarded the independent role of the quantity of money. It emphasized the role of financial institutions in the process of money supply and credit creation. The financial institutions could increase the amount of money supply by doing multiple transactions as the velocity of money is fixed. They argue a direct relationship between money supply and the general price level of goods and services. An increase in money supply induces a rise in the price level, not vice-versa.

Marx and Ricardo highlighted the inapplicability of the Quantity Theory of money in their seminal work on the value of the Labor theory. Values of commodities are proportional to the quantity of labor time required directly or indirectly in the production process. It means an item enters the market with a predetermined price measured in a money value, so money circulation speed brings only inflation.

Friedman and other economists proposed the Modern Approaches for money. The newly introduced concept of Portfolio Choice to Money was in sync with Keynes and Cambridge framework. The amount of wealth (permanent income) with the people at large decides the demand for money. The velocity of money would also determine the demand for money. The interest

rate does not influence the demand for money much. The principal argument here was that any change in interest rate would merely affect the return on money and not the demand for money. Friedman emphasized that the monetary policies followed by the country in the long run significantly influenced the demand for money.

New-Classical economics predicted that changes in the money supply would push the price level to shift upward. Anticipation of change in the money supply also influences inflation. Some degrees of change in the price level are also necessary for market clearance. Changes in the price level (inflation) also influence the money supply.

The quantity theory of money is considered as a short-run theory for money supply. Both Quantity theory and the Cambridge approach advocate that money supply is a phenomenon related to a group of factors, including inflation, wealth, and income level. The approach rules out interest rate as a factor influencing money supply. Classical theories could not establish a clear relationship between money supply and inflation. Keynesian theory too emphasized the interest rate. The Post-Keynesian model assumed fixed velocity, but at the same time, they also stressed that the private sector might control it through transactions. Marx proposed the Labor theory of value and price of goods are predetermined in the quantity of labor time.

2.4.2.2 Money Supply in India

The money supply is generally considered a policy-determined phenomenon. Due to financial reforms, various changes were made, and statutory ratios such as CRR and SLR were introduced. These changes have greatly affected money supply and other macroeconomic indicators such as price level, unemployment, etc.

The Central Bank approach and definition of Money Supply is also undergoing a constant review.

Figure 3 shows the recent trends of money supply measure M3 in India. The money supply measures exhibited a steady increase (as indicated by the trend line) during the period considered for the study. The increasing money supply is a common feature of any developing country. The average growth rate of the money supply was 13.7 percent during the period it increased from Rs. 11.72 trillion to Rs. 113.04 trillion and increases of 8.64 times from 2000-01 Q1 to 2015-16 Q3. The rate of accumulation of foreign exchange further accelerated in the subsequent periods.

Further analysis of components of M3 points that currency as a component of M3 has registered a robust growth than demand deposits and time deposits. If we compare the pace of currency growth in the pre-reforms and post-reforms era of the economy, we find that currency as a component of M3 has increased in absolute terms. Still, in its relative terms, the contribution has declined during the post-reforms era but not continuously in the pre-reforms age. The continuous decline of currency as a component of M3 during recent times points to the increasing maturity of the financial system.

An increase in economic activities due to the rise in GDP also generates a need for money. As a result, the supply of money is increased to meet the increased demand. Determining the growth rate of money supplies is an essential concern to any monetary authorities. Monetary authorities announce the targets for desired growth rates in money supply at the outset. Chakravarti and Rangarajan Committee Report underlines that the RBI should fix a

growth rate target for M3 for the year ahead while keeping the inflation target.

Table 5: Estimates of descriptive statistical parameters for money supply

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**63,635**	**21,957**	**81,546**	**1,40,176**
Standard Deviation	**43,609**	**7,858**	**25,768**	**8,770**
Coefficient of Variation	**68.5**	**35.8**	**31.6**	**6.3**
Skewness	**0.5**	**0.7**	**0.1**	**0.2**
Kurtosis	**(1.1)**	**(0.5)**	**(1.2)**	**(1.1)**

Data Source: Author calculation

A recovery in deposit growth and credit growth also increases the money supply. It was observed that in India growth rate of the money supply is generally at a peak in the third quarter due to the festive season and low in the first quarter of the financial year. Quarter-on-quarter variation in the money supply was observed to increase during period two. In period one and period three, the money supply rate of the money supply was almost steady. For the whole period, period one and period 2, the money supply growth curve has the tail of the left, and mode is located to the mean's right. The mean is usually less than the mode because the few low scores shift the mean to the left. The shape of the money supply distribution curve is flat across all the periods.

2.5 External Sector Indicators

2.5.1 Foreign Exchange Reserve

The IMF has prescribed a general definition for the foreign exchange reserve of a country. The IMF definition suggests an external asset at the disposal of Central Banks of a country that is readily available to and controlled by for direct financing of external payment imbalances will be considered as foreign

exchange reserve. These assets also support the monetary authority to affect the currency exchange rate and other purposes either through direct intervention in the foreign exchange market or indirectly regulating the magnitudes of imbalances. Central banks across the countries have accepted the foreign exchange reserve definition suggested by the IMF in BoP Manual and Guidelines on Foreign Exchange Reserve Management, 2001.

India's foreign exchange reserve situation was abysmally low, but the 1991 balance of payment crisis led to many reforms; consequently, the foreign exchange reserve position improved. During the Asian financial crisis (1997), many Asian currencies experience a very volatile currency exchange rate. Post-crisis foreign exchange reserve holding in Asian countries skyrocketed (Romero, 2005). As per the International Financial Statistics (IFS) database, emerging and developing countries account for approximately 67.37% of foreign reserve holding by December 2014. Only Asian emerging and developing countries account for around 39.34% of the world's total foreign exchange reserves. During the same period, India, with foreign exchange reserves holdings of $319.17 billion, is in 9th place globally and 3rd place in Asia, after China and Japan having reserves of $3.94 trillion and $1.26 trillion, respectively.

