A PROJECT REPORT

(18MBAPR407)
on the Topic
"GLOBAL STOCK MARKET INTEGRATION"

By
Ms. Pallavi M
USN: ICR18MBA33
MBA 4th Semester

Submitted to VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
in partial fulfillment of the requirements for the award of the degree of
MASTER OF BUSINESS ADMINISTRATION

Under the Guidance of

INTERNAL GUIDE
Mr.Kathari Santosh
Assistant professor
Department of management studies
CMR Institute of Technology
Bangalore

EXTERNAL GUIDE
Mr.Manjunath
Equity Dealer
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MG Road Bangalore

DEPARTMENT OF MASTER OF BUSINESS ADMINISTRATION
C M R INSTITUTE OF TECHNOLOGY
#132, AECS Layout, ITPL Main Road, Kundalahalli,
BENGALURU-560037

Batch 2018-20

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CERTIFICATE

This is to certify that **Ms. Pallavi M** bearing USN **1CR18MBA33** is a bonafide student of Master of Business Administration Programme of the Institute (2018-20 Batch), affiliated to Visvesvaraya Technological University, Belagavi. Project report on **"GLOBAL STOCK MARKET INTEGRATION"** is prepared by her under the guidance of **Mr Kathari Santosh,** Assistant Professor, in partial fulfilment of the requirements for the award of the degree of Master of Business Administration of Visvesvaraya Technological University, Belagavi in Karnataka.

Signature of Internal Guide

Signature of HoD

Head of the Department
Department of MBA
CMRIT-PG Studies
Bangalore-560 037

Sanjay Jain
Signature of Principal

Principal
CMR Institute of T..
Bangalore - 560037

Evaluators

1) Name of external evaluator _____ Signature with Date _____

2) Name of internal evaluator _____ _____

Ref SIC/2020-21

Date: 2nd March 2020

CERTIFICATE

This is to certify that **Ms. Pallavi M** bearing the USN ICR18MBA33 student of **"CMR Institute of Technology"** Bangalore has successfully completed her project in our organization, for the period of 2nd January 2020 to 14th February 2020.

Topic **"GLOBAL STOCK MARKET INTEGRATION"** During this period, she was reporting to **Mr. Manjunath, Equity Dealer**. Her progress on the project was monitored and was found to be very good.

We wish her All the Best for her future professional endeavours.

FOR SIC STOCKS & SERVICES PVT. LTD.

DIRECTOR

SIC Stocks & Services Pvt. Ltd.

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DECLARATION

I, Ms.Pallavi M hereby declare that the Project report entitled "(Global Stock market integration)" prepared by me under the guidance of Prof. Kathari Santosh faculty of MBA Department, CMR Institute of Technology and external assistance by Mr.Manjunath(Equity Dealer SIC Stock and Service Pvt.Ltd). I also declare that this project work is towards the partial fulfillment of the university regulations for the award of degree of Master of Business Administration by Visvesvaraya Technological University, Belagavi. I have undergone a summer project for a period of six weeks. I further declare that this project is based on the original study undertaken by me and has not been submitted to any other University/Institution for the award of any degree/diploma.

Pallavi

Place: Bangalore

Signature of the student

Date: 26-6-2020

1CR18MBA33

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ACKNOWLEDGEMENT

I have been fortunate enough to get good timely advice and support from a host of people to whom I shall remain grateful.

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And finally, there is deepest of thanks for the patience and cooperation of the family and friends, without whom the endeavour would not have been possible.

Ms.Pallavi M

USN : 1CR18MBA33

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EXECUTIVE SUMMARY

I have been selected the management intern at SIC Stock and Service Private Limited, the topic of this report is “Global stock market integration” and I carried out my internship for a duration of 2nd January 2020 to 14th February 2020. During this period I tried to integrate my theoretical knowledge of MBA and combine with the practical as observed during my internship.

This study examines the co-integration between the Sensex and other eight stock markets (DJIA, S&P 500, FTSE 100, Hang Seng, SSEC and Moex). It has been asserted that links between the global stock markets has increase with the improved electronic communication and abolition of exchange control over the prices. The spread of information just takes seconds so the effect of the news can be seen to the all markets at the same time To examine the presence of unit root, Augmented Dickey Fuller stationary test is used, Johansen co integration test is used to know the co integration between the stock markets, VAR test helped to know the error correction term. The findings tell us there is no co integration among stock markets in the long run, but some resulted in co integration in the short run. This study will help to find out the relation between different cross border stock market so that the investors can make efficient decision by understanding interrelation between different markets.

I convey my understanding of this study through this project. At the end of the report I have shared the detailed analysis and performed different analysis that I have gained during my tenure.

CHAPTER 1
INTRODUCTION

A stock market is also called as equity market or share market. In simple words stock market is the aggregation of buyers and sellers. Stock market is a source for companies to grow their wealth, raise funds and to buy part-ownership in growing businesses. As part of the stock market an investor and shareholder earns profits in the form of dividends. In tune with the worldwide stock markets that have started to recover since the second half of 2003. Indian stock markets have also seen fast development. India's two major indices, the most famous BSE Sensex, and the one most widely used by the S&P CNX Nifty markets grew to record rates. There was a sharp rise in both main and secondary market activity. Stock exchanges are Bursaries are the location where stock shares are traded and monitored on indices like NASDAQ, NSE, BSE, Nikkei and FTSE100. There are more than a dozen stock market in the world, including Shanghai stock market, Japan securities market. In order to make earnings, stock brokers will purchase and sell stocks. Increase and decrease Increase and reduce the share value s moves accordingly in the perceived value of the business. When stocks move higher, Wall Street is said to be "bullish" on the economy, and when stocks fall, Wall Street is said to have a "bearish" perspective.

The documents of securities exchange refer to the arrangement of individual stocks joined in a weighted whole and are designed to offer a percentage of how the overall monetary exchange takes place in contrast to an individual inventory.

1.1 STOCK EXCHANGE

Securities market is a provision for traders and stock brokers to buy and sell financial instruments such as shares and bonds, issue and redemption of such instruments and payment of dividends and income. Earlier there was open outcry system which means stocks are traded in some central locations on the floor, there was no digitalization of system. But now all the stocks are traded in exchanges by using an electronic trading platform. Stock issued by listed companies, derivatives, pooled investment products, bonds and unit trusts can be traded in stock exchange. Only the members of stock exchange can trade in exchange.

If any security wants to trade in stock exchange that must be listed in exchange. All the transactions in the stock exchange will be carried out as per the procedure prescribed by the

management committee which is specially established for regulation of stock exchanges. Stock exchange is an organized market.

A stock market is an important component of securities market it helps the companies to raise capital for doing business and mobilizes the savings for investment from the public. Stock exchanges regulate the stock prices. It acts as barometer of the economy. It facilitates the companies to expand and develop through mergers and acquisition.

SEBI is the governing member that controls stock exchange, bank and other financial institutions activities. SEBI was established in 1988, and in 1992 the SEBI Act of 1992 gained statutory powers. Its headquarter is situated in Mumbai, India. It is set up to safeguard investors ' interest in securities, control the securities market, and encourage exchange growth. In India, SEBI is comparable to the United States Securities and Exchange Commission (SEC).

A US independent entity, the Securities and Exchange Commission (SEC). It is accountable for proposing securities rules, regulating the securities sector, exchanging the nation's inventory and choices, and implementing federal securities laws including the United States ' digital securities markets.

1.2 COMPANY PROFILE

1.2.1 BACKGROUND

In the year 1993 sic was established by Col. Rajendra Handa,a senior reclusive government official. He started Sic after finishing 27 years of service in Indian military. Col. Rajendra Hand the spokes person of SIC stock and service pvt. Ltd was the only Ex defense personnel went on to become the member of BGSC, CDSL,NSE,BSE acquiring officer in Hyderabad, Bangalore and Mumbai constantly raising because of strong commitment, dedication and continuous attempt with kindest regards.

From a modest opening of being a sub broker from Bangalore to having an Indian appearance in over decades with our brand SIC.SIC is a joint alliance with dominant stock exchange of India. SIC also provides variety of DP services.

1.2.2 VISION

Being the supreme trade broking, trade mark in the stock marketing exchange branding.

MISSION

To cultivate and grant the individual capitalist to make better initiation, better choice through the

kind advice and superior assistance.

1.2.3 PRODUCT AND SERVICE PROFILE

- Trading call center services.
- Delivery call center services.
- Depository financial service: CDSL
- Our specialty financial service.
- Mutual fund consultants service.
- IPO investments services.
- Stock broker service.
- Share broker service.
- Equity share broker service.
- Trading in NSE services.
- Trading in BSE services.
- Flash news and intraday calls service.
- Intraday and historical charts services.
- Call and trade from anywhere services.
- Real time trade confirmation via sms
- Web enabled back office service.
- Sic research service.
- Depository participant service.
- Financial service.
- Delivery calls service.
- Depository service.
- Trading call center service.
- Weekly report service.

1.2.4 COMPETITORS

- Karvy stock broking Ltd
- India Bulls financial securities Ltd.
- Kotak securities Ltd.
- Angel stock broking Ltd.

1.2.5 SWOT ANALYSIS

a) STRENGHT

The company's strengths differs from business to business

Few strengths are:

- Huge trade mark identification
- Powerful financial
- Effective management
- Expenditure advantage
- Profit
- Recapitulate clients
- Experience workforce
- Customer faith

b) WEAKNESSES

Weaknesses that may affect company:

- Non monotonous clients
- Shortage of money

The future. SIC on the forefront enabling investment advisors and technology disruptors to derive best of technology and finest transaction platform.

- Advanced software Outmoded technology
- More obligations
- Unqualified workforce
- Poor brand recognition
- Impenetrable

c) OPPORTUNITY

A company with abundant circumstances has a adequate scope to exel and make profits for forth coming

- Inner growth chance
- Outer growth chance
- Enlargement
- Pacifying government management
- Advanced enlargement

d) **THREATS**

In order to sustain, it's really crucial for a company to figure out problems. Here are few of the massive threats of a association

- Rivalry
- Altering customer choice
- Improper authority control

1.2.6 Future Growth and Prospects

- Investments assistance are
- Cloud technology
- Scalable plans

1. Changing the financial service domain

With ready to use platform like SICROBO, we are challenging the status quo of financial services. Empowering Secure All enabled Investors Environment Chat boards

2. Simple and incredibly powerful APIS

Are you a technology product or an app company looking to integrate with a world class transaction platform in Indian equities SIC the world's leading investment apps through its industry leading REST APIS and CRM frame works. The true brokerage as service, the first of its kind in India.

3. Broking and more

Weather you need a simple execution platform or personalized dealer, CSB houses is at your service with livequawk powered services. A relationship based broking house, CSB boasts a wide range of cliental ranging from ultra-high network individuals, housewife's to retired families.

1.2.7 Financial statement analysis

Financial statement on 31/3/2018 in millions

Specifications	J/F	31/03/2018		31/3/2017	
EQUITY AND LIABILITIES					
Shareholders' funds					
Share capital	2	170.81		170.81	
Reserves and surplus	3	13,456.20		10,427.33	
			13,627.01		10,598.14
Non-current liabilities					
Long-term borrowings	4	759.47		773.13	
Deferred tax liabilities (net)	5	301.33		195.09	
Long-term provisions	6	369.57		376.41	
			1,430.37		1,344.63
Current liabilities					
Short-term borrowings	7	83.83		98.63	
Trade payables	8	1,277.79		1,362.84	
Other current liabilities	9	2,156.68		1,807.26	
Short-term provisions	6	2,818.73		2,493.20	
			6,337.03		5,761.93
Total			21,394.41		17,704.70
ASSETS					
Non-current assets					
Fixed assets	10				
Tangible assets		6,198.94		3,554.97	
Intangible assets		32.96		33.69	
Capital work-in-progress		1,443.60		1,024.97	
Intangible assets under development		3.14		4.84	
		7,678.64		4,618.47	
Non-current investments	11	160.76		160.76	
Long-term loans and advances	12	567.69		353.52	
Other non-current assets	13	1.22		3.43	
			8,408.31		5,136.18
Current assets					
Inventories	14	3,350.08		2,928.58	
Trade receivables	15	4,527.89		3,806.77	
Cash and bank balances	16	2,945.67		4,107.90	
Short-term loans and advances	12	2,119.30		1,656.78	
Other current assets	13	43.16		68.49	
			12,986.10		12,568.52
Total			21,394.41		17,704.70
Significant accounting policies	1				

1.2.7.1 Debt to Equity Ratio

The equation to measure debt t0 equity ratio is [total debt / total equity]
T0tal debt here consists of twain long term and short term debt.

Total debt = Short term borrowings + Long term borrowings

= 2188.915 + 1497.663

= Rs.3686.578 Crs

Total Equity = Rs.2175.549 Crs

Hence, Debt t0 Equity ratio is:

= 3686.578 / 2175.549

= 1.69

Interpretation: The debt to equity ratio 1.69 'times'

1.2.7.2 Debt to Asset Ratio

The debt t0 asset rati0 can be measured as,
Total Debt / Total Assets

w.k.t, total debt = Rs.3686.578Crs.
From the record book, w.k.t total assets = Rs.8204.447 Crs:
So, Debt to Asset ratio

=3686.578 / 8204.44

= 0.449 or ~45%.

Interpretation: This indicates almost 45% of the equity associated with the corporate is financed over debt capital rather lendors (also as a result 55% is funded through stakeholders). Pointless to mention, greater the share larger the more involved the funder could be because it demonstrates better benefit likewise gamble.

1.2.7.3 Financial Leverage Ratio

The equation to determine 0n the basis of the company FY18 annual financial statement, w.k.t mean sum of assets is Rs.8012.615. The average total equity is Rs.2171.755 . Therefore, the

financial leverage ratio

Financial Leverage Ratio = Average Total Asset / Average Total Equity

= 8012.615 / 2171.755

= 3.6

Interpretation: This shows the company assists Rs 3.68 units of funds for every unit of share. Higher the number , higher is the company's leverage.

1.2.7.4 Fixed Asset Turnover Ratio

Fixed Assets Turnover = 0perating Revenues / Total Average Asset

The capital reviewed whilst computing the fixed assets turnover should be net of c0llected derogation, which is nothing but the net block of the companies. It must furthur contain the capital w.i.p.

= (767.864+461.847)/2

=Rs.614.855Crs

W.k.t. 0perating revenue f0r FY18 is Rs.3436.7 Crs, thus the Fixed Asset Turnover ratio

= 3436.7 /614.85

= 5.59

Interpretation: The fixed asset turnover ratio is 5.59 times. The association is completely and adequately managing its fixed assets if the rati0 is higher.

CHAPTER 2

CONCEPTUAL BACKGROUND AND LITERATURE REVIEW

2.1 Theoretical Background of the study

"Generally, a literature study may be a process to define also as scrutinize inspection that's handled and tests that are presented on the research field." Accordingly, we will say that desk research is an study of current investigation. It also guides in illustrating and validating how the researcher's inspection will interpret the inquiry or rift within the field of explore. "Document search present to a study to the bulkier, g0ing dialogue within the publicati0ns, stuffing holes ranging anterior studies". it's also possible t0 say that bibliography review contributes a framework for organizing the research and benefits in understandingther clearly the seriousness of study.

It also aids in correlating the results with other findings during a enhanced way. Cooper (1988) "also suggests that theoretical study is often integrative in nature under which the researcher summarizes broad themes within the literature". Hence during this chapter, researcher has thrown some light on the review of documentation associated with the studies of Capital Market, stock exchange and stock market.

2.2 Literature review

Title: world wide stock exchange is linked with indian stock exchange.

By: Vanitha and Shruthi

Grubel"s seminar paper is one of the benchmark for research in the area of integration of world stock markets started in the year 1968. Grubel"s seminar paper paved way for further Hamao et al., (1990), Becker et al., (1990), Liu, Pan & Shieh (1998), Eun & Shim (1989) found USA was the most influential stock market, they also did an effort to progress the framework for checking the real and financial integration. Arshanapalli, Doukas and lang (1995), Lie et al. (1998) discovered an expansion in0the degree of integration among the stock markets after the 1987 crash. After 10 years, Janor, Ali and Shaharudin (2007) presumed that the 1997 emergency affected the local and global coordination of five ASEAN countries. research by Agmon (1972), Hillard (1979), Becker, Finnerty1and Gupta (1990) and Hamao,

Masulis and Ng (1990). They have taken then developed market such as USA, UK, Germany and Japan. They were mainly focused on the correlation among these developed countries. The initial objective of Eun&shim (1989) was to double check whether international diversification of portfolio1would be favourable or not. This resulted in markets did have some integration but the interaction was flat, this led for further research.

Wong, Agarwal and Du (2005) used weekly data and located that in post liberalization period Indian stock exchange was integrated with the USA, the united kingdom and Japan. Again, Nath and Verma (2003) found there was no co- integration between the Indian stock exchange with Taiwan and Singapore.

similarly, different researches about the Indian stock market with developing countries markets additionally gave confounding results. Mukherjee and Mishra (2005) found that the Indian stock market was integrated with developing Asian markets of Indonesia, Malaysia, Philippines, Korea and Thailand.

