CHAPTER: - 4

DESCRIPTIVE STATISTICS OF SELECTED THE DEPENDENT AND INDEPENDENT VARIABLES

“Primary discussion in this chapter is on the descriptive or summary statistics of all the dependent, namely, the S&P BSE SENSEX (BSE 30) index, S&P CNX Nifty index (NIFTY 50), Financial Times Stock Exchange 100 Index (FTSE 100) and Dow Jones Industrial Average (Dow 30) and independent variables, namely, Gross Domestic Product (GDP), The Index of Industrial Production (IIP), Consumer Price Index (CPI), Foreign-exchange reserves (also called forex reserves or FX reserves), International Crude Price (CP) with their logarithm returns. The main objective of this chapter is to develop subject knowledge of the variables considered in the whole research work. Summary statistics are presented through E-Views”.

4.1 Summary Statistics

“This section presents summary statistics for all the selected variables. The frequency distributions of the data series of selected variables is shown by Histogram divides the series range (the distance between the maximum and minimum values) into a number of equal length intervals or bins and displays a count of the number of observations that fall into each bin. A complements of standard descriptive statistics are displayed along with the histograms. Descriptive statistics include the Mean, Median, Maximum, Minimum, Standard Deviation (Std. Dev.), Skewness, Kurtosis, Jarque-Bera and its probability”.
4.1.1 LNIFTY

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.1 Summary Statistics of NIFTY

“The NIFTY 50 is one of the diversified 50 stocks Index for 12 sectors of the economy. It is used for the range of purposes such as benchmarking fund portfolios, index based derivatives and index funds. It is owned and handled by India Index Services and Product Ltd (IISL), is specialised company focused upon the index as a core product. The NIFTY 50 Index represents about 62.9% of the free float market capitalization of the stocks listed on NSE as on March 31, 2017. NIFTY 50 is ideal for derivatives trading.”

Over the period of the study i.e. April 2001 to March 2013, the NIFTY varied between 913.8500 to 6138.600 with the mean and standard deviation value 16.20999 and 0.636977 respectively. Jarque-Bera applied on series of NIFTY has confirmed the non-normality of the distribution, as the hypothesis of normality of data has rejected at 1% significance level (p=0.000) as the value of Skewness and kurtosis are 0.074929 (positively skewed) and 1.703345(Platykurtic).
4.1.2 GDP (GROSS DOMESTIC PRODUCT)

![Graph showing summary statistics of India’s GDP](image1)

**Data Source:** International Financial Statistics (IMF Data Base)

**Figure 4.2 Summary Statistics of India’s GDP**

![Graph showing summary statistics of UK’s GDP](image2)

**Data Source:** International Financial Statistics (IMF Data Base)

**Figure 4.3 Summary Statistics of UK’s GDP**
GDP Gross Domestic Product is the market value of all officially recognized final goods and services produced in a country within a given period. There are three approaches to determining GDP namely, Production (or Output) approach, Income approach and Expenditure approach. In production approach, GDP is the market value of all final goods and services produced in a year. The income approach works on the principle that the incomes of the productive factors must be equal to the value of their product and determines GDP by finding the sum incomes of all the factors. The expenditure approach works on the principle that all of the product must be bought by somebody, therefore the value of the total product must be equal to people's total expenditures in buying things”.

“The most directive of the three is the production approach, which sums the outputs of every class of enterprise to arrive at the total. The production approach is also called as Net Product, Output, Value added method. This method consists of three stages: Estimating the Gross Value of domestic Output in various economic activities; determining the intermediate consumption, i.e., the cost of material, supplies and services used to produce final goods or services; and finally, Deducting intermediate consumption from Gross Value to obtain the Net Value of Domestic Output”.

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.4 Summary Statistics of US's GDP

Series: U_S__LGDP
Sample 2001M04 2013M03
Observations 144
Mean 16.42304
Median 16.47496
Maximum 16.62101
Minimum 16.18028
Std. Dev. 0.133861
Skewness -0.466252
Kurtosis 1.962213
Jarque-Bera 11.67939
Probability 0.002910
“As the only quarterly data on GDP is available government’s authentic website but the research required monthly data. So, to bring homogeneity in the data of selected variables, GDP is assumed constant for all the three months of the same quarter considering the complete enumeration sampling technique”.

The range of INDIA’s GDP fluctuated “between” 15.36024 to 17.05113 with Average of GDP for the selected period is 16.20999. From the table value of Skewness and kurtosis is 0.0749292 (Positively skewed) and 1.703345 (Platykurtic) respectively defines that data which is collected for a selected period is not normally distributed. Jarque-Bera statistic tests the null hypothesis that data follow normal distribution. By using probability values of Jarque- Bera statistics, null hypothesis is rejected for all variables even at 1% level of significance. This shows randomness and inefficiency of the market.