RBI Act, 1934 gives it the power to be a custodian of foreign reserves also manages reserves on behalf of the government of India. The act mandates RBI to use the foreign currency management system to the country's advantage to have monetary stability. There is no globally accepted definition of assets, which may comprise a foreign exchange reserve. However, central banks define items' coverage, ownership of assets, and liquidity aspects as per their framework. In India, the term foreign

reserves basket comprises gold holding, SDR, Foreign Currency Assets (FCAs), and Reserve Position in the IMF (see table 7). The primary purpose of holding foreign exchange reserves is to have insurance against unforeseen currency crises in the future (Russell Green and Tom Torgerson, 2013). In India, foreign exchange reserves serve three motives: transaction, speculation, and precautionary demand for foreign exchange monitored or carried out by RBI. The transaction motive of foreign exchange is to manage the smooth flow of currency to facilitate international trades. Speculative motive serves the interest of individuals and corporate trading in the currency market to earn profit from exchange rate fluctuations or arbitrage opportunities available in different parts of the world. Simultaneously, the precautionary motive is to act as insurance against the unpredictable demand for a foreign exchange due to global vulnerability, trade deficits, etc. Foreign exchange reserves are indicators of confidence in the country's monetary and exchange rate policy. A comfortable reserve level enables orderly absorption of international capital flows. It enhances monetary authority capacity to intervene in the foreign exchange market to curb any excess volatility in the foreign exchange market. It improves the confidence of the global and domestic rating agencies in the country's economic and financial system and also the ability to meet any external obligations.

Table 6: Foreign exchange reserves of India (US$ billions)

Year	Foreign Currency Assets	Gold	Reserve Tranch Position	SDRs	Total
2001-02	**51.1**	**3.1**		**0.0**	**54.2**
2002-03	**71.1**	**3.7**	**0.7**	**0.0**	**75.5**
2003-04	**106.1**	**4.2**	**1.3**	**0.0**	**111.6**
2004-05	**135.1**	**4.4**	**1.4**	**0.0**	**140.9**

2005-06	**145.1**	**5.8**	**0.8**	**0.0**	**151.6**
2006-07	**191.9**	**6.8**	**0.5**	**0.0**	**199.2**
2007-08	**299.2**	**9.6**	**0.4**	**0.0**	**309.2**
2008-09	**241.6**	**9.8**	**1.0**	**0.0**	**252.3**
2009-10	**252.8**	**17.9**	**1.4**	**5.0**	**277.0**
2010-11	**273.7**	**22.1**	**2.4**	**5.2**	**303.5**
2011-12	**260.1**	**27.0**	**2.8**	**4.5**	**294.4**
2012-13	**259.7**	**26.3**	**2.3**	**4.3**	**292.7**
2013-14	**276.4**	**21.6**	**1.8**	**4.5**	**304.2**
2014-15	**317.3**	**19.0**	**1.3**	**4.0**	**341.6**
2015-16	**336.1**	**20.1**	**2.5**	**1.5**	**360.2**
2016-17	**346.3**	**19.9**	**2.3**	**1.4**	**370.0**
2017-18	**399.4**	**21.5**	**2.1**	**1.5**	**424.5**
2018-19	**385.4**	**23.1**	**3.0**	**1.5**	**412.9**
2019-20	**442.2**	**30.6**	**3.6**	**1.4**	**477.8**

Source: RBI database on Indian economy

2.5.2 Trend of Foreign exchange reserves in India

India's foreign exchange reserve is constantly growing. It has grown from USD 34.43 billion in 2000-01 to USD$ 319.71 billion in Q3: 2014-15, registered growth of 929 percent as illustrated in figure 3.7 below. If we analyze the trend and progress of various foreign exchange reserve components, we find FCA and Gold are the two crucial components whose growth stands apart. SDR, which was almost insignificant in 2000-01, became an essential component in 2009-10. Over time, the continued accumulation of foreign exchange reserves may cause many risks, such as inflationary pressure, monetary policy management, and other market risk costs. The cost of foreign exchange reserve accumulation may not be uniform across countries or for the different periods for a country. The cost and benefits of foreign exchange reserves accumulation are subject to continuous change.

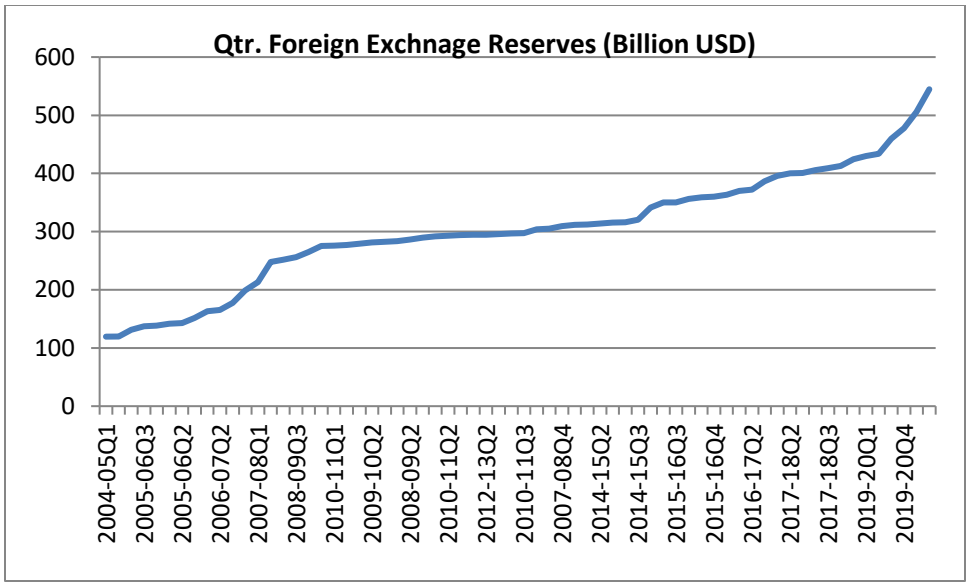

Figure 4: Quarterly foreign exchange reserve (billion USD)