But Bose and Mukherjee (2006) couldn‟t confirm the integration of the Indian stock market with that of the seven Asian markets such as Japan, Hong Kong, Malaysia, South Korea, Singapore,

Taiwan and Thailand and the USA market. They used Johansen co-integration check on Asian group of countries including and excluding India. By excluding India, they found there was no co-integration and by including India there was co-integration among Asian countries.

Mixed integration was found during this course of action. So Indian stock market has an crucial place or performance in the integration of Asian markets. And this was proved by applying Johansen co-integration test.

Title: BRIC and US Integration and Dynamic Linkages -An Empirical Study for International diversification strategy

By: Dr. Ranjan Dasgupta

The important purpose of the study is to find out the integration and dynamic linkages between developed (US) and developing countries (BRIC) both in short and long term. In this study the closing indices from 1st January 1998 to 31st December 2012 of different stock markets of US

and BRIC countries are considered and by help of different statistical tools the objective is achieved. The stock markets used for the research are NASDAQ (US), BOVESPA (Brazil), RTS (Russia), NIFTY (India) and SHCO (CHINA). The study has revealed that there exists a specific correlation among the BRIC nations. China is going most favorable among the BRIC nations for the investors.

Title: The structure of linkages and causal relationships between BRIC and developed equity markets.

By: Norasyikin Abdullah Fahami (2011)

The main objective of the study is to find out the relationship between world‟s rapidly emerging economies (BRIC) and the developed countries (US, UK and Japan). The stock market indices of the countries are used as base for the study. The whole study is divided into three (3) phases namely pre-crisis phase starting from 10th January 2005 to 22nd July 2007, during crisis phase from 29th July 2007 to 10th January 2010, and the post crisis period starting from 11th January 2010 to 21st July 2011. For the study the seven prominent stock exchanges of each country are selected: BOVESPA (Brazil), RTS (Russia), S&P CNX 500 (India), SSE (China), S&P 500 (USA), FTSE 100 (UK) and NIKKEI 500 (Japan) and the closing prices are on weekly basis.

Title: Stock market integration: a multivariate GARCH analysis on Poland and Hungary.

By: Hang Li and Ewa Majerowska

Chelley-Steeley (2005) applies the orthogonalised variance decomposition of VAR modelling to Poland, Hungary, Czeh Republic and Russia and 9 other indices by using daily data in 1994- 1999. She discovers connection between the four rising markets and the five developed markets in research. She was convinced by her research that global factors determine the returns of the Polish and Hungarian stock exchanges.

But the variance decomposition approach does not give any data about observed interactions. In addition to that,an unanticipated event in a market will influence not only returns but also variances of the other markets. The study of volatility can be surrogate for the risk of assets.

Title: Stock market integration: a multivariate GARCH analysis of Polan and Hungary.

Gilmore and McManus (2002) utilize the idea of co-integration to find the short and long term connection between any pair of three Central European markets (Czeh Republic, Hungary and Poland) and the US market by considering weekly data from 1995 to 2001. In spite of present of low short run correlations, there was no long run relationship between the emerging markets and the US.

As indicated by **Bernard and Durlauf (1995)** is that there are n-1 co-integration vectors in an arrangement of n lists. **Voronkova (2004)** applies the Gregory and Hansen based co- integration test and they allowed fora structural break to the indices of Czeh Republic, Hungary, Poland, Britain, France, Germany and the US. They encountered six co-integration vectors, these were addition of the conventional co-integration tests after considering the breaks. Voronkova (2004) concludes that developing markets have integration with the world markets. According to him Yet Lence and Falk (2005) co-integration model was not well-described model, as these test outcome are not informative with respect to market efficiency and market integration.

As per **Bekaert and Harvey (1995)** the degree of integration may vary over sort period of time as there was a difference between correlations and markets**.** **Longin and Solnik (1995)** said, there was change in the conditional covariance due to changes in the correlation and markets. **Kaplanis** (1988) finds that the correlation and the covariance matrix of monthly retur ns 0t numerous national equity markets are irrational over a 15-year period.

Title: Are the Global Stock markets inter-linked: Evidence from the literature

By: Gagan Deep Sharma and B.S.Bodla

Kwam, Sim and Cotsomitis (1995) conducted research to study the casual linkages with the help of monthly time series of nine stock market indices for the period

of January 1982 to February 1991 and proved the notion that markets are informationally efficient. Kasa (1992) analyzes the stochastic patterns in the equity markets of the US, japan, England, Germany and Canada. He utilized monthly and quarterly data from January 1974 through August 1990 and applied Johansen tests for common trends (1988,1991) His research focuses toewards a single common trend, the stochastic properties and relative importance of this trend changes somewhat from the trend in stock prices. Richards finds out major reason for the fndings in Kasa (1992) that is usage of long slow duration in the appraisal action.

Similarly stock market liquidity was researched by **Rohatgi (1973)** which wind-up "that the basic function of stock market is to contribute ready marketability or liquidity to holdings of securities. The ideal stock market is one that can provide urgent and abundent liquidity."

Cho (1986) alleges that "securities market released might stay undone lacking a productive marketplace for capital as a way of growing peril & benefit".

Bancivenga and Smith (1992) "in case a replacement st0ck business also can boost process by reducing holdings 0f liquid assets and increasing the expansion rate of physical money, a minimum of within the t0p of the day, within the shortrun, however, the equilibrium return of the capital st0ck to a replacement securities exchange are 0ften negative because the opening of an exchange can increase households prosperity and lift their contemporaneous utilization enough to temporarily lower the expansion rate 0f capital."

Mohan (2002)0analyzed "the change in0volatility within the Indian stock exchange . They studied the establishment of future trading using daily end prices of Nifty and week by week end prices of Satyam Computers Ltd. The individual stocks seem to be somewhat more volatile and their volatility has subsided and fewer enthusiastic to previous volatility and more dependent upon this era . the standard long-term volatility has deteriorated at an index level.

In concordance with **Ibrahim & Aziz** (2003) "the performance of a stock exchange are often damaged by influence. Sway are often decribed as an persuade to impact persons or events supported prestige thus generating something with none direct or possible attempt."

Nowbutsing (2011) analyzed the connection between two important constituents of economy with special regard to Mauritius i.e. stock exchange development and economic process and hence it had been concluded that there's a positive relation between the 2.

Pandey (1981) inspected the explanation for advantage on share prices and also concludes that Miller - Modigliani proposition isn't backed. Although, threat proxy utilized within the article, viz, coefficient of variation of net operating revenue was terribly debatable. He also identified that dividend per share was to be much imperative.

Kalman Cohen The Determinants of Common Stock Returns Volatility: An International Comparison. The Journal of Finance Volume XXXI, No. 2 The Journal of Finance, American Finance Association, 1976.

L. C. Gupta, Long Term Rates of Return on Industrial Equities in India. Economic & Political Weekly, Review of Management, 1980, p. M85-92.

I.M. Pandey, Investment Structure and the fixed capital New Delhi: Vikas, 1981.

2.3 Research Gap

1. The analyst being unknown person, outboard analyst certainly do not have entry to the private data. Therefore, to characterize inside view of the stock exchange in the study is tough.

2. The financial performances of the NSE & BSE of the present study was associated to it. Therefore, for the financial enterprise & performance of the stock exchanges of country the study would be finite.

3. On secondary data gathered from the various websites of BSE, additionally NSE also, yearly reports, materials published and many more. The interpretation can be created and also the findings of the survey focused absolutely on veracity of that type of data.

4. For analyzing the collected statistics, the researchers will use some of the statistical tools.

5. The research is a repeated journey not a terminal. To grant to the existing pool of expertise is the primitive job of research.

6. For evaluating the access as well as performance of stock exchange several professionals have various considerations. It is therefore, the view applied in the study for the present objective can’t be handled as definite & pure.

CHAPTER 3
RESEARCH DESIGN

3.1 STATEMENT OF THE PROBLEM

The major stock market of the worldwide in terms of market capitalization has influence 0ver almost every stock exchange. The problem defined in this particular research is to investigate the influence of DJIA, S&P 500, FTSE 100, Hang Seng, Bovespa, Moex and Nikkei over Indian bench mark Sensex stock index. The different indices react differently on gl0bal economic trend. US, UK and Japan have the strongest economy. The crisis or devel0pment in these countries economy has some effect in overall world economy The Brazil, China, India, Russia are f0ur prominent emerging market of 15 emerging nations. These four countries also play a vital r0le in global economics. In last subprime crisis Bank like Leman Brothers g0t bank rafted in the subprime crisis of 2008-2009 whereas the banks of BRICS nations especially Indian Banks were quite stable in the crisis. The There is a considerable and proven relation that exists between the Indian stock markets and their existing counterparts in other gl0bally successful economies. This relation can be studied further to provide the investors with information, as to which markets are related in their movements; thus helping them to take better investment decisions through international diversification.

Today economy of any liberalized country is very much depended on global economy. The five major benchmark economy or indices including DJIA, S&P 500 of US, Hang Seng of Hong Kong, SSEC of China, Nikkei of Japan, FTSE 100 of London, Bovespa of Brazil and Moex of Russia. Here the researcher tested the attitude of Indian stock market in different circumstances. The trend of different stock exchange has been tested under normal circumstances, when the five benchmark markets has gained or dropped 1% or more and extreme condition when the NYSE has dropped more than 3%. These different circumstances help to understand the trend different economy shows under different global scenario.

The trend shown by different indices helps the investor to understand better where to invest in different market situation. It also will reflect the economic conditions of different countries.

This study aims in answering the following questions:

From the

1. perspective of Indian investors, which international markets do not move with the Indian market?

2. Within the international markets, how sensible is it for investors to diversify into foreign markets?

3.2 NEED FOR THE STUDY

It has been asserted that links between the worldwide stock markets has increase with the improved transmission and abolition of exchange control over the costs . The spread of data just takes seconds therefore the effect of the news are often seen to the all markets at an equivalent time.. As now a day we all talk about globalization and global economy and say that all economy is interdependent and a change in one will affect the change in the other economy. The need for this study is to find out the relation between different cross border stock market so that the investors can make efficient decision making by understanding interrelation between different markets.

3.3 OBJECTIVES OF THE STUDY

1. To examine the relationship between the domestic and foreign stock markets (DJIA, S&P 500, FTSE 100, Hang Seng, , Moex, SSEC and) and to determine the degree to which they are related.
2. To investigate the capabilities of transmission of volatility among the developed markets (DJIA, S&P 500, FTSE 100, Hang Seng, Moex, and SSEC) with the Indian stock market (Sensex).
3. To study the cause and effect relationship between the various stock markets across the globe.
4. To determine the volatility and cause for the volatility in India stock market with respect to global stock markets.
5. To offer suggestions based on the current study.

3.4 RESEARCH METHODOLOGY

The study deals with huge amounts of data which is used to analyze and get some useful information by performing certain test. Thus the study undertaken is quantitative, based on historical data and is analytical in nature. In this study various test such as the Granger Causality test, VAR frame work model have been used to find out the causality between the time series data chosen and impact of volatility on various stock market

- Primary Data

The study is based on the stock indices of various stock markets, as these data is easily available at various stock market websites and several other websites thus primary data is not relevant for this study.

- Secondary Data

In this study the data of ten stock indices of the world were collected from yahoo finance website. Since the data was readily available from various sources and secondary in nature.

3.5 HYPOTHESIS

1) Hypothesis

H0 = There is a unit root in the time series data H1 = There is no unit root in the time series data

2) Hypothesis

H0 = The Developed stock markets (DJIA, S&P 500, FTSE 100, Hang Seng, Bo Vespa, Moex, SSEC and Nikkei) do not influence the volatility in Indian stock markets.

H1 = The Developed stock markets (DJIA, S&P 500, FTSE 100, Hang Seng, Bovespa, Moex, SSEC and Nikkei) do influence the volatility in Indian stock markets

3) Hypothesis

H0 = There is no significant relationship between the Developed and developing stock markets (DJIA, S&P 500, FTSE 100, HangSeng, , Moex and SSEC) do not influence the volatility in Indian stock market

H1 = There is a significant relationship between the Developed and developing stock markets (DJIA, S&P 500, FTSE 100, HangSeng, , Moex and SSEC) it influence the volatility in Indian stock market

4) Hypothesis

H0 = The Developed stock market (DJIA, S&P 500, FTSE 100, Hang Seng, , Moex, SSEC and Nikkei) does not cause Indian stock market, H1 = The Developed stock market (DJIA, S&P 500, FTSE 100, Hang Seng, Moex and SSEC) does cause Indian stock market.

3.6 LIMITATIONS OF THE STUDY

The following are the limitations of the study:

1. The study is based on the closing prices and returns of the stock markets and does not take into account any other factors.

2. Possible care is taken to consider time lag, yet the lag between the propagation of the information and its impact cannot be easily assimilated in the study. The period of study is limited to 21 years, and can be further enhanced with structural breaks, to get information on the events like the global meltdown in 1990s, and 2008 and their impact on the stock exchanges.

3.7 CHAPTER SCHEME

CHAPTER 1:- INTRODUCTION

This phrase propoes the topic of the study and its importance. It gives a bird's eye view about the topic of study; it also provides a background for the study. This chapter introduces the selected industries and companies of the study and its importance. It gives a bird's eye view about the selected industries and companies.

CHAPTER 2:- CONCEPTUAL BACKGROUND AND LITERATURE REVIEW

This chapter deals with the study of research papers and projects done by various researchers to identify the research gap and to make a study about such gaps and also will deal with the research designs adopted for the study.

CHAPTER 3:- RESEARCH DESIGN

It includes the type of research, sampling technique, sample size, data gathering, data source, and tools to be used for hypothesis.

CHAPTER 4:- DATA ANALYSIS AND INTERPRETATION

This chapter takes the centre stage where the analysis and the interpretation of the data will be collected.

CHAPTER 5:- SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

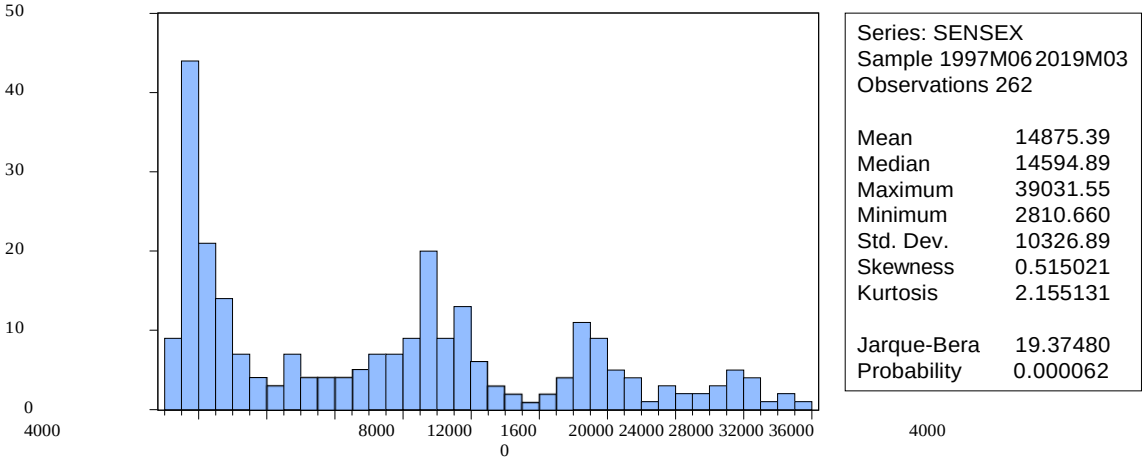
This chapter deals with the observations, findings that would be arrived after the study, also the suggestions and recommendations that would be found after studies are undertaken and final conclusion and Scope for further study.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

TABLE 4.1

TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR SENSEX



Analysis: It is evident from the above Table 4.1 the mean of SENSEX was 14875.39 with a standard deviation of 10326.89, Kurtosis of 2.155131 and a skewness of 0.515021. The maximum range reached during the study period was 39031.55 and minimum range was 2810.660. with a range of 36220.89.