Similarly, Considering the GDP data of UNITED KINGDOM, the data scattered “between” 12.45400 to 12.89564 with Average and Standard deviation for the selected period is 12.71730 and 0.132502 respectively. From the table it is observed that the frequency distributions of underlying variable is not normal distributed because of the value of Skewness and Kurtosis is -0.530053 (Negatively skewed) and 1.992578 (Platykurtic) respectively. By using probability values of Jarque- Bera statistics, null hypothesis is rejected for all variables even at 1% level of significance. This shows randomness and inefficiency of the market.

Concerning with the USA economy, the data range of GDP fluctuated “between” 16.18028 to 16.62101 with Mean value for the selected period is 16.42304. From the calculated data of selected period it is observed that the frequency distribution of underlying variable is not normal. Here the value of skewness and kurtosis is -0.466252 (negatively skewed) and 1.962213 (platykurtic) respectively. Jarque-Bera statistic tests the null hypothesis that data follow normal distribution. By using probability values of Jarque- Bera statistics, null hypothesis is rejected for all variables even at 1% level of significance. This shows randomness and inefficiency of the market.
4.1.3 IIP

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.5 Summary Statistics of India’s IIP

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.6 Summary Statistics of UK’s IIP
The Index of Industrial Production (IIP) is an index which details out the growth of various sectors in an economy such as mineral mining, electricity and manufacturing. The all IIP is a composite indicator that measures the short-term changes in the volume of production of a basket of industrial products during a given period with respect to that in a chosen base period. In India, it is compiled and published monthly by the Central Statistical Organisation (CSO) six weeks after the reference month ends. The level of the Index of Industrial Production (IIP) is an abstract number, the magnitude of which represents the status of production in the industrial sector for a given period of time as compared to a reference period of time. With reference to India, The base year was at one time fixed at 1993–94 so that year was assigned an index level of 100. The current base year is 2011-2012. The Eight Core Industries comprise nearly 40.27% of the weight of items included in the Index of Industrial Production (IIP). These are Electricity, steel, refinery products, crude oil, coal, cement, natural gas and fertilisers”.

The range of India’s LIIP fluctuated “between” 4.306728 to 5.201873 with Average of LIIP for the selected period is 4.7430355. The value of Skewness and kurtosis indicate the lack of symmetric in the distribution. Here the value of Skewness and kurtosis is -0.092224 (Negatively
skewed) and 1.731348 (Platykurtic) respectively. This shows randomness and inefficiency of the market.

The range of UK’s LIIP varied “between” 4.364653 to 4.717507 with Average of LIIP for the selected period is 4.563983. From the table it is perceived that the frequency distribution of underlying variable is not symmetric. At this point the value of skewness and kurtosis is -0.294807 (Negatively skewed) and 2.395175 (Platykurtic) respectively.

The series of US’s LIIP fluctuated “between” 4.674323 to 4.465530 with Average of LIIP for the selected period is 4.580450. The value of skewness and kurtosis indicate the lack of symmetric in the distribution. The value of skewness and kurtosis is -0.150900 (Negatively skewed) and 2.108063 (Platykurtic) respectively.

3.1.4 LFXRE

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Data Source: International Financial Statistics (IMF Data Base)

Figure 4.8 Summary Statistics of India’s FXRE
“The central government and other monetary authority held some assets and money as Foreign-exchange Reserve so that it can pay if need be its liabilities, such as the currency issued by the central bank, as well as the various bank reserves deposited with the central bank by the government and other financial institutions. These assets include foreign marketable securities, monetary gold, special drawing rights (SDRs) and reserve position in the IMF. FXRE are also called Forex reserves or Forex (FX) reserves. The main objective of holding foreign reserve is to make international payment and hedge against exchange rate risks”.
The series of India’s FX fluctuated “between” 10.59215 to 12.62766 with Average and standard deviation of FX for the selected period is 11.95271 and 0.183927 respectively. The value of Skewness and Kurtosis defines the non-normality of the data as the values are -0.7986675 (Negatively skewed) and 2.355964 (Platykurtic) respectively. By the probability values of Jarque-Bera statistics, null hypothesis is rejected for selected variables at 1% level of significance.

The range of U.K’s FX oscillated “between” 10.08884 to 11.09929. The selected series has value 10.57214 and 0.271140 for Mean and Standard Deviation. The value of Skewness and Kurtosis is 0.266017 (Positively skewed) and 2.137751 (Platykurtic) respectively defines that data is not normally distributed. This shows randomness and inefficiency of the market.