Data Source: RBI handbooks of statistics on Indian economy

There has been a significant improvement in the country forex reserves in the last 20 years (2000-19) to the tune of 700 -800 percent. The average forex reserve during period 2 is almost four times to period 1. The quarter-on-quarter variation in reserve accumulation was highest during period 2. The forex reserve distribution curve is leftward skewed, which means a slighter quarter-on-quarter increase in reserve. The distribution's shape is platykurtic, which means a consistent and slight quarter-on-quarter rise in forex reserves.

Table 7: Descriptive statistical analysis of foreign exchange reserve

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**232**	**115**	**292**	**408**
Standard Deviation	**117**	**69**	**37**	**14**
Coefficient of Variation	**50.2**	**60.0**	**12.6**	**3.3**
Skewness	**(0.2)**	**0.9**	**0.9**	**0.1**
Kurtosis	**(1.1)**	**0.4**	**(0.3)**	**(1.2)**

Data Source: Author calculation

2.6 Exchange rate

In common parlance, the exchange rate is the value of a country's currency concerning the value of another country's currency. It may value one nation’s currency to another nation or economic zone currency and vice versa. The exchange rate of any currency also follows the common law of economics,i.e., the interaction of the supply and demand curve determines the price. There are multiple factors at play that influence a currency's exchange rate at any given point in time.

The exchange rate is a critical macroeconomic variable that influences decisions by many economic agents such as exporters and importers, bankers and other financial institutions, foreign tourists, etc. Exchange rates affect the business cycle, foreign trade, and capital inflows and outflows, etc. This section of the study analyses the Indian rupee's exchange rate with the US dollar using quarterly end-of-period exchange rates for these two currencies over the last two decades.

2.6.1 Exchange rate policy in India

Exchange rate movement depends on the exchange rate policy followed by the country. India’s exchange rate policy is dynamic and has undergone many changes through broader macroeconomic reforms and gradual liberalization. Independent India adopted IMF's par value system whereby the rupee's external par value was fixed at 4.15 grams of fine gold. Post Bretton Woods, the par value system was abandoned for peg against a foreign currency. In 1971-rupee value was pegged with the pound sterling. Later, to overcome the weakness in the rupee exchange rate due to the single currency peg and to ensure stability, India shifted to a system and pegged the rupee against a basket of currency from September 1975. With the initiation of a series of economic

reforms to contain the rapid decline in the foreign exchange reserve and improve domestic competitiveness, two consecutive exchange rate adjustments were carried out in July 1991. In March 1992, LERMS (Liberalised Exchange Rate Management System), a system that permits a dual exchange rate system, was adopted for an interim period. This system allows for only partial convertibility of the rupee. An enterprise earning foreign exchange must convert 40 percent of their earnings at the official exchange rate and the remaining 60 percent at the market-determined rate. The system was abandoned for a unified exchange rate (market-determined) system in March 1993. From time to time, various monetary and administrative measures were also carried out to manage exchange rate volatility effectively. The market intervention combined with monetary and organizational measures effectively responded to the different exchange rate volatility episodes.

There are two forex markets: spot market and futures market. The exchange rate realized on foreign currency's sale, and purchase in the spot market is the spot market buying and selling exchange rate. The foreign exchange transactions in the spot market follow the T+2 principle. That is, delivery of currency will be settled within two days of the deal. In the forward market, the sale and purchase of currency take place for a settlement at a date in the future. The rate of exchange for the future settlement is pre-settled and agreed upon between the parties. The buyers and sellers agree to execute the deal after 90 days of the deal or forward transaction. The exchange rate mutually agreed between buyer and seller for settlement on a predefined date in the future is called the forward exchange rate.

2.6.2 Exchange rate trends over the last two decades

To study the exchange rate movement trend of USD-INR, we used the quarterly end of period USD-INR exchange rate. The start period of data for studying exchange rate trends was carefully selected. Almost a decade after India adopted managed float system. The historical data covers 18 years (from Q1, 2001 to Q4, 2018), representing 72 quarters in total. Figure 5 shows the quarterly pattern of USD-INR movement over two recent decades. The rupee has treaded along an uneven path throughout this period. But the last decade has witnessed a rapid and volatile movement in the USD-INR exchange rate. One USD's value was INR 46.64 at the end of the fourth quarter of 2000-01 changed to INR 45.14 at the end of 2009-10. During this period, the USD-INR exchange rate was almost range-bound, having trending approximately between INR 40 for a USD to INR 50. INR was relatively strong in 2007-08 and terminal period of the second quarter of 2007-08 exchange rates was below 40, and it remains to hover at those levels till the fourth quarter of 2007-08. The depreciation of INR started from the first quarter of 2008-09 lasts for a year. INR regained its value against the USD but could not hold it for long. From the second quarter of 2011-12-rupee depreciation was very fast and then onwards at the end of almost each quarter rupee was depreciation from its previous quarter value. In between, it regained some values, but the gain was short-lived. The USD-INR exchange rate even crossed 70 in the second quarter of 2018-19. Then onwards, it is hovering at that level.