GRAPH 4.1

GRAPH SHOWING SENSEX TREND

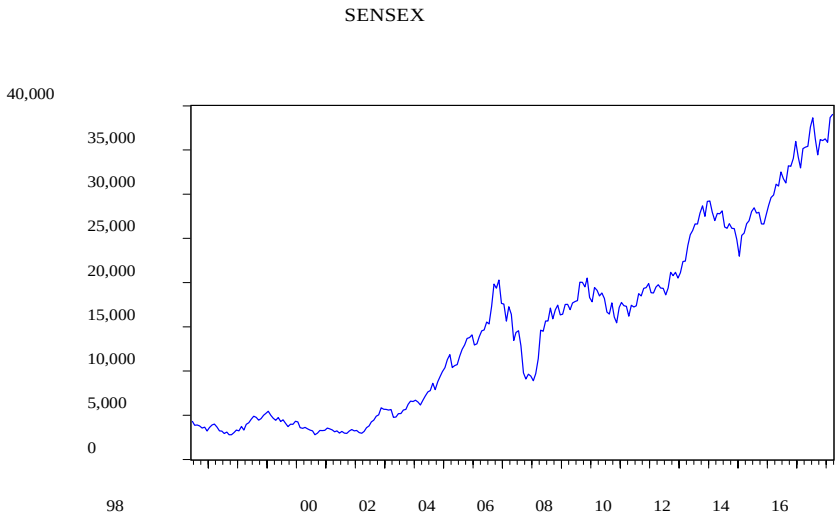


TABLE 4.2

TABLE SHOWING ADF STATISTICS FOR UNIT ROOT

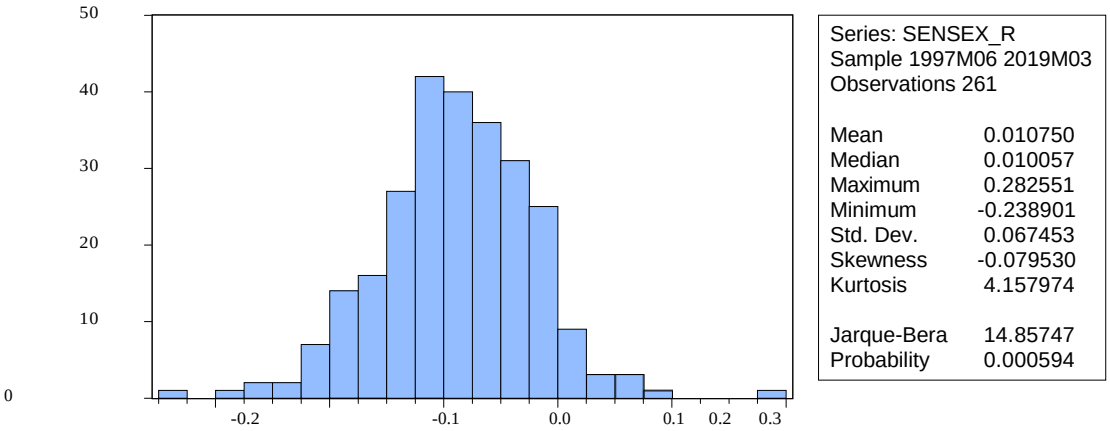
Augmented Dickey-Fuller test statistic at level			
		t Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-2.258671	0.4546
sTest critical values:	1% level	-3.993608	
	5% level	-3.427137	
	10% level	-3.136859	
Augmented Dickey-Fuller test statistic First differenced			
		t- Statistic	**Prob .***
Augmented Dickey- Fuller test statistic		-16.38401	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

*MacKinnon (1996) 1-sided p-values.

Analysis: In order to check the stationary of the time series data of Sensex (Adjusted closing price) it was tested by using ADF test. It is evident from Table 4.2 that ADF test statistics -2.258671 is less than the three critical values i.e., at 1% with -3.993608, at 5% with -3.427137 and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -16.38401 which is greater than the three critical values indicating there is no unit root in the time series data.

TABLE 4.3

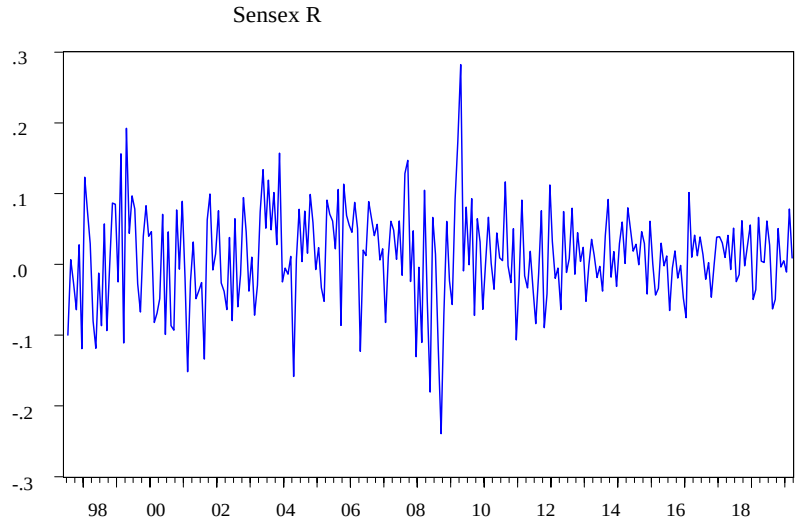
TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR SENSEX RETURNS



Analysis: It is evident from the above Table 4.3 the Mean of Sensex Returns was 0.010750 with a standard deviation of 0.067453, Kurtosis of 4.157974 and a skewness of -0.079530. The maximum range reached during the study period was 0.282551 and minimum range was - 0.238901.

GRAPH 4.2

GRAPH SHOWING SENSEX RETURNS TREND



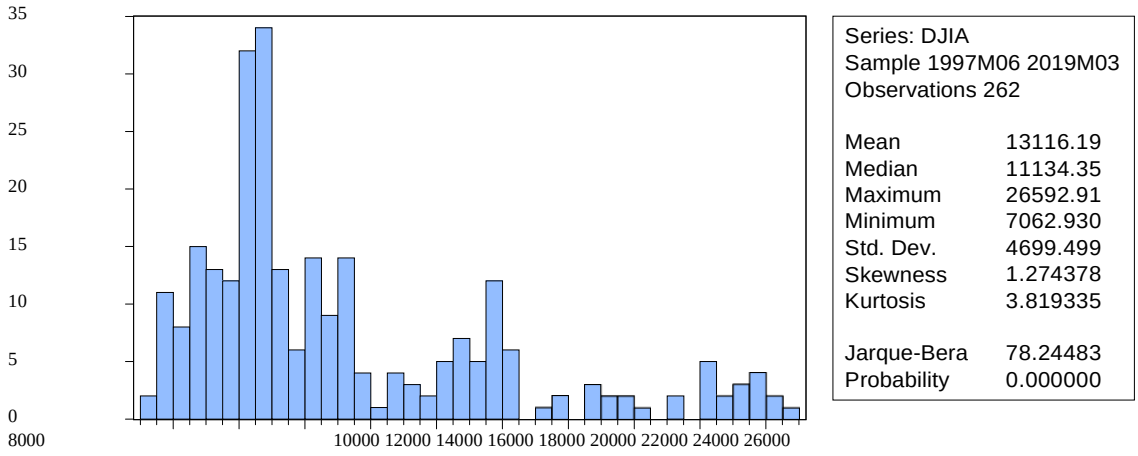
Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey - Fuller test statistic		-15.45971	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order to check the stationary of the time series data of Sensex (Returns) it was tested for the stationary by using ADF test, that ADF test statistics -15.45971 is greater than the three critical values at 1% with -3.993746, at 5% with -3.427203, and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data.

DOW JONES INDUSTRIAL AVERAGE

TABLE 4.4

TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR DJIA



Analysis: It is evident from the above Table 4.4 the mean of DJIA was 13116.19 with a standard deviation of 4699.499, Kurtosis of 3.819335 and a skewness of 1.274378. The maximum range reached during the study period was 26592.91 and reported minimum was 7062.930.

GRAPH 4.3

GRAPH SHOWING DOW JONES INDUSTRIAL AVERAGE TREND

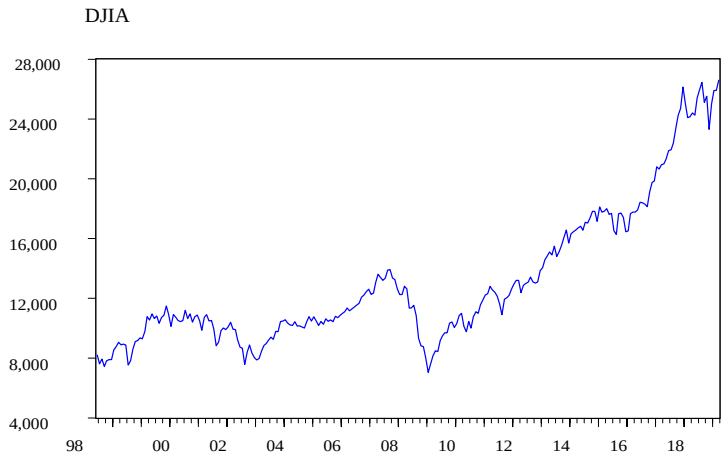


TABLE 4.5

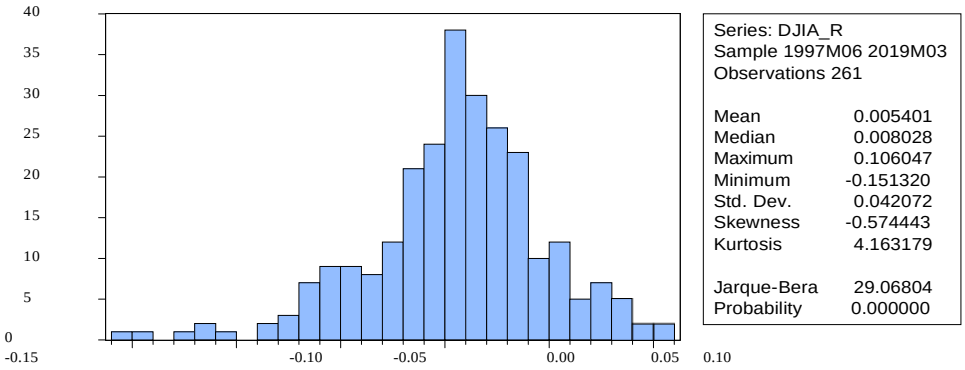
TABLE SHOWING ADF STATISTICS FOR UNIT ROOT

Augmented Dickey-Fuller test statistic at level			
		t- Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-0.634415	0.9758
Test critical values:	1% level	-3.993608	
	5% level	-3.427137	
	10% level	-3.136859	
Augmented Dickey-Fuller test statistic First differenced			
		t- Statistic	**Prob.***
Augmented Dickey- Fuller test statistic		-16.65037	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order to check the stationary 0f the time series data of DJIA (Adjusted closing price) it was tested by using ADF test. It is evident from Table 4.5 that ADF test statistics -0.634415 is less than the three critical values i.e., at 1% with -3.993608, at 5% with -3.427137, and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -16.65037 which is greater than the three critical values indicating there is no unit root in the time series data.

TABLE 4.6

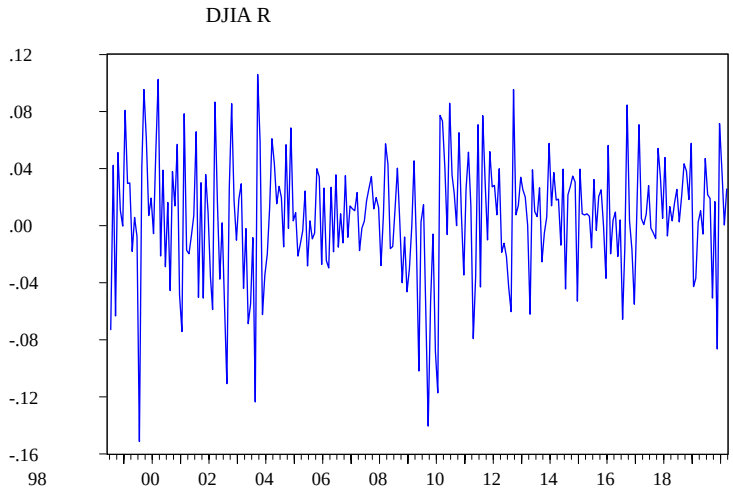
TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR DJIA RETURNS



Analysis: It is evident from the above Table 4.6 the mean of DJIA Returns was 0.005401 with a standard deviation of 0.042072, Kurtosis of 4.163179 and a skewness of -0.574443. The maximum range reached during the study period was 0.106047 and reported minimum was - 0.151320.

GRAPH 4.4

GRAPH SHOWING DOW JONES INDUSTRIAL AVERAGE RETURNS TREND



Augmented Dickey-Fuller test statistic at level			
t-Statistic			**Prob.***
Augmented Dickey-Fuller test statistic		-15.96486	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order to check the stationary of the time series data of DJIA (Returns) was tested for the stationary by using ADF test that, ADF test statistics -15.96486 is greater than the three critical values at 1% with -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data.

Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up

LAG SELECTION FOR SENSEX AND DJIA

Lag	Log	LR	FPE	AIC	SC
0	-4985.958	NA	3.91e+14	39.27526	39.30311
1	-4010.068	1928.728*	1.86e+11*	31.62258*	31.70614*
2	-4008.628	2.822448	1.89e+11	31.64274	31.78201
3	-4006.441	4.254056	1.92e+11	31.65702	31.85199
4	-4003.897	4.907882	1.94e+11	31.66848	31.91916
5	-4001.927	3.768287	1.97e+11	31.68447	31.99085
6	-4001.592	0.637183	2.03e+11	31.71332	32.07541
7	-4000.048	2.905743	2.07e+11	31.73266	32.15045
8	-3999.527	0.971211	2.13e+11	31.76006	32.23356

Analysis: It is evident from the above table that majority of the criteria LR, FPE, AIC and SC were of the opinion that the VAR lag order was 1. Therefore, lag order for the analysis is 1 for Sensex and DJIA.

TABLE 4.7

TABLE SHOWING JOHANSEN CO INTEGRATION TEST

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.012809	4.698708	15.49471	0.8399
At most 1	0.005167	1.346946	3.841466	0.2458
Trace test indicates no co integration at the 0.05 level				

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co integration Rank Test (Maximum Eigen value)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None	0.012809	3.351762	14.26460	0.9206
At most 1	0.005167	1.346946	3.841466	0.2458

Max-Eigenvalue test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Analysis: It is evident from the above table 4.7 that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co- integration between Sensex and DJIA as Trace values and Max-Eigen values are less than critical values.

UNRESTRICTED VAR FRAME WORK

TABLE 4.8

TABLE SHOWING VECTOR CORRECTION EQUATION

Co integrating EQ:	SENSEX	DJIA
SENSEX(-1)	0.974605	0.062336
	(0.07054)	(0.04014)
	[13.8161]	[1.55297]
SENSEX(-2)	0.020249	-0.051869
	(0.07080)	(0.04029)
	[0.28599]	[-1.28744]
DJIA(-1)	0.032370	0.911738

	(0.12349)	(0.07027)
	[0.26212]	[12.9747]
DJIA(-2)	-0.008413	0.074636
	(0.12422)	(0.07068)
	[-0.06772]	[1.05592]
C	-99.82438	94.29340
	(234.498)	(133.437)
	[-0.42569]	[0.70665]
R-squared	0.992301	0.987950
Adj. R-squared	0.992180	0.987761
Sum sq. resid	2.12E+08	68804491
S.E. equation	912.8564	519.4435
F-statistic	8216.438	5226.523
Log likelihood	-2138.710	-1992.117
Akaike AIC	16.49008	15.36244
Schwarz SC	16.55855	15.43091
Mean dependent	14958.35	13156.14
S.D. dependent	10322.92	4695.236
Determinant resid covariance (dof adj.)	1.77E+11	
Determinant resid covariance	1.70E+11	
Log likelihood	-4099.463	
Akaike information criterion	31.61126	
Schwarz criterion	31.74821	

SENSEX = C(1)*SENSEX (-1) + C(2)*SENSEX(-2) + C(3)*DJIA(-1) + C(4)*DJIA(-2) + C(5)
DJIA = C(6)*SENSEX(-1) + C(7)*SENSEX(-2) + C(8)*DJIA(-1) + C(9)*DJIA(-2) + C(10)

TABLE 4.9

TABLE SHOWING THE ERROR CORRECTION TERM

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*DJIA(-1) + C(4)*DJIA(-2) + C(5)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.974605	0.070541	13.81607	0.0000
C(2)	0.020249	0.070801	0.285994	0.7751
C(3)	0.032370	0.123491	0.262120	0.7934
C(4)	-0.008413	0.124218	-0.067724	0.9461
C(5)	-99.82438	234.4984	-0.425693	0.6707
R-squared	0.992301	Mean dependent var		14958.35
Adjusted R-squared	0.992180	S.D. dependent var		10322.92
S.E. of regression	912.8564	Akaike info criterion		16.49008
Sum squared resid	2.12E+08	Schwarz criterion		16.55855
Log likelihood	-2138.710	Hannan-Quinn criter.		16.51761
F- statistic	8216.438	Durbin-Watson stat		2.003969
Prob(F-statistic)	0.000000			

Analysis: It is evident from the above Table 4.9 that the error correction term is not significant at conventional level that is at 5%. Therefore, there1is no long term relationship between the Sensex and DJIA. However, lag 1 and lag 2 of DJIA are not statistically significant meaning that there is no short run relationship between Sensex and DJIA.

In order to understand the joint effect of lags Wald statistics have been run. The following table presents the results.

TABLE 4.10

TABLE SHOWING WALD TEST-FOR JOINT IMPACT

:			
Test Statistic	Value	Df	Probability
F-statistic	0.326022	(2, 255)	0.7221
Chi-square	0.652045	2	0.7218
Null Hypothesis: C(3)=C(4)=0			

Analysis: In order to investigate the Joint impact of the Independent variable DJIA with Sensex that is dependent variable, Wald test has been run. It is evident from the above Table 4.10 that the p value is not less than 0.05, there is no joint impact of DJIA on Sensex.

IMPULSE RESPONSE FUNCTION (CHOLSKY'S CRITERIA)

Response to Cholesky One S.D. Innovations ± 2 S.E.