Concerning with the US economy, the series of FX fluctuated “between” 10.24811 to 10.91387 with Average of FX for the selected period is 10.65217. Jarque-Bera statistic tests the null hypothesis that data follow normal distribution. By using probability values of Jarque-Bera statistics, null hypothesis is rejected for all variables even at 1% level of significance as the value of skewness and kurtosis is -0.543253 (Negatively skewed) and 2.282944 (Platykurtic) respectively.

**4.1.5 LSENSEX**

![Summary Statistics of SENSEX](image)

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.11 Summary Statistics of SENSEX

“S&P BSE SENSEX was calculated on a "Market Capitalization-Weighted" methodology of 30 component stocks representing large, well-established and financially sound companies across
key sectors. It was first compiled in 1986. S&P BSE SENSEX’s base year was taken as 1978-79. Today, it is widely stated in domestic and international markets operate through print as well as electronic media. It is based on globally accepted construction and scientifically designed market. “Free- float market capitalization- weighted” methodology is used in S&P BSE SENSEX for calculation since September 1, 2003. This methodology is a widely followed index construction methodology on which majority of global equity indices are based; all major index providers like MSCI, FTSE, STOXX, and Dow Jones use the free-float methodology”.

The series of India’s Sensex oscillated “between” 2811.600 to 20509.09, Because Sensex 30 Index share of BSE market capitalisation fell from 49% to 25% due to the rise of sectoral indices like BSE PSU, Bankex, BSE-Teck, etc. during 2008-12. The value of skewness -0.106007 (negatively skewed) and kurtosis 1.453146 (platykurtic) indicate the lack of symmetric in the distribution.

4.1.6 LCPI (CONSUMER PRICE INDEX)

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.12 Summary Statistics of India’s CPI
A Consumer price index is a statistical estimate constructed using the prices of a sample of representative items whose prices are collected periodically. A CPI measures the variations (due to inflation) in the goods and services which is purchased by the households. Sub-indices and sub-sub-indices are to be calculated for different types and sub types of goods and services, after that it get combined to give the overall index with weights reflecting their shares in the total of
the consumer expenditures covered by the index. CPI is one of the measures of inflation and used to calculate the real values of wages, salaries, and pensions”.

The range of India’s CPI fluctuated “between” 5.2264916 to 4.425804 with Average of CPI for the selected period is 4.772788. Here the value of skewness and kurtosis is 0.466221 (Positively skewed) and 1.875468 (Platykurtic) respectively defines that data which is collected for a selected period is not normally distributed.

Similarly, the range of U.K’s CPI fluctuated “between” 4.543901 to 4.833182 with Average of CPI for the selected period is 4.662459. By using probability values of Jarque- Bera statistics, null hypothesis is rejected for selected variable at 1% level of significance as the value of skewness and kurtosis is 0.401969 (Positively skewed) and 1.864405 (Platykurtic) respectively.

Concerning with the US economy, the range of CPI fluctuated “between” 4.505129 to 4.780719 with Average of CPI for the selected period is 4.646167. Jarque-Bera statistic tests the null hypothesis that data follow normal distribution. By using probability values of Jarque- Bera statistics, null hypothesis is rejected for all variables even at 1% level of significance.

4.1.7 LCP

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.15 Summary Statistics of Crude Price
The range of LCP varied “between” 2.960794 to 4.796724 with Average and standard deviation of LCP for the selected period is 4.034885 and 0.532200 respectively. From the table it is observed that the frequency distributions of underlying variables are not symmetrically distributed. Here the value of skewness and kurtosis is -0.386268 (Negatively skewed) and 1.899946 (Platykurtic) respectively. Furthermore by using probability values of Jarque-Bera statistics, null hypothesis is rejected for all variables even at 1% level of significance. This shows randomness and inefficiency of the market.

4.1.7 LDJI

Data Source: International Financial Statistics (IMF Data Base)

Figure 4.16 Summary Statistics of DJI

“DJI is an index that shows how 30 largely US based publicly owned companies have traded during a standard trading session in the stock market. It is the second-oldest U.S. market index after the Dow Jones Transportation Average, which was also created by Dow. The Dow Jones Industrial Average also called DJIA, the Industrial Average, the Dow Jones, the Dow Jones Industrial, DJI, the Dow 30 or simply the Dow. It is one of several indices created by Wall Street Journal editor and Dow Jones & Company co-founder Charles Dow”
The range of DJI fluctuated “between” 7062.930 to 14578.54 with Average of DJI for the selected period is 10883.70. The value of skewness and kurtosis is 0.032610 (positively skewed) and 2.327458 (platykurtic) respectively defines that data which is collected for a selected period is not normally distributed. By using probability values of Jarque- Bera statistics, null hypothesis is rejected for selected variables at 1% level of significance.