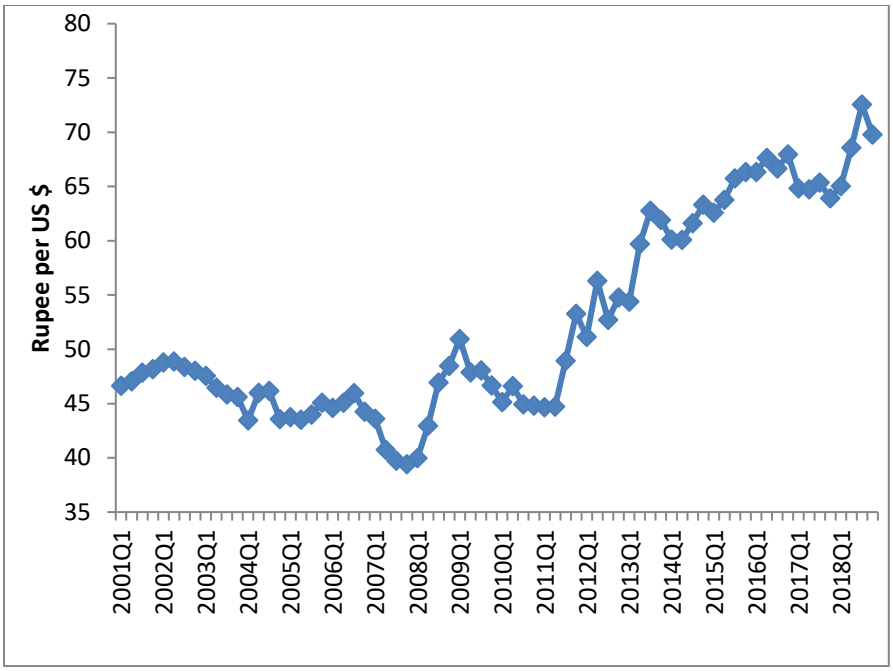

Figure 5: INR-USD rate end of the period
Data Source: IFS-IMF

A look at year on year (YoY) movement of the USD-INR exchange rate in figure 5 also concurs with the above statement that INR has lost its value against USD quite rapidly in the immediate last decade of our analysis period considered in this study. Figure 6 shows the highest deprecation of rupee values in FY 2008-09, followed by FY 2011-12 and FY 2013-14, respectively. Rupee value appreciated substantially in FY 2009-10 immediately after the largest deprecation in the preceding year. The momentum of the rupee value appreciation trend continued in the subsequent FY 2010-11. But the deprecation of rupee value to the dollar, which in FY 2011-12, continued year on year till 2015-16. Though, the quantum of rupee value deprecation keeps on changing during this period. The deprecating of rupee observed a trend reversal only in FY 2017. In these five (FY 2011-12 to FY 2015-16), continuous YoY depreciation of rupee values to USD led to a net fall in rupee value by approximately 46 percent. The

rupee pared some losses incurred in those five consecutive years only in FY 2016-17 and partially regained.

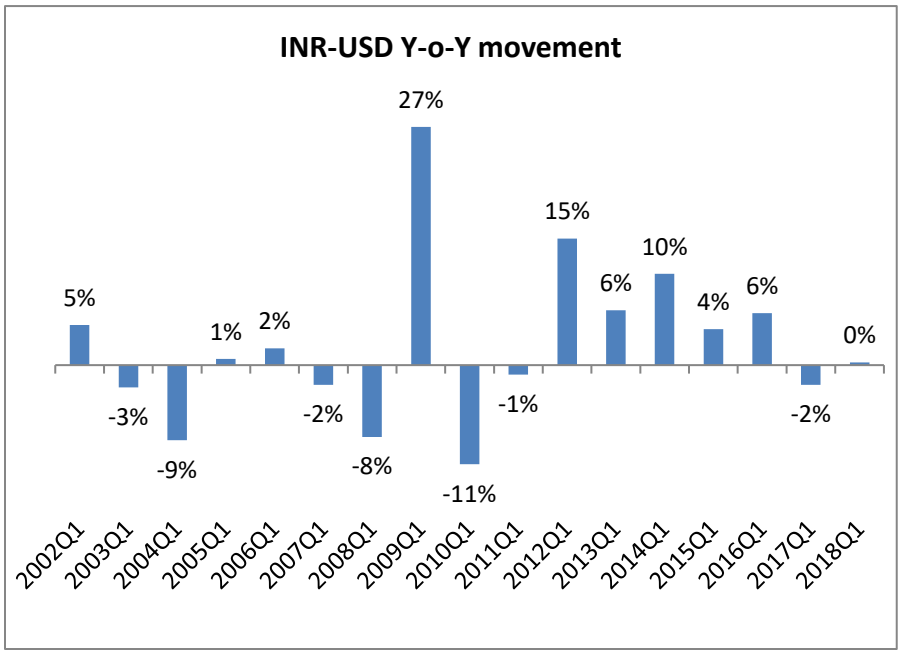

Figure 6:INR-USD y-o-y movement
Data Source: IFS-IMF

2.6.3 Determinants of exchange rate

Several economic factors affect the value of the Indian rupee, and foreign capital inflows are one. Generally, capital flows are considered to have a positive effect on the economy. However, the surge in inflows in a short period could stress the financial institutions and the economy. It may put pressure on the domestic currency to appreciate and can create possible asset-price bubbles.