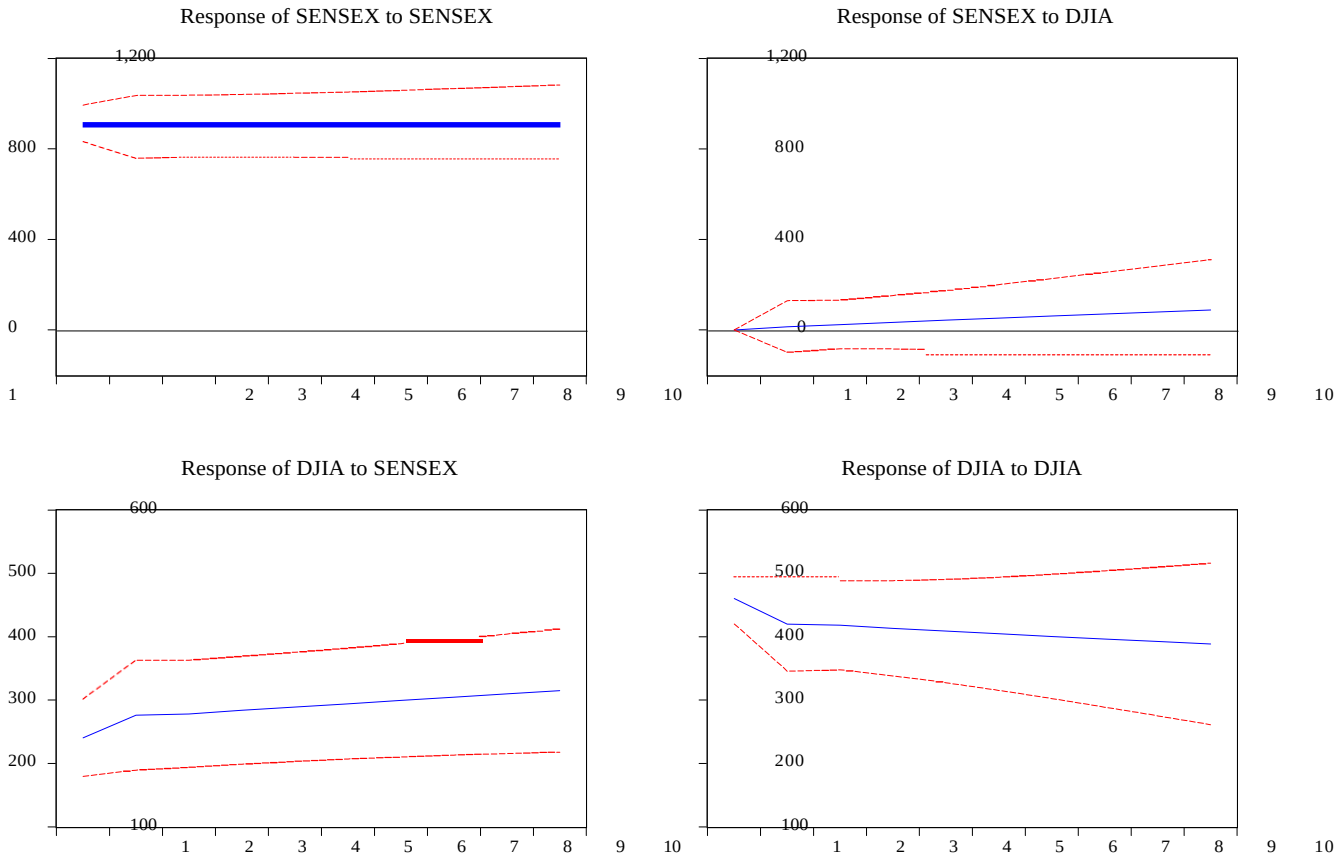


TABLE 4.11

TABLE SHOWING VARIANCE DECOMPOSITION

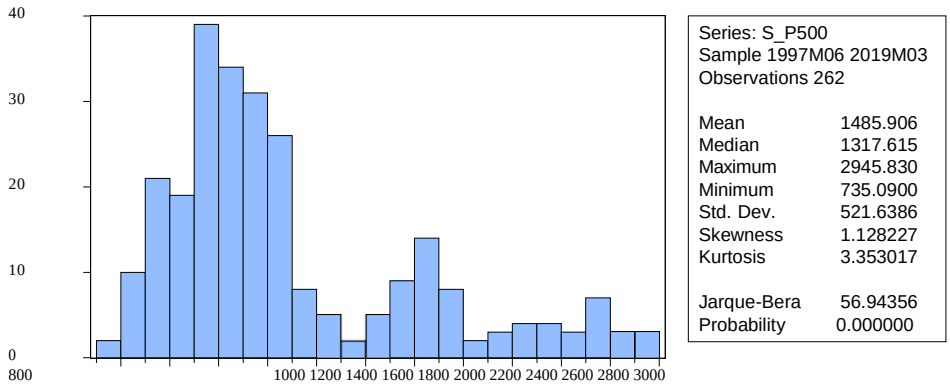
Period	S.E.	SENSEX	DJIA
1	912.8564	100.0000	0.000000
2	1280.219	99.98645	0.013552
3	1565.143	99.96695	0.033052
4	1806.807	99.93994	0.060058
5	2020.910	99.90585	0.094154
6	2215.541	99.86497	0.135033
7	2395.528	99.81762	0.182375
8	2564.027	99.76413	0.235866
9	2723.236	99.70480	0.295199
10	2874.758	99.63993	0.360074
Variance Decomposition of DJIA			
Period1	S.E.	SENSEX	DJIA
1	519.4435	21.43615	78.56385
2	722.7087	25.67685	74.32315
3	880.0709	27.31847	72.68153
4	1012.857	28.48430	71.51570
5	1129.877	29.44140	70.55860
6	1235.692	30.29322	69.70678
7	1333.039	31.08345	68.91655
8	1423.718	31.83402	68.16598
9	1508.987	32.55706	67.44294
10	1589.768	33.25976	66.74024

Cholsky ordering: Sensex and DJIA

S&P 500

TABLE 4.12

TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR S&P500



Analysis: It is evident from the above Table 4.12 the mean of S&P500 was 1485.906 with a standard deviation 521.6386, Kurtosis of 3.353017 and a skewness of 1.128227. The maximum range reached during the study period was 2945.830 and reported minimum was 735.0900

GRAPH 4.5

GRAPH SHOWING S&P500 TREND

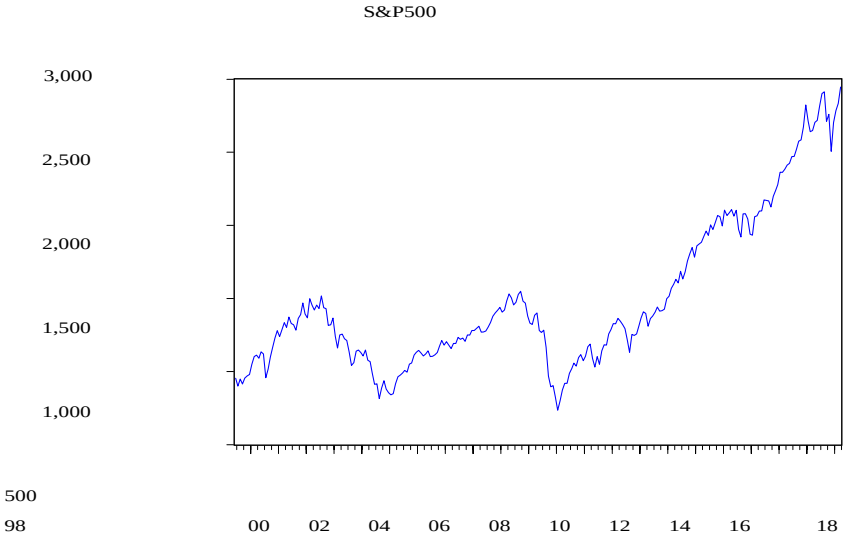


TABLE 4.13

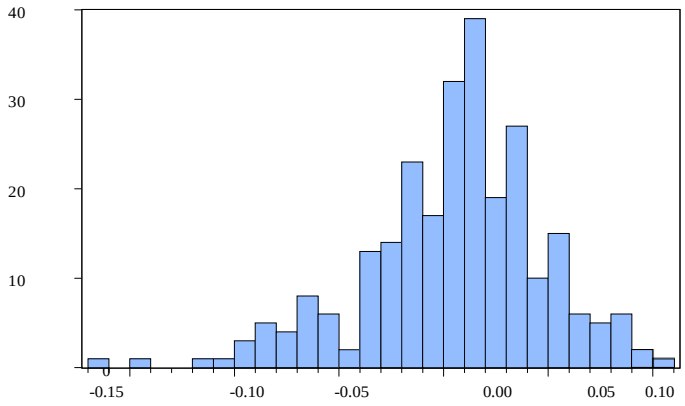
TABLE SHOWING ADF STATISTICS FOR UNIT ROOT

Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-0.569006	0.9796
Test critical values:	01% level	-3.993608	
	5% level	-3.427137	
	010% level	-3.136859	
Augmented Dickey-Fuller test statistic First differenced			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-16.32138	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order t0 check the stati0nary 0f the time series data of S&P500 (Adjusted closing price) it was tested by using ADF test. It is evident from Table 4.13 that ADF test statistics - 0.569006 is less than the three critical values i.e., at 1% with -3.993608, at 5% with -3.427137, and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -16.32138 which is greater than the three critical values indicating there is no unit root in the time series data.

TABLE 4.14

TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR S&P500 RETURNS

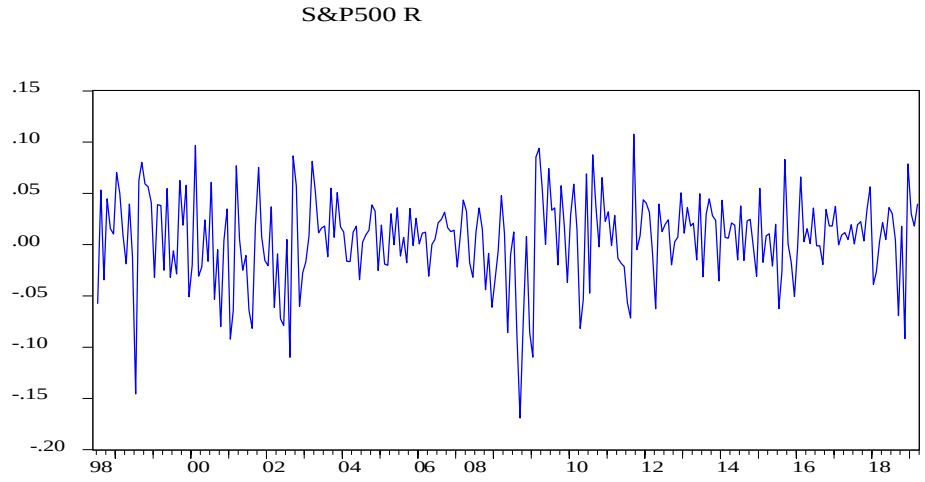


Series: S_P500_R	
Sample 1997M06 2019M03	
Observations 261	
Mean	0.005263
Median	0.009980
Maximum	0.107723
Minimum	-0.169425
Std. Dev.	0.042952
Skewness	-0.663588
Kurtosis	4.155834
Jarque-Bera	33.68363
Probability	0.000000

Analysis: It is evident from the above table 4.14 the mean of S&P500 Returns was 0.005263 with a standard deviation of 0.042952, Kurtosis of 4.155834 and a skewness of -0.663588. The maximum range reached during the study period was 0.107723 and reported minimum was - 0.169425.

GRAPH 4.6

GRAPH SHOWING S&P500 RETURNS TREND



Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-15.18086	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order to check the stationary of the time series data of S&P500 (Returns) was tested for the stationary by using ADF test that, ADF test statistics -15.18086 is greater than the three critical values i.e., at 1% with -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is n0 unit root in the time series data.

Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up

LAG SELECTION FOR SENSEX AND S&P500

Lag	Log	LR	FPE	AIC	SC	HQ
0	-4471.084	NA	6.78e+12	35.22114	35.24899	35.23234
1	-3454.742	2008.676*	2.34e+09*	27.24994*	27.33350*	27.28355*
2	-3452.302	4.784853	2.37e+09	27.26222	27.40148	27.31824
3	-3449.781	4.902239	2.40e+09	27.27387	27.46884	27.35230
4	-3448.254	2.946455	2.45e+09	27.29334	27.54401	27.39418
5	-3446.555	3.251341	2.49e+09	27.31145	27.61784	27.43471
6	-3446.253	0.573144	2.56e+09	27.34057	27.70266	27.48624
7	-3445.836	0.783834	2.64e+09	27.36879	27.78658	27.53686
8	-3445.291	1.016999	2.71e+09	27.39599	27.86949	27.58648
* indicates lag order selected by the criterion						

Analysis: It is evident from the above table that majority of the criteria LR, FPE, AIC, SC and HQ were of the opinion that the VAR lag order was 1. Therefore, lag order for the analysis is 1 for Sensex and S&P500.

TABLE 4.15

TABLE SHOWING JOHANSEN CO INTEGRATION TEST

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.009755	3.380175	15.49471	0.9470
At most 1	0.003192	0.831372	3.841466	0.3619
Trace test indicates no cointegration at the 0.05 level				

Trace test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co integration Rank Test (Maximum Eigenvalue)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.009755	2.548803	14.26460	0.9721
At most 1	0.003192	0.831372	3.841466	0.3619
Trace test indicates no cointegration at the 0.05 level				

Trace test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Analysis: It's evident from the above table 4.15 that both Unrestricted Co integration Rank Test Trace and Maximum Eighteen value statistics are accepting the null hypothesis i.e. there is no co- integration between Sensex and S&P500 as Trace values and Max-Eigen values are less than critical values.

UNRESTRICTED VAR FRAME WORK

TABLE 4.16

TABLE SHOWING VECTOR CORRECTION EQUATION

Co integrating EQ:	**SENSEX**	**S&P500**
SENSEX(-1)	0.978986	0.009043
	(0.07250)	(0.00474)
	[13.5027]	[1.90807]
SENSEX(-2)	0.021256	-0.008055
	(0.07279)	(0.00476)
	[0.29201]	[-1.69288]
S_P500(-1)	0.175234	0.908907
	(1.10717)	(0.07237)
	[0.15827]	[12.5585]
S_P500(-2)	-0.072280	0.079890
	(1.11065)	(0.07260)
	[-0.06508]	[1.10039]
C	-18.69788	9.347195
	(215.896)	(14.1127)
	[-0.08661]	[0.66233]
R-squared	0.992288	0.987078
Adj. R-squared	0.992167	0.986876
Sum sq. resids	2.13E+08	909542.4

S.E. equation	913.6401	59.72297
F-statistic	8202.238	4869.799
Log likelihood	-2138.933	-1429.726
Akaike AIC	16.49179	11.03635
Schwarz SC	16.56027	11.10483
Mean dependent	14958.35	1490.206
S.D. dependent	10322.92	521.3162

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*S_P500(-1) + C(4)*S_P500(-2) + C(5) S_P500 = C(6)*SENSEX(-1) + C(7)*SENSEX(-2) + C(8)*S_P500(-1) + C(9)*S_P500(-2)+ C(10)

TABLE 4.17

TABLE SHOWING THE ERROR CORRECTION TERM

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*S_P500(-1) + C(4) *S_P500(-2) + C(5)				
	Coefficient	Std. Err0r	t-Statistic	Prob.
C(1)	0.978986	0.072503	13.50269	0.0000
C(2)	0.021256	0.072793	0.292012	0.7705
C(3)	0.175234	1.107172	0.158272	0.8744
C(4)	-0.072280	1.110654	-0.065079	0.9482
C(5)	-18.69788	215.8955	-0.086606	0.9311
R-squared	0.992288	Mean dependent var		14958.35
Adjusted R-squared	0.992167	S.D. dependent var		10322.92
S.E. of regression	913.6401	Akaike info criterion		16.49179
Sum squared resid	2.13E+08	Schwarz criterion		16.56027
Log likelihood	-2138.933	Hannan-Quinn criter.		16.51932
F-statistic	8202.238	Durbin-Watson stat		2.004310
Prob(F-statistic).	0.000000			

Analysis: It is evident from the above table 4.17 that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and S&P500. However, lag 1 and lag 2 of S&P500 are not statistically significant meaning that there is no short run relationship between Sensex and S&P500.

In order to understand the joint effect of lags Wald statistics have been run. The following table presents the results.

TABLE 4.18

TABLE SHOWING WALD TEST- FOR JOINT IMPACT

:			
Test Statistic	Value	Df	Probability
F-statistic	0.106820	(2, 255)	0.8987
Chi-square	0.213641	2	0.8987
Null Hypothesis: C(3)=C(4)=0			

Analysis: In order to investigate the Joint impact of the Independent Variable S&P500 with Sensex that is dependent variable, Wald test has been run. It is evident from the above Table

4.18 that the p value is not less than 0.05, there is no joint impact of S&P500 on Sensex.