India follows a floating exchange rates system. Under a floating exchange rate, the supply and demand of currencies in the currencies market determine the ratio. Descriptive statistics of the Indian rupee and US dollar exchange rate are presented in table 9. The average exchange rate is lower in period two than period one, but the exchange rate volatility is also high in period 2. The average exchange rate increased substantially during period 3. The

depreciation rate of rupee value in terms of the US dollar was high in the last few years of the analysis period. The exchange rate distribution curve in the three compartmentalized periods considered for the analysis is leftward skewed, but the period is rightward skewed. The shape of the distribution curve is flat platykurtic during the first period three periods.

Table 8: Descriptive statistical analysis of exchange rate

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**53**	**45**	**55**	**68**
Standard Deviation	**9**	**3**	**8**	**3**
Coefficient of Variation	**17.8**	**5.6**	**14.9**	**4.1**
Skewness	**0.6**	**(0.7)**	**0.0**	**0.3**
Kurtosis	**(1.2)**	**0.1**	**(1.6)**	**(1.0)**

Data Source: Author calculation

2.7 Exports, Imports and Balance of payments

The mercantilist school of thought, and economic philosophy built around foreign trade, postulates that the world has limited wealth and foreign trade is a tool to accumulate wealth, i.e., gold and silver. Exports and imports were usually settled with gold or silver. We had a limited amount and number of currencies in circulation, unlike the fiat currencies today. The amount of gold holding of a country is directly proportional to the export and inversely proportional to import. Therefore, exports make a country richer by bringing more gold into the economy, whereas imports enrich competitors. Mercantilist doctrine considers trade a zero-sum transaction. Exports were viewed as desirable, and imports were deemed harmful. Therefore, an economy tries to maximize exports and minimize imports. An economy aims to be a net exporter. Following this approach, exports entered into the balance of payments as a credit item and imports as a negative or debit item.

Exports of more goods than imports of goods are considered a favorable balance of trade.

The net amount of foreign trade influences another macroeconomic indicator called the balance of payments (BoP). BoP is divided into groups and subgroups. For the analysis in this chapter, we have extracted data from the IMF data warehouse, which uses the balance of payments. Balance of Payment is divided into two traditional subdivisions: (1) current account, (2) capital and financial account. The current account comprises the values of goods and services imported or exported, primary income such as the payment and receipt of wage, dividends, and interest, and secondary income, i.e., general government, financial corporations, nonfinancial corporations, households, and other transfers.

All items in BoP are registered as flows. The overall results are always in the balance. The balance of payments always shows zero,i.e., deficits or surplus in the current account is met with a deficiency or excess in the capital account or vice-versa. But droughts and gluts show up in the sub balances under different components of the BoP. In accounting terms, BoP is always in equilibrium as a current account deficit implies debt accumulation or loss of ownership. The accumulated debt shows up indirectly and significantly later as a debit in the investment income, such as payments for interest, dividends, rents, etc., to foreigners. In simple terms, a negative current account balance is offset by a positive capital and financial account surplus. Further, this implies an increase in foreigners holding of domestic assets.

BoP records the value of transactions between domestic and foreign residents usually measured for a year. In principle, BoP is based on double-entry bookkeeping, generally measured in the

USD value of transactions recorded as credit and debt, respectively. However, many trades are estimated based on surveys, are only partly recorded, or are missed entirely in practice. In the BoP book-keeping, the purchase or import is registered as a negative or debit entry, and sale or export is a plus or credit entry. BoP contains a third component, i.e., change in foreign reserve. The foreign fund's account is compensatory financing. Net increase of forex explicitly represents capital exports. Similarly, a decrease in the foreign reserves statement implies deficit or negative—the net difference in current and capital account balance results in a change in the forex reserve position.

2.7.1 Export

India's export has been increasing over the years both in absolute term (as shown in figure10) and as a share of GDP. The percentage of Indian exports in world exports reached 1.7 percent in 2018-19. The increase in export is primarily driven by the export of services rather than the export of goods. Shares of service sector exports in the world services export have risen faster than the Indian goods exports and have reached 3 percent in 2013. India export has been facing a difficult time in recent years and posting a negative growth in subsequent quarters after Q2 2014-15. As per Ministry of Commerce data, India's merchandise exports were US$ 310 billion in 2014-15 and declined to US$ 262 billion in 2015-16 in percentage terms, approximately 16 percent. Despite a significant fall in export India's share in world total merchandise exports reduced only marginally. This implies that the total volume of world merchandise exports also declined marginally, reflected in India's export volume contraction because of a modest and uneven recovery in advanced economies. It remained at 1.6 percent in 2015.

The diversification of export, both geographically and product-wise, minimizes risk from the global slowdown, expands revenues, and enhances growth (Henn et al.,2015). Countries are having a narrow export basket (only a limited number of goods to export) and are geographically less diversified may often suffer from export instability and unstable export earnings in the long run due to inconsistent global demand. India'sexportswere progressively diversifying in products (different types of products) and destinations. The share of many developing economies as destinations has increased. India enjoyed good exports growth during 2000-01 to 2007-08 before the global recession of 2008 jolted this rising export growth trajectory. Exports increased from US$45 billion in 2000-01 to US$163 in 2007-08, an annual increase of 17 percent (CAGR). The recession of 2008 reversed the trend and, in a yearly knee-jerk, export growth declined from 29 percent (positive) in 2007-08 to 13.6 percent (positive) in 2008-09 and further 3.5 percent (negative) in 2009-10 (table 3.10). The highly geographically concentrated export to a limited destination was an important factor for the sudden decline. USA and EU accounted for 40 percent of total Indian export. The impact of the recession was poorly felt in the USA and EU, leading to a sudden decline in imports. The exports concentration to only a few markets impeded steady and sustainable exports growth in the past.