IMPULSE RESPONSE FUNCTION (CHOLSKY'S CRITERIA)

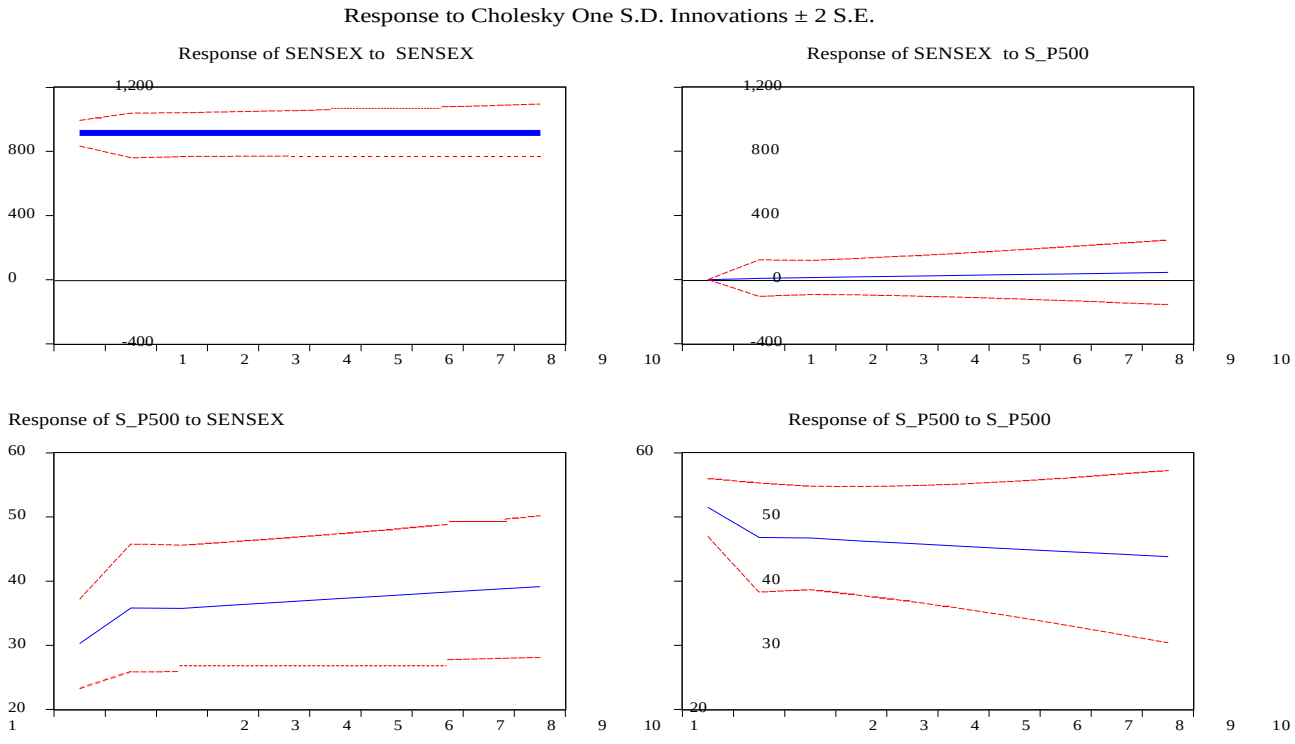


TABLE 4.19

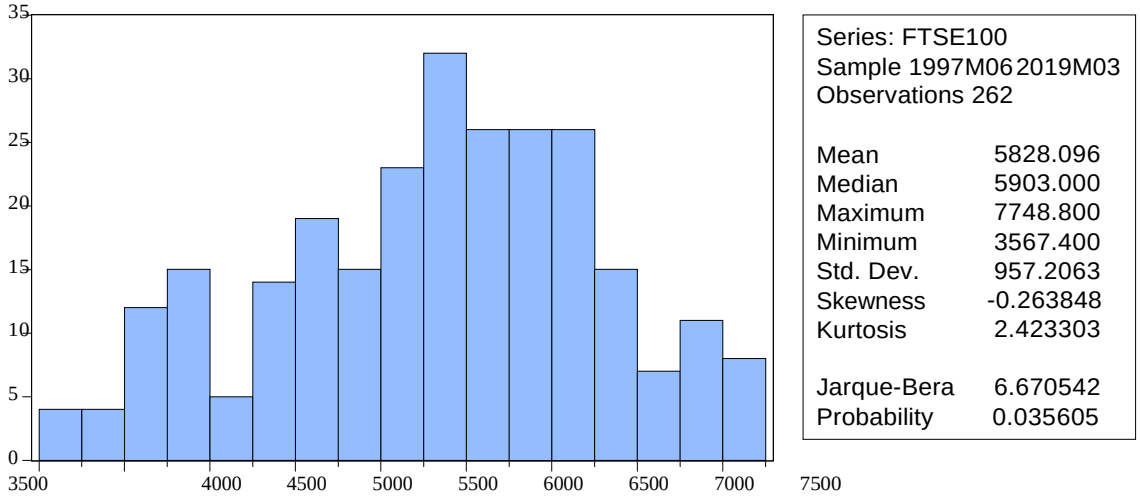
TABLE SHOWING VARIANCE DECOMPOSITION FUNCTION

Period	S.E.	SENSEX	S&P500
1	913.6401	100.0000	0.000000
2	1282.328	99.99505	0.004948
3	1569.196	99.98950	0.010497
4	1813.123	99.98225	0.017747
5	2029.719	99.97338	0.026622
6	2227.007	99.96291	0.037087
7	2409.769	99.95091	0.049094
8	2581.122	99.93741	0.062590
9	2743.236	99.92248	0.077522
10	2897.689	99.90616	0.093840
Variance Decomposition of S&P500			
Period	S.E.	SENSEX	S&P500
1	59.72297	25.71293	74.28707
2	83.88409	31.23550	68.76450
3	102.4468	33.10141	66.89859
4	118.1057	34.33120	65.66880
5	131.9030	35.28210	64.71790
6	144.3788	36.09405	63.90595
7	155.8556	36.82569	63.17431
8	166.5444	37.50648	62.49352
9	176.5923	38.15279	61.84721
10	186.1070	38.77437	61.22563
Cholesky ordering: Sensex, S&P500			

FTSE100

TABLE 4.20

TABLE SHOWING TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR FTSE100



Analysis: It is evident from the above table 4.20 the mean of FTSE100 was 5828.096 with a standard deviation 957.2063, Kurtosis of 2.423303, skewness of -0.263848 The maximum range reached during the study period was 7748.800 and reported minimum was 3567.400.

GRAPH 4.7

GRAPH SHOWING FTSE100 TREND

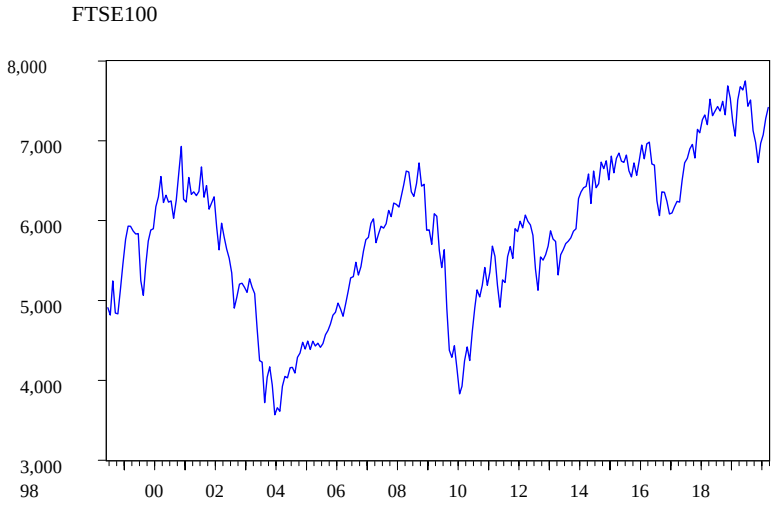


TABLE 4.21

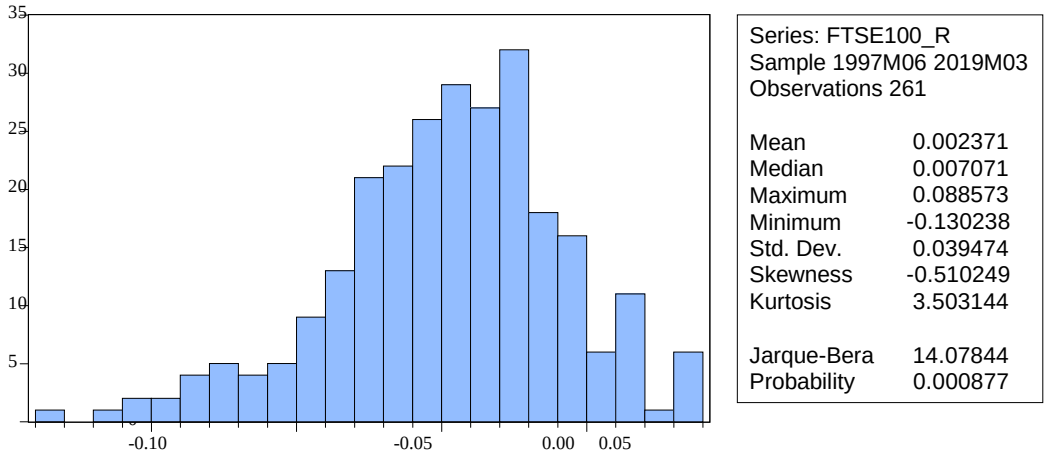
TABLE SHOWING ADF STATISTICS FOR UNIT ROOT

Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-2.161130	0.5088
Test critical values:	1% level	-3.993608	
	5% level	-3.427137	
	10% level	-3.136859	
Augmented Dickey-Fuller test statistic First differenced			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-16.61297	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order to check the stationary of the time series data of FTSE100 (Adjusted closing price), it was tested for the stationary by using ADF test. It is evident from Table 4.21 that ADF test statistics is -2.161130 which is lesser than three critical values i.e., at 1% with -3.993608, at 5% with -3.427137 and for 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is unit root in the time series data. After differencing (first) the ADF test statistics was -16.61297 which is greater than three critical values indicating there is no unit r00t in the time series data.

TABLE 4.22

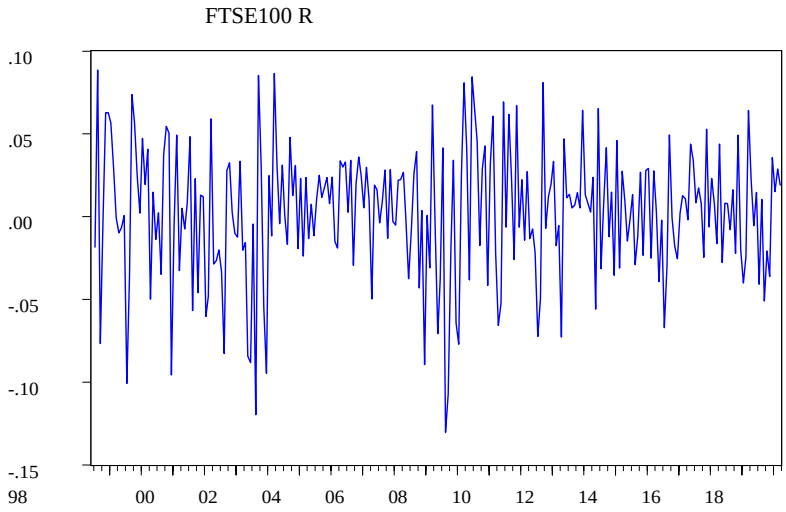
TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR FTSE100 RETURNS



Analysis: It is evident from the above table 4.22 the mean of FTSE100 Returns was 0.002371 with a standard deviation 0.039474, Kurtosis of 3.503144 and a skewness of -0.510249. The maximum range reached during the study period was 0.088573 and reported minimum was - 0.130238.

GRAPH 4.8

GRAPH SHOWING FTSE100 RETURNS



Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-16.05212	0.0000
Test critical values:	1%level	-3.993746	
	5%level	-3.427203	
	10%level	-3.136898	

Analysis: In order to check the stationary of the time series data of FTSE100 (Returns) was tested for the stationary by using ADF test, ADF test statistics -16.05212 is greater than three critical values i.e., at 1% -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data.

Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up.

LAG SELECTION FOR SENSEX AND FTSE100

Lag	Log	LR	FPE	AIC	SC	HQ
0	-4722.352	NA	4.91e+13	37.19963	37.22748	37.21083
1	-3783.493	1855.540*	3.12e+10*	29.83853*	29.92209*	29.87215*
2	-3782.685	1.584164	3.20e+10	29.86367	30.00293	29.91969
3	-3779.854	5.506642	3.23e+10	29.87287	30.06784	29.95130
4	-3778.129	3.328357	3.28e+10	29.89078	30.14146	29.99162
5	-3774.733	6.496562	3.30e+10	29.89554	30.20192	30.01879
6	-3773.934	1.517333	3.38e+10	29.92074	30.28283	30.06640
7	-3772.587	2.533922	3.46e+10	29.94163	30.35943	30.10971
8	-3771.987	1.120320	3.55e+10	29.96840	30.44190	30.15889
* indicates lag order selected by the criterion						

Analysis: It is evident from the ab0ve table that majority of the criteria LR, FPE, AIC, SC and HQ were of the opinion that the VAR lag order was 1. Therefore, lag order for the analysis is 1 for Sensex and FTSE100.

TABLE 4.23

TABLE SHOWING JOHANSEN CO INTEGRATION TEST

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.020951	6.452096	15.49471	0.6421
At most 1	0.003636	0.947037	3.841466	0.3305
Trace test indicates no cointegration at the 0.05 level				

* denotes rejection of the hypothesis at the 0.05 level

** MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co integration Rank Test (Maximum Eigen value)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None	0.020951	5.505059	14.26460	0.6772
At most 1	0.003636	0.947037	3.841466	0.3305

Max-Eigenvalue test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

* MacKinnon-Haug-Michelis (1999) p-values

Analysis: It is evident from the above table 4.23 that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co- integration between Sensex and FTSE100 as Trace values and Max-Eigen values are less than critical values.

UNRESTRICTED VAR FRAME WORK

TABLE 4.24

TABLE SHOWING VECTOR CORRECTION EQUATION

Co integrating EQ:	**SENSEX**	**FTSE100**
SENSEX(-1)	0.959863	0.002198
	(0.07055)	(0.01699)
	[13.6045]	[0.12940]
SENSEX(-2)	0.048140	0.000846
	(0.07109)	(0.01711)
	[0.67722]	[0.04945]
FTSE100(-1)	0.220823	0.940203
	(0.29377)	(0.07073)
	[0.75168]	[13.2937]
FTSE100(-2)	-0.266875	0.013656
	(0.29363)	(0.07069)
	[-0.90889]	[0.19318]
C	288.7881	233.9056
	(424.946)	(102.305)
	[0.67959]	[2.28636]
R-squared	0.992311	0.948160
Adj. R-squared	0.992191	0.947347
Sum sq. resids	2.12E+08	12299368

S.E. equation	912.2403	219.6197
F-statistic	8227.626	1165.996
Log likelihood	-2138.535	-1768.293
Akaike AIC	16.48873	13.64072
Schwarz SC	16.55720	13.70919
Mean dependent	14958.35	5835.523
S.D. dependent	10322.92	957.1041
Determinant resid covariance (dof adj.)		3.14E+10
Determinant resid covariance		3.02E+10
Log likelihood		-3875.079
Akaike information criterion		29.88522
Schwarz criterion		30.02217

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*FTSE100(-1) + C(4)*FTSE100(-2) + C(5) FTSE100 = C(6)*SENSEX(-1) + C(7)*SENSEX(-2) + C(8)*FTSE100(-1) + C(9)*FTSE100(-2) + C(10)

TABLE 4.25

TABLE SHOWING ERROR CORRECTION TERM

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*FTSE100(-1) + C(4)*FTSE100(-2) + C(5)				
	Coefficient	Std. Error	t-Statistic	Prob .
C(1)	0.959863	0.070555	13.60449	0.0000
C(2)	0.048140	0.071085	0.677218	0.4989
C(3)	0.220823	0.293774	0.751677	0.4529
C(4)	-0.266875	0.293629	-0.908886	0.3643
C(5)	288.7881	424.9455	0.679588	0.4974
R-squared	0.992311	Mean dependent var		14958.35
Adjusted R-squared	0.992191	S.D. dependent var		10322.92
S.E. of regression	912.2403	Akaike info criterion		16.48873
Sum squared resid	2.12E+08	Schwarz criterion		16.55720
Log likelihood	-2138.535	Hannan-Quinn criter.		16.51626
F-statistic	8227.626	Durbin-Watson stat		2.015256
Prob(F-statistic)	0.000000			

Analysis: It is evident from the above table 4.25 that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and FTSE100. However, lag 1 and lag 2 of FTSE100 are not statistically significant meaning that there is no short run relationship between Sensex and FTSE100.

In order to understand the joint effect of lags Wald statistics have been run. The following table presents the results

TABLE 4.26

TABLE SHOWING WALD TEST- FOR JOINT IMPACT

:			
Test Statistic	Value	Df	Probability
F-statistic	0.498738	(2, 255)	0.6079
Chi-square	0.997475	2	0.6073
Null Hypothesis: C(3)=C(4)=0			

Analysis: In order to investigate the Joint impact of the Independent variable FTSE100 with Sensex that is dependent variable, Wald test has been run. It is evident from the above Table 4.26 that the p value is not less than 0.05, there is no joint impact of FTSE100 on Sensex.