Table 9: Changing pattern of regional distribution of Indian trade (export and import share)

	2005		2015		2019	
Region	**Import Partner Share (%)**	**Export Partner Share (%)**	**Import Partner Share (%)**	**Export Partner Share (%)**	**Import Partner Share (%)**	**Export Partner Share (%)**
South Asia	**0.98**	**5.38**	**0.76**	**6.53**	**0.77**	**6.96**
East Asia and Pacific	**25.71**	**26.85**	**36.39**	**22.77**	**38.2**	**23.52**
Middle East and North	**8.03**	**16.17**	**21.2**	**20.69**	**23.67**	**17.92**

Africa						
Europe and Central Asia	**24.39**	**25.21**	**18.92**	**20.02**	**16.89**	**20.51**
Sub Saharan Africa	**2.9**	**5.26**	**7.84**	**7.85**	**6.88**	**7.22**
North America	**6.59**	**17.47**	**6.22**	**16.04**	**8.11**	**17.69**
Latin America & Caribbean	**1.68**	**2.81**	**5.54**	**4.13**	**4.48**	**4.23**

Data Source: WITS, World Bank.

A PHDCCI study to measure India's export diversification (shift in India's trade from developed to developing economies) using Regional Hirshman Index (RHI) found that overall RHI rose from 0.52 in FY2000 to 0.57 in FY2005 and 0.59 in FY2010. However, it declined to 0.57 in FY2015. The export share of Asian and African nations increased from 42.79 percent in FY 2000 to 60.15 percent in FY 2015 (table 3.10). The structural shift in exports may be attributed to various developments at the domestic and international levels. For example, it could be due to the growing income level in developing countries, bilateral and multilateral trade agreements, availability of trade facilitation measures, etc. The government continually encourages and takes steps for exporters to venture to get into a new market and add new products to the export basket.

A closer look at India's direction and composition of exports seem to yield limited results. As shown in Table11, the number of export partners and the number of products exported to the other country in the last 15 years is almost stagnant. However, the index of export penetration has improved during these periods. India has many export partner countries; however, the bulk of exports are concentrated to a limited number of countries. The trend has been alarming and makes our export susceptible to bad economic

weather in these major export partners' countries. Any turbulence in the imports in those countries could be easily transmitted to India. Broader exports diversifications minimize export earnings risk.

Table 10: Export and import products and partner

Year	Index of export marker penetration2	No.of export partners	No.of Import partners	No.of products exported	No.of products imported
2001	**17.59**	**212**	**179**	**4577**	**4530**
2002	**18.61**	**213**	**185**	**4649**	**4558**
2003	**19.86**	**217**	**189**	**4662**	**4587**
2004	**20.5**	**222**	**198**	**4695**	**4551**
2005	**22.97**	**223**	**207**	**4696**	**4582**
2006	**23.8**	**221**	**209**	**4692**	**4608**
2007	**25.01**	**221**	**210**	**4684**	**4510**
2008	**25.79**	**222**	**218**	**4691**	**4484**
2009	**25.86**	**222**	**215**	**4467**	**4383**
2010	**27.14**	**223**	**214**	**4462**	**4338**
2011	**26.95**	**220**	**214**	**4483**	**4341**
2012	**27.46**	**221**	**207**	**4460**	**4354**
2013	**28.29**	**221**	**208**	**4444**	**4336**
2014	**27.93**	**221**	**222**	**4434**	**4331**
2015	**27.78**	**220**	**215**	**4424**	**4313**
2016	**27.73**	**219**	**211**	**4411**	**4310**
2017	**30.29**	**219**	**213**	**4418**	**4317**
2018	**29.95**	**222**	**220**	**4450**	**4343**
2019	**26.78**	**226**	**210**	**4442**	**4356**

Source: World Integrated Trade Solutions (World Bank) database

The descriptive analysis of the export performance of India is presented in table 3.12 below. It shows international trade is a crucial contributor to growth. We have analyzed the export patterns related to the GDP growth rate patterns to understand how export trends are conducive to GDP growth. The finding emerging

2Index of export market penetration data is calculated by TCdata360 of the World Bank. The index measures the penetration of exports of any country's products to the world. It is calculated as the number of countries to which the specific countries export a particular product divided by the number of countries importing it.

from the analysis is that the export growth rate increases with the increasing rate with the GDP growth rate. The average growth rate of export in period 2 is higher than period 1, and similarity in period 3 is higher than from period 2. The volatility of export growth is relatively tiny in period one and period 3. The growth and distribution pattern analysis suggest that growth is rightward and skewed in period one and leftward in periods two and three.

Table 11: Descriptive statistical analysis of export

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**49,041**	**21,322**	**66,094**	**79,391**
Standard Deviation	**26,340**	**10,433**	**13,372**	**4,144**
Coefficient of Variation	**53.7**	**48.9**	**20.2**	**5.2**
Skewness	**(0.2)**	**0.9**	**(0.8)**	**(0.6)**
Kurtosis	**(1.6)**	**(0.3)**	**(0.5)**	**0.1**

Data Source: Author calculation

2.7.2 Import

India's foreign trade has increased many folds over the last two decades. However, the growth of imports has outpaced that of export. The high increase in import over export puts the balance of trade deficit in an adverse position. For example, imports grew from 24.5 percent in 2006-07 to 35.49 percent in 2009-10then dipped to -5.05 percent in 2009-10. It regained the growth momentum and increased by28.23 percent in 2010-11. The compound growth rate of imports during the last decade was 15.7 percent per annum. Both exports and imports enhanced considerably during 2006-07 to 2019-20, which can be observed in GDP's enhanced share of foreign trade. This underlines an increased integration of the Indian economy with the world. Import growth was marginal in 2012-13, merely 0.29 percent growth from

the previous year. The subsequent three years saw an import reduction (Table 3.13). Despite the narrowing, the balance of payment situation has not improved much because import contraction also accompanied export contraction.

There has been an increase in the total volume of imports, but the value of imports was higher than that of exports. Similar to exports, the import basket is also less diversified. The number of import partners and several commodities in the Indian import basket has been almost constant in the last 15 years (table 13). Due to crude petroleum prices, there has been an increase/decrease in the trade deficit over the last many years. If we go back in history, India faced a severe food shortage during the 1950s and 1960s. The primary item of import at that time was food-grain, capital goods, machinery, and equipment. However, after 1970, fertilizers and petroleum replaced food-grain imports. Unfortunately, the import basket's share of capital goods was low and remained almost the same during those days.

Table 12: India trade in the US $ million

Year	Exports	Growth (%)	Imports	Growth (%)
2005	**100.4**		**140.86**	
2006	**121.2**	**20.8%**	**178.21**	**26.5%**
2007	**145.9**	**20.4%**	**218.65**	**22.7%**
2008	**181.9**	**24.6%**	**315.71**	**44.4%**
2009	**176.8**	**-2.8%**	**266.40**	**-15.6%**
2010	**220.4**	**24.7%**	**350.03**	**31.4%**
2011	**301.5**	**36.8%**	**462.40**	**32.1%**
2012	**289.6**	**-4.0%**	**488.98**	**5.7%**
2013	**336.6**	**16.2%**	**466.05**	**-4.7%**
2014	**317.5**	**-5.7%**	**459.37**	**-1.4%**
2015	**264.4**	**-16.7%**	**390.74**	**-14.9%**
2016	**260.3**	**-1.5%**	**356.70**	**-8.7%**
2017	**294.4**	**13.1%**	**444.05**	**24.5%**
2018	**322.3**	**9.5%**	**617.95**	**39.2%**
2019	**323.3**	**0.3%**	**478.88**	**-22.5%**

Data Source: WITS, World Bank

The descriptive analysis of import trend shows that the average growth of import from period 1 to period 2 was faster than from period 2 to period 3. The quarter's variation on quarter import growth during period 2 was highest compared to the other two periods. During periods one and two, the distribution of imports was leftward skewed, whereas rightward skewed during period 1. The curve is platykurtic during all three periods and the whole analysis period (table 14).

Table 13: Descriptive statistical analysis of import

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**73,608**	**29,356**	**1,00,518**	**1,23,307**
Standard Deviation	**41,851**	**17,255**	**19,601**	**7,759**
Coefficient of Variation	**56.9**	**58.8**	**19.5**	**6.3**
Skewness	**(0.2)**	**0.9**	**(0.7)**	**(0.7)**
Kurtosis	**(1.5)**	**(0.5)**	**(0.2)**	**(0.3)**

Data Source: Author Analysis

2.8 Foreign Investment (FDI and FII)

A perusal of India's foreign investment approach suggests that it begin with a relatively conservative posture. The progressive liberalization policy allowed for broader access to different economic sectors. The gradual liberalization, coupled with considerably improved macroeconomic fundamentals, has driven the country's steep rise in FDI flow. Apart from enhancing the domestic front, a significant change in the approach and direction of global fund flow more focused on emerging market economies also boosted India's FDI flow. Gradual opening up of capital accounts by many developing countries has accelerated the pace of cross-border investment flows in this century.

The FDI flow to India over the years is in sync with economic growth. The FDI inflow rose from around US$ 6 billion to US$ 38 billion in 8 years from 2001-02 to 2008-09. The flows witnessed moderation during 2008-09, maybe because of the financial crisis but dipped again in 2010-11 even though fund flow to other EMEs in Asia and Latin America was relatively robust (see figure12). Gross equity FDI inflows moderated a bit and reduced to US$ 22 billion in 2010-11 from US$ 27 billion in the preceding year. The inflow improved again in 2011-12, but it remains oscillating at the same level.

The year 2014-15 observed a significant reversal when the FDI flow increased to US$ 45 billion from US$ 36 billion in the immediately previous year (table15). The rising trend continues, and the inward FDI has attained a new level of US$ 60 billion in 2016-17. Further FDI flow concentrated in the services sector followed by manufacturing and mostly routed through Mauritius followed by Singapore. However, the service sector's dominance is moderating, and manufacturing has gained momentum in recent years.

Table 14: Components of FDI flows to India

Year	Gross inflows/ Gross Investments	Repatriation/ Disinvestment	Direct Investment to India	FDI by India	Net Foreign Direct Investment	Net Portfolio Investment	Total
2000-01	**4031**	**0**	**4031**	**759**	**3272**	**2590**	**5862**
2001-02	**6130**	**5**	**6125**	**1391**	**4734**	**1952**	**6686**
2002-03	**5095**	**59**	**5036**	**1819**	**3217**	**944**	**4161**
2003-04	**4322**	**0**	**4322**	**1934**	**2388**	**11356**	**13744**
2004-05	**6052**	**65**	**5987**	**2274**	**3713**	**9287**	**13000**
2005-06	**8962**	**61**	**8901**	**5867**	**3034**	**12494**	**15528**
2006-07	**22826**	**87**	**22739**	**15046**	**7693**	**7060**	**14753**
2007-08	**34844**	**116**	**34729**	**18835**	**15893**	**27433**	**43326**
2008-09	**41903**	**166**	**41738**	**19365**	**22372**	**-14030**	**8342**
2009-10	**37746**	**4637**	**33109**	**15143**	**17966**	**32396**	**50362**