IMPULSE RESPONSE FUNCTION (CHOLSKY'S CRITERIA)

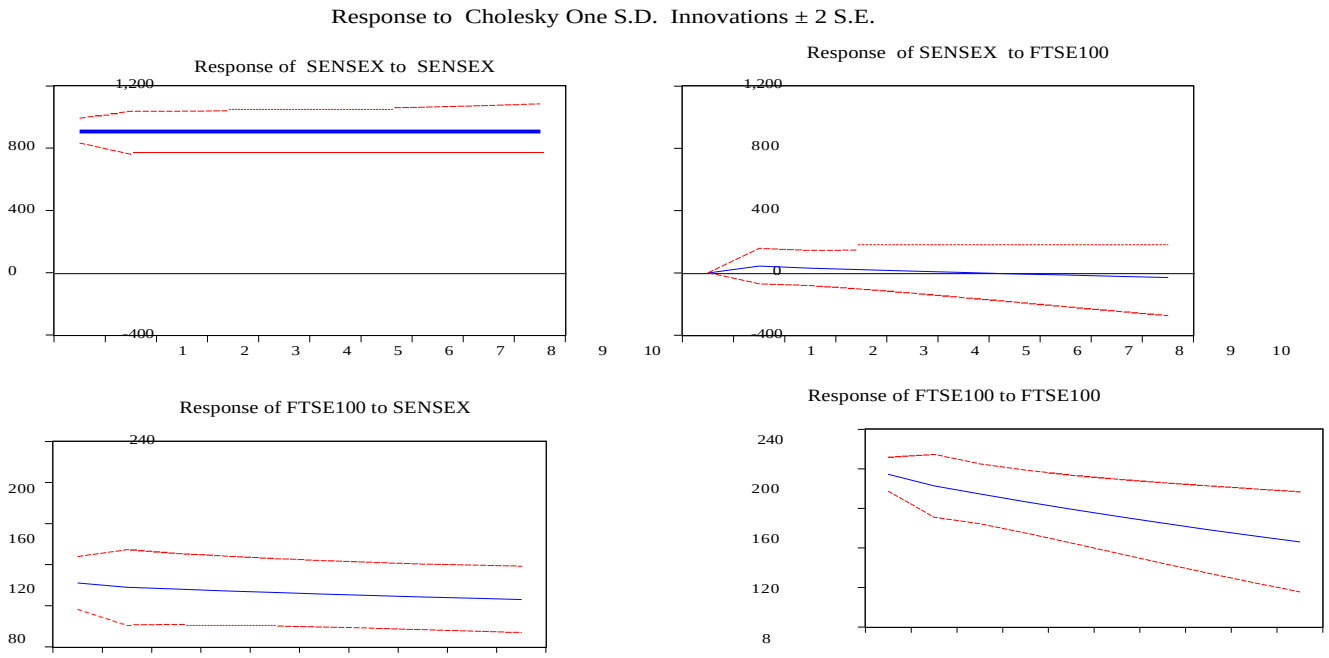


TABLE 4.27

TABLE SHOWING VARIANCE DECOMPOSITION FUNCTION

Period	S.E.	SENSEX	FTSE100
1	912.2403	100.0000	0.000000
2	1280.933	99.88772	0.112283
3	1566.040	99.88896	0.111044
4	1807.670	99.90400	0.095995
5	2021.568	99.92019	0.079812
6	2215.867	99.93346	0.066543
7	2395.415	99.94241	0.057593
8	2563.377	99.94661	0.053394
9	2721.958	99.94603	0.053971
10	2872.763	99.94085	0.059154

Variance Decomposition of FTSE100

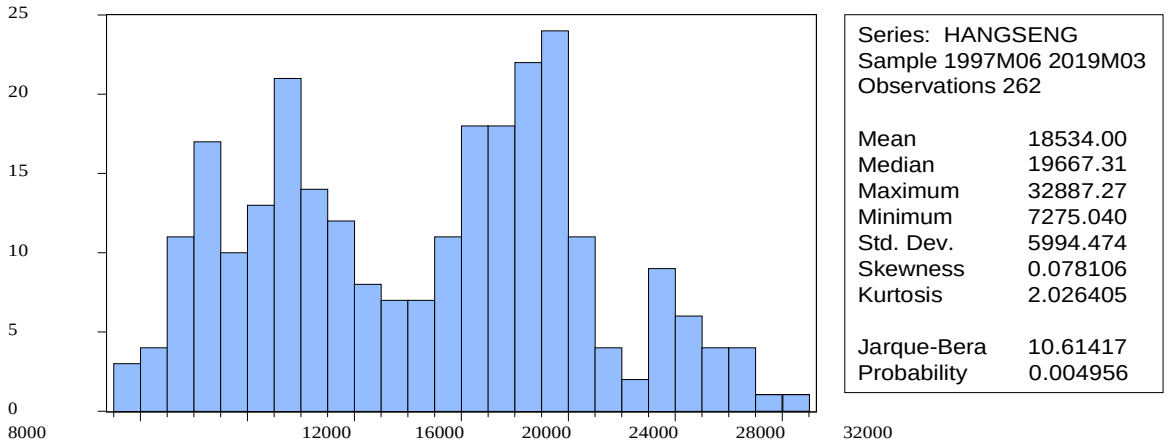
Period	S.E.	SENSEX	FTSE100
1	219.6197	21.66837	78.33163
2	302.0915	22.00267	77.99733
3	361.9772	22.41675	77.58325
4	409.6308	22.85062	77.14938
5	449.2401	23.29472	76.70528
6	483.0254	23.74553	76.25447
7	512.3449	24.20131	75.79869
8	538.1080	24.66106	75.33894
9	560.9622	25.12406	74.87594
10	581.3901	25.58975	74.41025

Cholesky Ordering: Sensex And FTSE100

HANGSENG

TABLE 4.28

TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR HANGSENG



Analysis: It is evident from the above table 4.36 the mean of HangSeng was 18534.00 with a standard deviation of 5994.474, Kurtosis of 2.026405 and a skewness of 0.078106. The maximum range reached during the study period was 32887.27 and reported minimum was 7275.040.

GRAPH 4.9

GRAPH SHOWING HANGSENG TREND

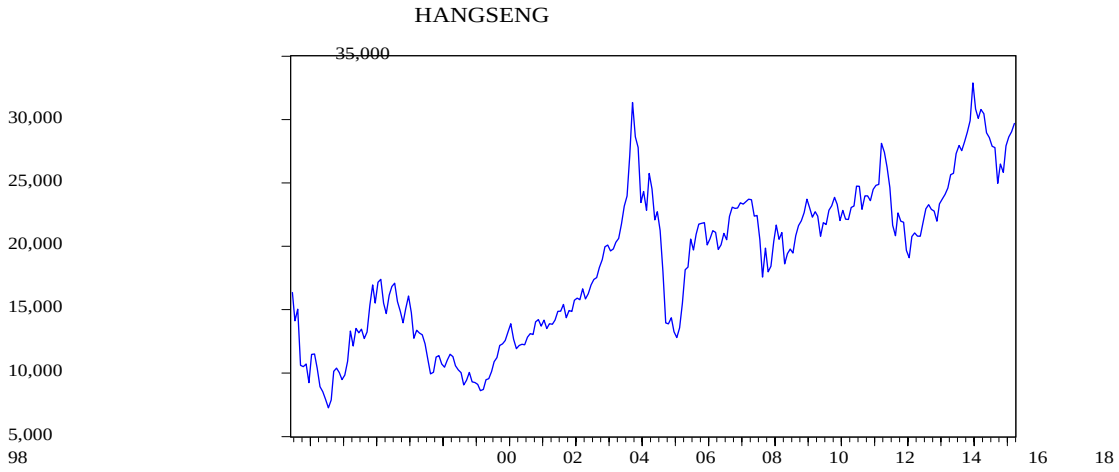


TABLE 4.29

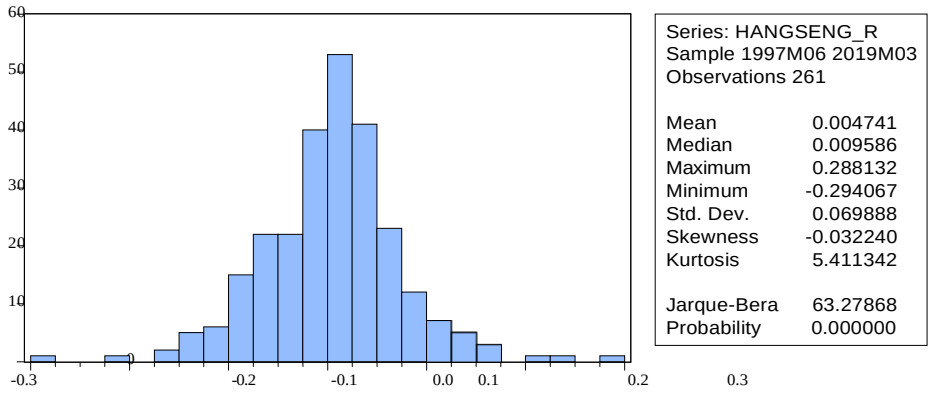
TABLE SHOWING ADF STATISTICS FOR UNIT ROOT

Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.**
Augmented Dickey-Fuller test statistic		-3.573867	0.0340
Test critical values:	1%level	-3.993608	
	5%level	-3.427137	
	10%level	-3.136859	
Augmented Dickey-Fuller test statistic First differenced			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-15.49589	0.0000
Test critical values:	1%level	-3.993746	
	5%level	-3.427203	
	10%level	-3.136898	

Analysis: In order to check the stationary of the time series data of Hang Seng (Adjusted closing price) was tested for the stationary by using ADF test. It is evident from Table 4.37 that ADF test statistics -3.573867 is less than three critical values i.e. at 1% with -3.993608, at 5% with - 3.427137 and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was - 15.49589 which is greater than the three critical values indicating there is no unit root in the time series data.

TABLE 4.30

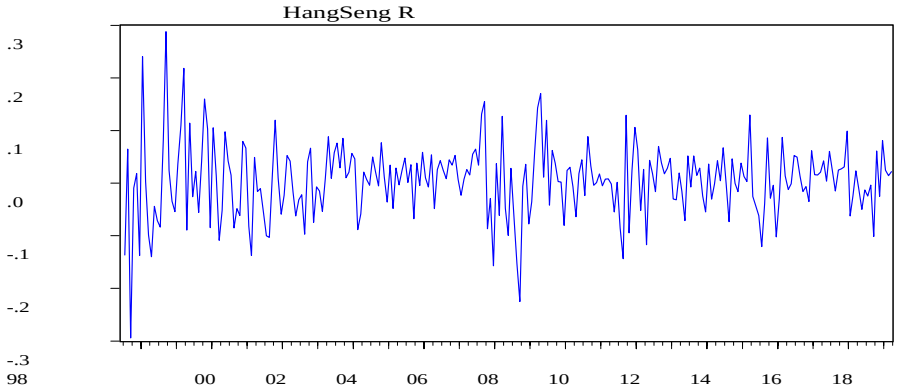
TABLE SHOWING NORMALITY AND JARQUE-BERA HANG SENG RETURNS



Analysis: It is evident from the above table 4.38 the mean of Hang Seng Return was 0.004741 with a standard deviation of 0.069888, Kurtosis of 5.411342 and a skewness of -0.32240. The maximum range reached during the study period was 0.288132 and reported minimum was - 0.294067.

GRAPH 4.10

GRAPH SHOWING HANGSENG RETURNS



Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic1		-15.19152	0.0000
Test critical values:1	1%level	-3.993746	
	5%level	-3.427203	
	10%level	-3.136898	

Analysis: In order to check the stationary of the time series data of Hang Seng (Returns), it was tested for the stationary by using ADF test that ADF test statistics -15.19152 is greater than three critical i.e., at 1% with -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data.

Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up.

LAG SELECTION FOR SENSEX AND HANGSENG

Lag	Log	LR	FPE	AIC	SC	HQ
0	-5040.134	NA	5.99e+14	39.70184	39.72970	39.71305
1	-4186.940	1686.234	7.47e+11	33.01528	33.09883*	33.04889*
2	-4184.309	5.157563	7.55e+11	33.02606	33.16532	33.08208
3	-4176.603	14.98725*	7.34e+11*	32.99688*	33.19185	33.07531
4	-4173.984	5.053046	7.42e+11	33.00775	33.25843	33.10859
5	-4172.613	2.624217	7.57e+11	33.02845	33.33483	33.15170
6	-4168.252	8.274825	7.55e+11	33.02561	33.38770	33.17127
7	-4165.740	4.727735	7.64e+11	33.03732	33.45512	33.20540
8	-4164.044	3.163922	7.78e+11	33.05547	33.52897	33.24595
* indicates lag order selected by the criterion						

Analysis: It is evident from the above table that LR, FPE, AIC, SC and HQ shows different lag order but AIC will be considered for analysis purposes i.e., lag 3 as it is more reliable and the VAR lag order was 3. Therefore, lag order for the analysis is 3 for Sensex and Hang Seng.

TABLE 4.31

TABLE SHOWING JOHANSEN CO INTEGRATION TEST

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	10.05	
No. of CE(s)	Eigenvalue	Statistic	Critical0Value	Prob.*
None	0.053260	16.06970	15.49471	0.0409
At most 1	0.007526	1.949030	3.841466	0.1627

Trace test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co integration Rank Test (Maximum Eigen value)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.*
None	0.053260	14.12067	14.26460	0.0526
At most 1	0.007526	1.949030	3.841466	0.1627

Max-Eigenvalue test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Analysis: It is evident from the above table 4.39 that Unrestricted Co integration Rank Test (Trace) indicates 1 cointegrating equation at the 0.05 level and rejecting null hypothesis. Maximum Eigen value statistics accepting the null hypothesis as Max-Eigen values are lesser than critical values indicating no long run co-integration.

UNRESTRICTED VAR FRAMEWORK

TABLE 4.32

TABLE SHOWING VECTOR CORRECTION EQUATION

Co integrating EQ:	SENSEX	HANG SENG
CointEq1	0.031687	0.065993
	(0.01338)	(0.01762)
	[2.36754]	[3.74531]
D(SENSEX(-1))	-0.137388	-0.060061
	(0.07774)	(0.10234)

	[-1.76736]	[-0.58687]
D(SENSEX(-2))	-0.255624	-0.135644
	(0.07793)	(0.10259)
	[-3.28025]	[-1.32215]
D(SENSEX(-3))	0.061743	0.088926
	(0.07882)	(0.10377)
	[0.78330]	[0.85694]
D(HANGSENG(-1))	0.132463	0.127023
	(0.05766)	(0.07591)
	[2.29724]	[1.67328]
D(HANGSENG(-2))	0.199017	0.132353
	(0.05826)	(0.07670)
	[3.41622]	[1.72570]
D(HANGSENG(-3))	0.063238	0.005920
	(0.05883)	(0.07745)
	[1.07493]	[0.07643]
C	157.9002	73.23988
	(57.3803)	(75.5417)
	[2.75182]	[0.96953]
R-squared	0.085452	0.066433
Adj. R-squared	0.059844	0.040293
Sum sq. resids	1.95E+08	3.39E+08
S.E. equation	883.9889	1163.780
F-statistic	3.336993	2.541448

Log likelihood	-2112.409	-2183.355
Akaike AIC	16.43728	16.98725
Schwarz SC	16.54745	17.09742
Mean dependent	136.5438	73.93531
S.D. dependent	911.6894	1187.959
Determinant resid covariance (dof adj.)		6.89E+11
Determinant resid covariance		6.47E+11
Log likelihood		-4240.384
Akaike information criterion		33.01073
Schwarz criterion		33.25861

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*SENSEX(-3) + C(4)*HANGSENG(-1) + C(5)*HANGSENG(-2) + C(6)*HANGSENG(-3) + C(7)
HANGSENG
= C(8)*SENSEX(-1) + C(9)*SENSEX(-2) + C(10)*SENSEX(-3) + C(11)*HANGSENG(-1) + C(12)*HANGSENG(-2) + C(13)*HANGSENG(-3) + C(14)

TABLE 4.33

TABLE SHOWING ERROR CORRECTION TERM

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*SENSEX(-3) + C(4)*HANGSENG(-1)+ C(5)*HANGSENG(-2) + C(6)*HANGSENG(-3) + C(7)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.887185	0.075681	11.72265	0.0000
C(2)	-0.112148	0.102850	-1.090399	0.2766
C(3)	0.259209	0.077741	3.334260	0.0010
C(4)	0.081695	0.057267	1.426560	0.1549
C(5)	0.064036	0.078083	0.820108	0.4129
C(6)	-0.197425	0.057582	-3.428610	0.0007
C(7)	618.0526	276.1188	2.238358	0.0261
R-squared	0.999003	Mean dependent var		7215.019
Adjusted R-squared	0.992804	S.D. dependent var		15001.04
S.E. of regression	0.992633	Akaike info criterion		10319.89

Sum squared resid	885.7845	Schwarz criterion	16.43748
Log likelihood	1.98E+08	Hannan-Quinn criter.	16.53361
F-statistic	-2121.654	Durbin-Watson stat	16.47613
Prob(F-statistic)	5794.634		2.009649

Analysis: It is evident from the above table 4.41 the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and HangSeng. However, lag 1 and lag 2 of Hangseng are not statistically significant meaning that there is no short run relationship between Sensex and Hangseng but lag 3 indicates there is short run relationship between Sensex and HangSeng.

In order to understand the joint effect of lags Wald statistics have been run. The following table presents the results

TABLE 4.34

TABLE SHOWING WALD TEST- FOR JOINT IMPACT

:			
Test Statistic	Value	Df	Probability
F-statistic	5.660926	(3, 252)	0.0009
Chi-square	16.98278	3	0.0007
Null Hypothesis: C(4)=C(5)=C(6)=0			

Analysis: In order to investigate the Joint impact of the Independent variable HangSeng with Sensex that is dependent variable, Wald test has been run. It is evident from the above Table

4.42 that the p value is less than 0.05, there is a joint impact of HangSeng on Sensex.

IMPULSE RESPONSE FUNCTION (CHOLSKY'S CRITERIA)

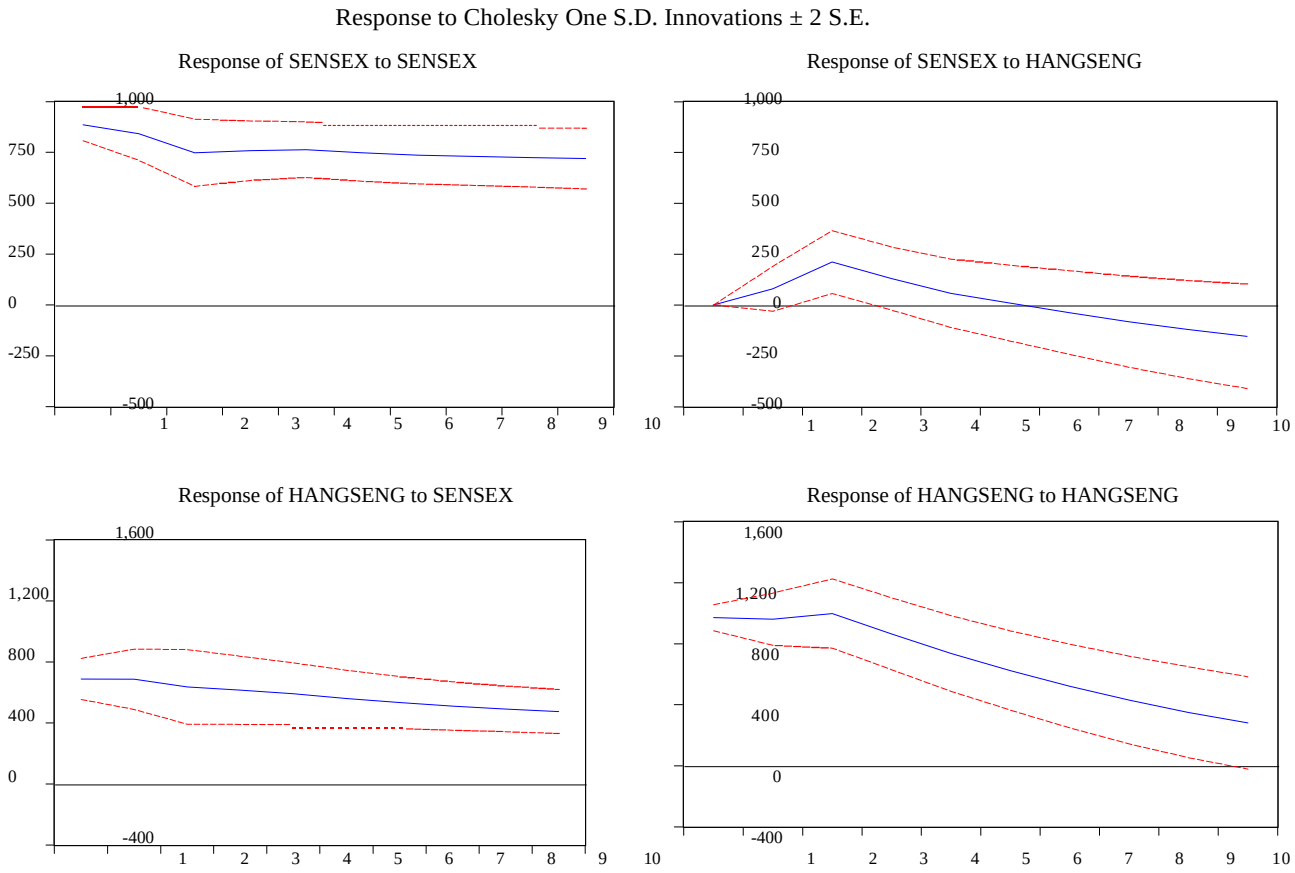


TABLE 4.35

TABLE SHOWING VARIANCE DECOMPOSITION FUNCTION

Variance Decomposition of Sensex:

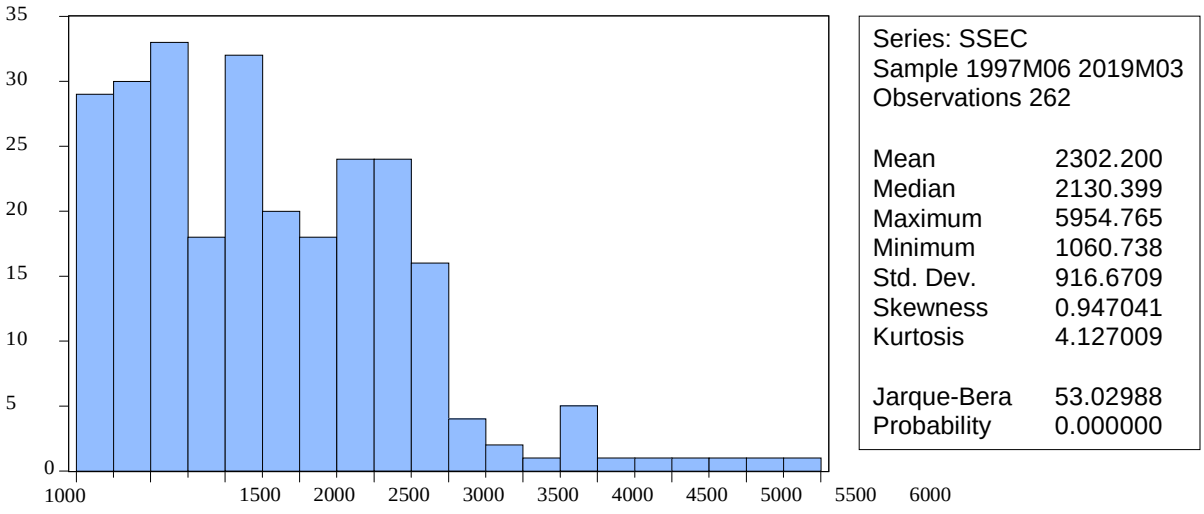
Period	S.E.	SENSEX	HANGSENG
1	885.7845	100.0000	0.000000
2	1224.725	99.58092	0.419082
3	1450.361	97.58677	2.413235
4	1641.888	97.49417	2.505826
5	1811.400	97.84285	2.157154
6	1959.624	98.15474	1.845265
7	2093.874	98.35186	1.648142
8	2219.100	98.39553	1.604473
9	2337.480	98.28674	1.713257
10	2450.560	98.04380	1.956204

Variance Decomposition of Hangseng			
Period	S.E.	SENSEX	HANGSENG
1	1189.562	33.43969	66.56031
2	1675.036	33.59799	66.40201
3	2050.745	32.03680	67.96320
4	2308.212	32.34784	67.65216
5	2493.413	33.32897	66.67103
6	2630.162	34.47619	65.52381
7	2733.686	35.70930	64.29070
8	2813.929	36.99113	63.00887
9	2877.762	38.27805	61.72195
10	2929.925	39.54369	60.45631
Cholesky Ordering: Sensex and Hangseng			

SSEC

TABLE 4.36

TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR SSEC



Analysis: It is evident from the above table 4.44 the mean of SSEC was 2302.200 with a standard deviation of 916.6709, Kurtosis of 4.127009 and a skewness of 0.947041. The maximum range reached during the study period was 5954.765 and reported minimum was 1060.73

GRAPH 4.11

GRAPH SHOWING SSEC TREND

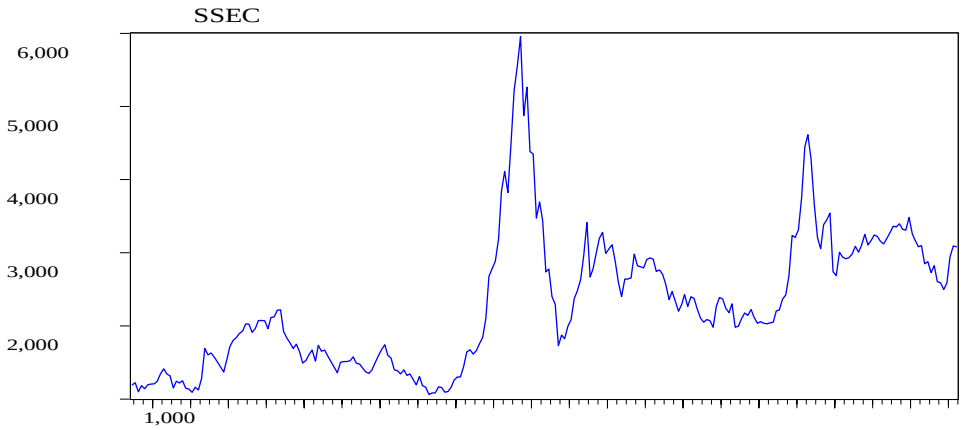


TABLE 4.37

TABLE SHOWING ADF STATISTICS FOR UNIT ROOT

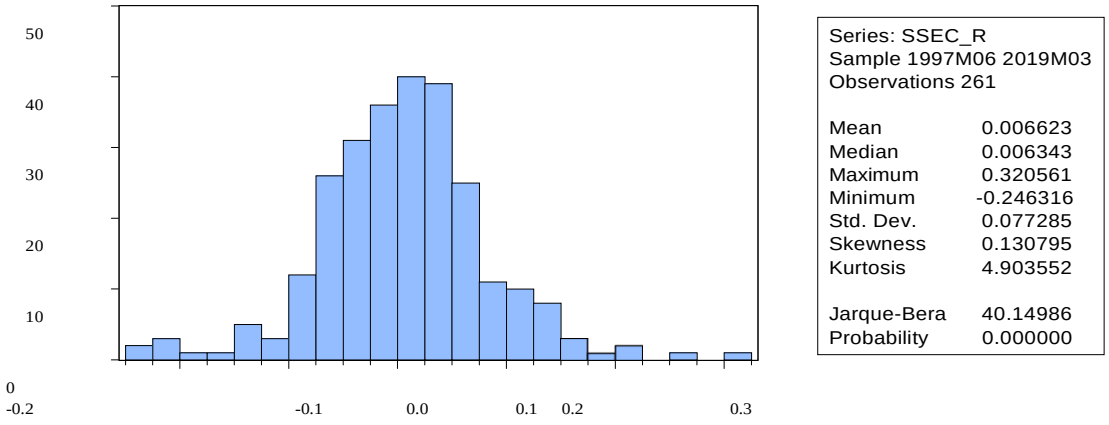
Augmented Dickey-Fuller test statistic at level				
		t-Statistic	**Prob.***	
Augmented Dickey-Fuller test statistic		-4.357	13	0.0030
Test critical values:	1% level	-3.994	10	
	5% level	-3.427	76	
	10% level	-3.137	59	
Augmented Dickey-Fuller test statistic First differenced				
		t-Statistic	**Prob.***	
Augmented Dickey-Fuller test statistic		-9.125	13	0.0000
Test critical values:	1% level	-3.993	85	

	5% level	-3.427271	
	10% level	-3.136938	

Analysis: In order to check the stationary of the time series data of SSEC (Adjusted closing price) was tested for the stationary by using ADF test. It is evident from Table 4.45 that ADF test statistics - 4.357213 is greater than three critical values i.e., at 1% with -3.994310, at 5% with -3.427476 and for 10% -3.137059 indicating rejecting of null hypothesis. Therefore, there is no unit root in the time series data. However, we found an intercept and the trend component in the time series data, therefore, to eliminate the trend and the intercept component the researcher converted that data into first differenced. Later the researcher was able to eliminate the trend component and it became stationary.

TABLE 4.38

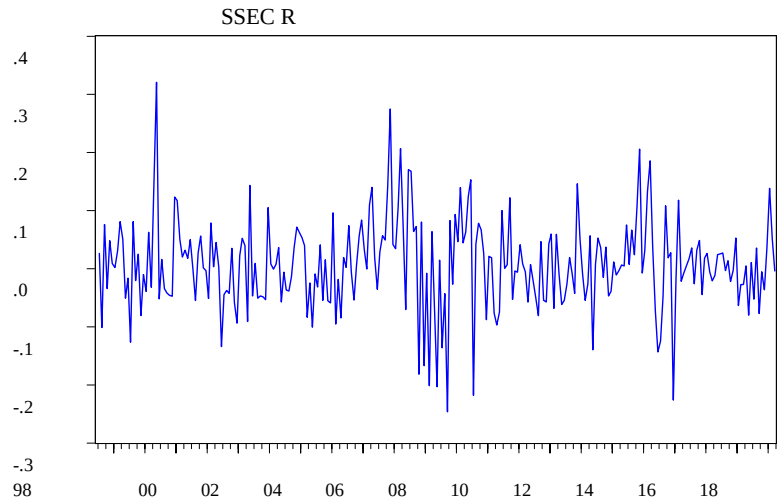
TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR SSEC RETURNS



Analysis: It is evident from the above table 4.46 the mean of SSEC Returns was 0.006623 with a standard deviation of 0.077285, Kurtosis of 4.903552 and a skewness of 0.130795. The maximum range reached during the study period was 0.320561 and reported minimum was - 0.246316.

GRAPH 4.12

GRAPH SHOWING SSEC RETURNS TREND



Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-14.23227	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order to check the stationary of the time series data of SSEC (Returns) was tested for the stationary by using ADF test ADF test statistics -14.23227 is greater than three critical values i.e., at 1% with - 3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data.

Since there is a difference in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up.

LAG SELECTION FOR SENSEX AND SSEC

Lag	Log	LR	FPE	AIC	SC	HQ
0	-4721.617	NA	4.88e+13	37.19384	37.22169	37.20504
1	-3807.251	1807.133	3.76e+10	30.02560	30.10916*	30.05922
2	-3805.433	3.565565	3.82e+10	30.04278	30.18204	30.09880
3	-3790.941	28.18470	3.52e+10*	29.96017*	30.15514	30.03860*
4	-3789.040	3.666752	3.58e+10	29.97670	30.22737	30.07754
5	-3783.547	10.51147*	3.54e+10	29.96494	30.27132	30.08819
6	-3779.721	7.259566	3.54e+10	29.96631	30.32840	30.11197
7	-3778.335	2.608894	3.62e+10	29.98689	30.40468	30.15496
8	-3773.873	8.326303	3.60e+10	29.98325	30.45675	30.17374
* indicates lag order selected by the criterion						

Analysis: It is evident from the above table that LR, FPE, AIC, SC and HQ shows different lag order but AIC will be considered for analysis purposes i.e., lag 3 as it is more reliable and the VAR lag order was 3. Therefore, lag order for the analysis is 3 for Sensex and SSEC.

TABLE 4.39

TABLE SHOWING JOHANSEN CO INTEGRATION TEST

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	10.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.*
None	0.040842	12.30213	15.49471	0.1430
At most	0.005966	1.543758	3.841466	0.2141

Trace test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co integration Rank Test (Maximum Eigen value)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None	0.040842	10.75838	14.26460	0.1667
At most 1	0.005966	1.543758	3.841466	0.2141

Max-Eigenvalue test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Analysis: It is evident from the above table 4.47 that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co- integration between Sensex and SSEC as Trace values and Max-Eigen values are less than critical values.