2010-11	**36047**	**7018**	**29029**	**17195**	**11834**	**30293**	**42127**
2011-12	**46552**	**13599**	**32952**	**10892**	**22061**	**17170**	**39231**
2012-13	**34298**	**7345**	**26953**	**7134**	**19819**	**26891**	**46711**
2013-14	**36047**	**5284**	**30763**	**9199**	**21564**	**4822**	**26386**
2014-15	**45147**	**9864**	**35283**	**4031**	**31251**	**42205**	**73456**
2015-16	**55559**	**10652**	**44907**	**8886**	**36021**	**-4130**	**31891**
2016-17	**60220**	**18005**	**42215**	**6603**	**35612**	**7612**	**43224**
2017-18	**60974**	**21544**	**39431**	**9144**	**30286**	**22115**	**52401**
2018-19	**62001**	**18699**	**43302**	**12590**	**30712**	**-618**	**30094**
2019-20	**74390**	**18384**	**56006**	**12993**	**43013**	**1403**	**44417**
2020-21	**81973**	**27046**	**54927**	**10972**	**43955**	**36137**	**80092**

Source: RBI database

India has attracted robust FDI inflows during the analysis period barring a few years of moderation and subsequent regaining the momentum in line with its growth performance. The descriptive analysis of inflows further segregates the inflows in three time periods divided based on the Indian economy's growth rate. Table 16 shows FDI inflows observed a more significant variation during period two. It was relatively consistent following a set the trend during period one and period 3. To understand the inflow distribution, we analyzed skewness and kurtosis to understand the shape of the distribution. A negative value to skewness suggests that leftward skewed distribution and a negative kurtosis mean the platykurtic shape of the distribution curve.

Table 15: Descriptive statistical analysis of FDI to India

Statistics	**Whole Period**	**Period 1**	**Period 2**	**Period 3**
Mean	**8,136**	**2,883**	**10,907**	**15,730**
Standard Deviation	**5,409**	**3,040**	**2,734**	**1,021**
Coefficient of Variation	**66.5**	**105.4**	**25.1**	**6.5**
Skewness	**0.0**	**2.4**	**0.7**	**2.9**
Kurtosis	**(1.3)**	**5.8**	**(0.7)**	**8.6**

Data Source: Author Analysis

FII has been allowed to invest in the Indian securities market since 1992. As per the details provided by NSE, FII was permitted to invest in securities in the primary and secondary markets. Shares, debentures, and warrants issued by listed companies and any schemes floated by domestic mutual funds are also allowed to attract FII. The government made several changes in the policy regulating FII flows in India in the subsequent years. For example, in the Union budget 2011-12, qualified foreign investors meeting the "Know Your Customer" (KYC) norms were allowed to invest directly in equity and debt mutual funds. The provision was later on extended for investment in corporate bonds also. FII was permitted to invest in Mutual Funds, Equity Market, and Corporate Bond Market.

The flow of FIIs in a country depends on several factors about domestic as well as international circumstances. For example, a high growth potential, better macroeconomic stability in an economy than other economies may attract the FIIs. Growth rate, interest rate, etc., in FII origin country may also affect the fund's flows. The global turmoil profoundly impacts equity markets, especially emerging markets, scuttle the flows of FIIs in emerging economies.

Table 16: Descriptive statistical analysis of FPI flow to India

Statistics	Whole Period	Period 1	Period 2	Period 3
Mean	**3,093**	**2,285**	**3,979**	**2,428**
Standard Deviation	**3,508**	**2,010**	**4,395**	**2,778**
Coefficient of Variation	**113.4**	**87.9**	**110.5**	**114.4**
Skewness	**0.3**	**1.3**	**(0.2)**	**0.3**
Kurtosis	**(0.6)**	**1.0**	**(1.1)**	**(2.6)**

Data Source: Author Analysis

2.9 Correlation and Cross-correlation analysis

The inter-relations among the macroeconomic variables are significant to understand their impact on economic growth. Macroeconomic variables are the main signpost signaling the current behaviors of the economy. It explains the forces of economic growth. The correlation analysis presented in Table 18 also suggests a high correlation between these macroeconomic indicators. The correlation analysis explains whether the two variables are associated without distinguishing between the two variables, and no causation is implied, only the degree of linear association. The correlation coefficient values explain the degree of relationship, i.e., higher the value. The more robust is the association, irrespective of sign and vice-versa.

Table 17: Correlation among leading indicators

	GDP_FC	WPI_AL	FEX_US	EXR_A	CMR_A	M3	IMP	EXP	FDI	FPI
GDP_FC										
WPI_AL	**0.954**									
FEX_US	**0.949**	**0.909**								
EXR_A	**0.872**	**0.857**	**0.716**							
CMR_A	**-0.422**	**-0.311**	**-0.437**	**-0.270**						
M3	**0.991**	**0.961**	**0.922**	**0.915**	**-0.401**					
IMP	**0.886**	**0.944**	**0.908**	**0.673**	**-0.361**	**0.868**				
EXP	**0.905**	**0.962**	**0.913**	**0.707**	**-0.352**	**0.890**	**0.985**			
FDI	**0.903**	**0.862**	**0.948**	**0.701**	**-0.415**	**0.883**	**0.852**	**0.854**		
FPI	**0.125**	**0.206**	**0.203**	**-0.106**	**0.157**	**0.102**	**0.279**	**0.280**	**0.121**	

Source: Author Analysis

We found a strong positive linear relationship between GDP and most of the other series for the analysis. While calculating the correlation coefficient, it is assumed that at least one of the variables is usually distributed. Similarly, inflation, rupee vs. US $ exchange rate, broad money supply, and foreign portfolio investment have a strong linear positive relationship with other variables. Interest rate measured through call money rate

negatively correlates with foreign exchange reserve, import, export, and FDI.