UNRESTRICTED VAR FRAME WORK

TABLE 4.40

TABLE SHOWING VECTOR CORRECTION EQUATION

Co integrating EQ:	SENSEX	SSEC
SENSEX(-1)	0.953375	-0.008409
	(0.06391)	(0.01573)
	[14.9179]	[-0.53446]
SENSEX(-2)	-0.143495	0.007733
	(0.08979)	(0.02211)
	[-1.59812]	[0.34983]
SENSEX(-3)	0.207227	0.004643

	(0.06548)	(0.01612)
	[3.16479]	[0.28804]
SSEC(-1)	0.084377	1.040059
	(0.26557)	(0.06538)
	[0.31772]	[15.9074]
SSEC(-2)	0.983898	0.101826
	(0.38327)	(0.09436)
	[2.56711]	[1.07911]
SSEC(-3)	-1.234871	-0.212092
	(0.26674)	(0.06567)
	[-4.62946]	[-3.22957]
C	289.4335	110.6814
	(151.141)	(37.2108)
	[1.91500]	[2.97445]
R-squared	0.992980	0.945725
Adj. R-squared	0.992813	0.944433
Sum sq. resids	1.93E+08	11691431
S.E. equation	874.8754	215.3940
F-statistic	5941.099	731.8406
Log likelihood	-2118.444	-1755.426
Akaike AIC	16.41270	13.60947
Schwarz SC	16.50883	13.70560
Mean dependent	15001.04	2315.321
S.D. dependent	10319.89	913.7452
Determinant resid covariance (dof adj.)		3.22E+10
Determinant resid covariance		3.05E+10

Log likelihood	-3861.095
Akaike information criterion	29.92351
Schwarz criterion	30.11578

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*SENSEX(-3) + C(4)*SSEC(-1) + C(5)*SSEC(-2) + C(6)*SSEC(-3) + C(7) SSEC = C(8)*SENSEX(-1) + C(9)*SENSEX(-2) + C(10)*SENSEX(-3) + C(11)*SSEC(-1) + C(12)*SSEC(-2) + C(13)*SSEC(-3) + C(14)

TABLE 4.41

TABLE SHOWING ERROR CORRECTION TERM

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*SENSEX(-3) + C(4)*SSEC(-1) + C(5)*SSEC(-2) + C(6)*SSEC(-3) + C(7)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.953375	0.063908	14.91788	0.0000
C(2)	-0.143495	0.089790	-1.598116	0.1113
C(3)	0.207227	0.065479	3.164787	0.0017
C(4)	0.084377	0.265565	0.317725	0.7510
C(5)	0.983898	0.383271	2.567106	0.0108
C(6)	-1.234871	0.266742	-4.629462	0.0000
C(7)	289.4335	151.1406	1.914995	0.0566
R-squared	0.992980	Mean dependent var		15001.04
Adjusted R-squared	0.992813	S.D. dependent var		10319.89
S.E. of regression	874.8754	Akaike info criterion		16.41270
Sum squared resid	1.93E+08	Schwarz criterion		16.50883
Log likelihood	-2118.444	Hannan-Quinn criter		16.45135
F-statistic	5941.099	Durbin-Watson stat		1.959266
Prob(F-statistic)	0.000000			

Analysis: It is evident from the above table 4.49 the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and SSEC. However, lag 1 of SSEC is not statistically significant meaning that there is no short run relationship between Sensex and SSEC but lag 2 and lag 3 indicates there is short run relationship between Sensex and SSEC.

In order to understand the joint effect of lags Wald statistics have been run. The following table presents the results

TABLE 4.42

TABLE SHOWING WALD TEST - FOR JOINT IMPACT

:			
Test Statistic	Value	Df	Probability
F-statistic	7.910895	(3, 252)	0.0000
Chi-square	23.73269	3	0.0000
Null Hypothesis :C(4)=C(5)=C(6)			

Analysis: In order to investigate the Joint impact of the Independent variable SSEC with Sensex that is dependent variable, Wald test has been run. It is evident from the above Table 4.50 that the p value is less than 0.05, there is joint impact of SSEC on Sensex.

IMPULSE RESPONSE FUNCTION (CHOLSKY'S CRITERIA)

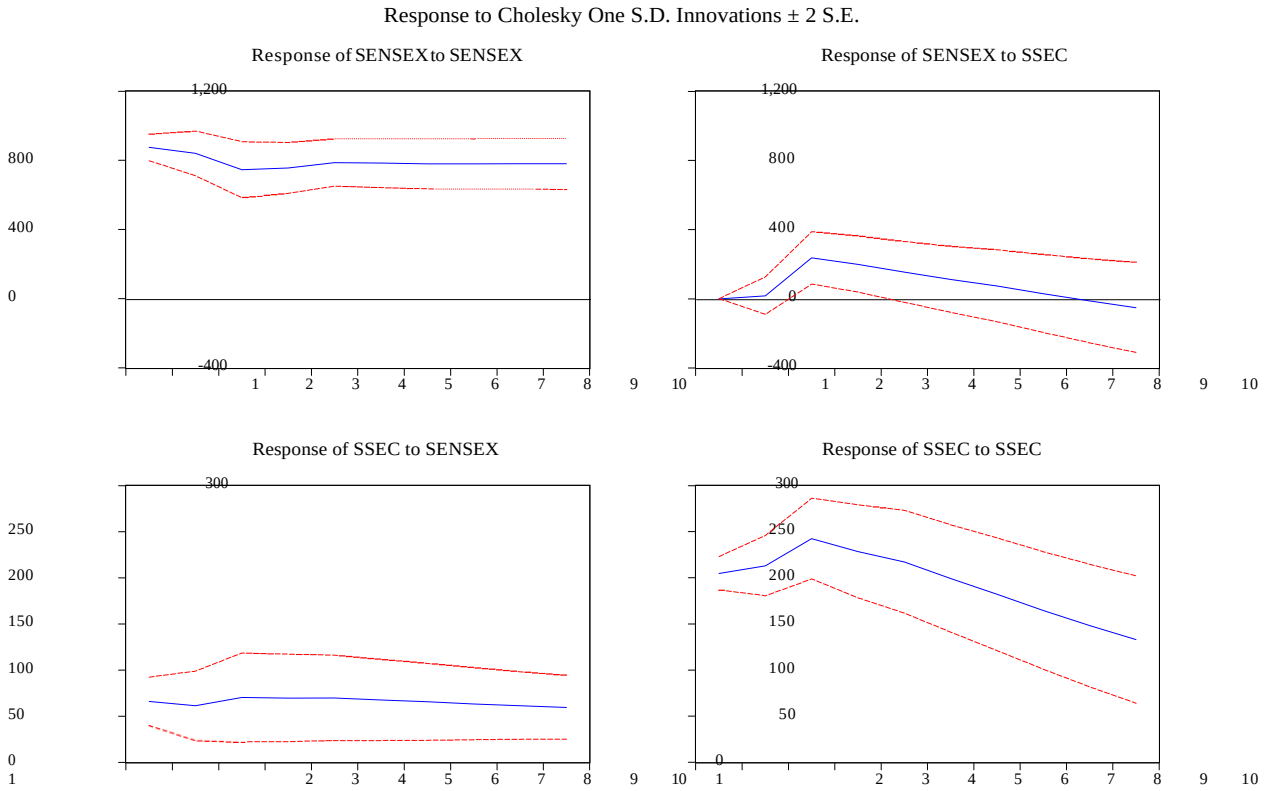


TABLE 4.43

TABLE SHOWING VARIANCE DECOMPOSITION FUNCTION

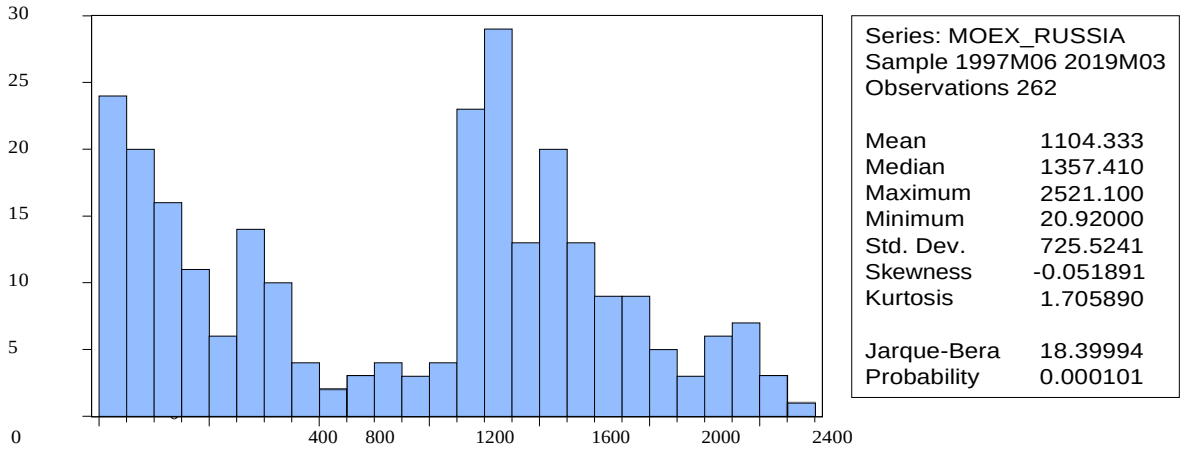
Variance Decomposition of Sensex:			
Period	S.E.	SENSEX	SSEC
1	874.8754	100.0000	0.000000
2	1212.735	99.97965	0.020349
3	1442.805	97.30530	2.694697
4	1641.026	96.43455	3.565449
5	1826.524	96.40416	3.595838
6	1990.731	96.65857	3.341434
7	2139.171	96.98626	3.013736

8	2276.943	97.32296	2.677037
9	2406.935	97.60172	2.398281
10	2530.720	97.78986	2.210140
Variance Decomposition of SSEC:			
Period	S.E.	SENSEX	SSEC
1	215.3940	9.394027	90.60597
2	309.2321	8.488037	91.51196
3	399.2044	8.184413	91.81559
4	465.2518	8.259076	91.74092
5	518.2803	8.467423	91.53258
6	559.3784	8.722497	91.27750
7	591.9335	9.014045	90.98595
8	617.6556	9.331201	90.66880
9	638.1734	9.665830	90.33417
10	654.6063	10.01228	89.98772
Cholesky Ordering: Sensex and SSEC			

MOEX

TABLE 4.44

TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR MOEX



Analysis**:** It is evident from the above table 4.53 the mean of Moex 1104.333 with a standard deviation of 725.5241, Kurtosis of 1.705890 and a skewness of -0.051891. The maximum range reached during the study period was 2521.100 and reported minimum was 20.92000.

GRAPH 4.13

GRAPH SHOWING MOEX TREND

TABLE 4.45

TABLE SHOWING ADF STATISTICS FOR UNIT ROOT

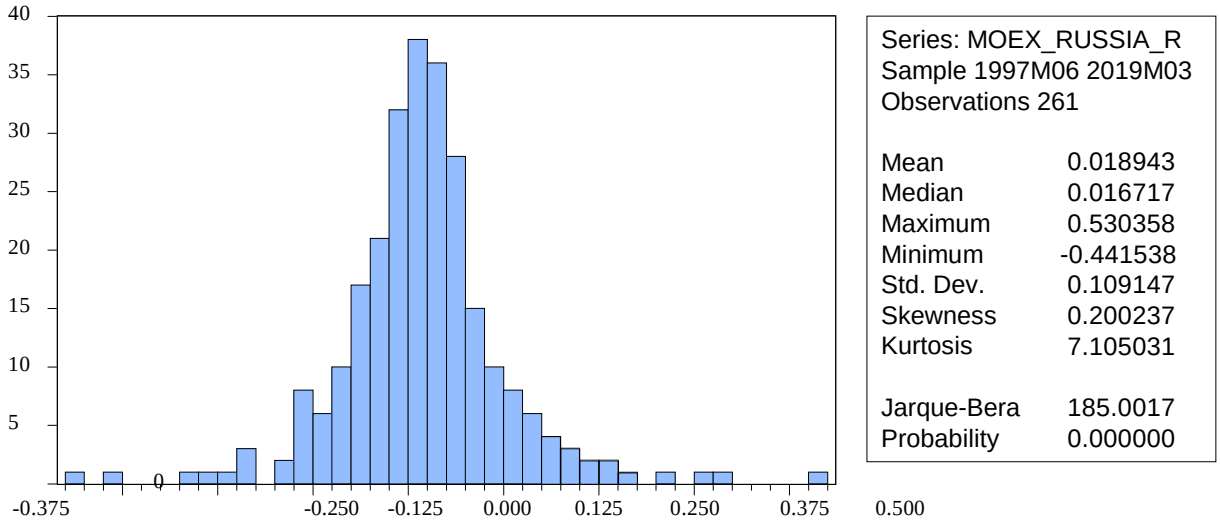
Augmented Dickey-Fuller test statistic at level			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-2.298629	0.4328
Test critical values:	1% level	-3.993608	
	5% level	-3.427137	
	10% level	-3.136859	
Augmented Dickey-Fuller test statistic First differenced			
		t-Statistic	**Prob.***

Augmented Dickey-Fuller test statistic		-14.56719	0.0000
Test critical values:	1% level	-3.993746	
	5% level	-3.427203	
	10% level	-3.136898	

Analysis: In order to check the stationary of the time series data of MOEX (Adjusted closing price) was tested for the stationary by using ADF test. It is evident from Table 4.53 that ADF test statistics -2.298629 is lesser than three critical values i.e., at 1% with -3.993608, at 5% with -3.427137 and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -14.56719 which is greater than the three critical values indicating there is no unit root in the time series data.

TABLE 4.46

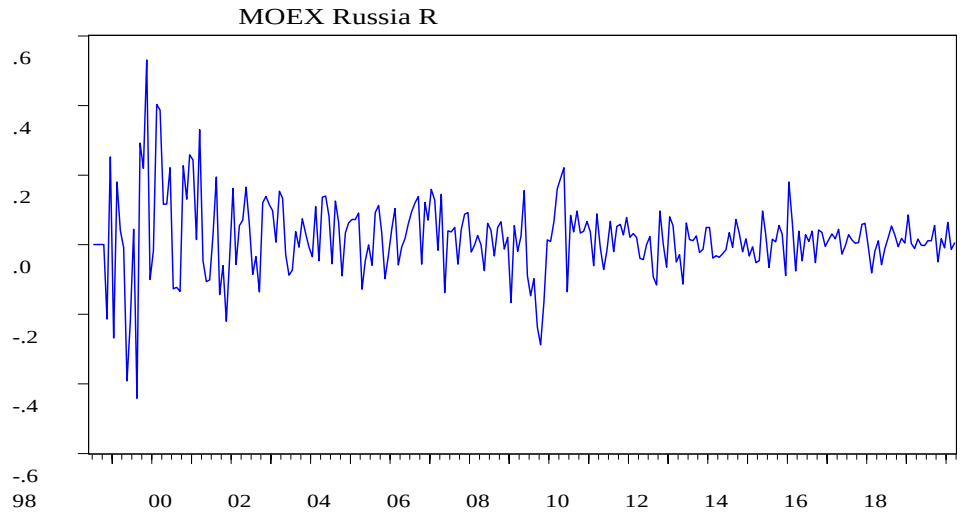
TABLE SHOWING NORMALITY AND JARQUE-BERA STATISTICS FOR MOEX RETURNS



Analysis**:** It is evident from the above table 4.54 the mean of Moex Returns was 0.018943, with a standard deviation of 0.109147, Kurtosis of 7.105031 and a skewness of 0.200237. The maximum range reached during the study period was 0.530358 and reported minimum was - 0.441538

GRAPH 4.14

GRAPH SHOWING MOEX RETURNS TREND



Augmented Dickey-Fuller test statistic at level			
		t-Statis ic	**Prob.***
Augmented Dickey-Fuller test statistic		-14 00343	0.0000
Test critical values:	1% level	-3.9 93746	
5% level		-3.4 27203	
10% level		-3.1 36898	

Analysis: In order to check the stationary of the time series data of MOEX (Returns) was tested for the stationary by using ADF test ADF test statistics -14.00343 is greater than three critical values i.e., at 15 level -3.993746, at 5% level -3.427203 and at 10% level with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data.

Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up.

LAG SELECTION FOR SENSEX AND MOEX

	VAR Lag Order Selection Criteria					
Lag	Log	LR	FPE	AIC	SC	HQ
0	-4490.229	NA	7.89e+12	35.37188	35.39973	35.38308
1	-3558.447	1841.553	5.30e+09	28.06651	28.15007	28.10013
2	-3533.098	49.69896*	4.48e+09	27.89841	28.03768*	27.95444*
3	-3528.309	9.314378	4.45e+09*	27.89220*	28.08717	27.97063
4	-3527.090	2.351555	4.55e+09	27.91410	28.16477	28.01494
5	-3526.366	1.386814	4.67e+09	27.93989	28.24627	28.06314
6	-3524.540	3.463780	4.75e+09	27.95701	28.31910	28.10267
7	-3520.805	7.028743	4.76e+09	27.95910	28.37689	28.12717
8	-3519.857	1.769886	4.88e+09	27.98312	28.45663	28.17361
* indicates lag order selected by the criterion						

Analysis: It is evident from the above table that LR, FPE, AIC, SC and HQ shows different lag order but AIC will be considered for analysis purposes i.e., lag 3 as it is more reliable and the VAR lag order was 3. Therefore, lag order for the analysis is 3 for Sensex and Moex.

TABLE 4.47

TABLE SHOWING JOHANSEN CO INTEGRATION TEST

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.025025	7.378012	15.49471	0.5341
At most 1	0.003138	0.813949	3.841466	0.3670

Trace test indicates no co integration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co integration Rank Test (Maximum Eigen value)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None	0.025025	6.564062	14.26460	0.5419
At most 1	0.003138	0.813949	3.841466	0.3670

At the 0.05 level trace test indicates there is no co-integration

* represents negation at the 0.05 level of thesis

**show p-values MacKinnon – Hang - Michelis

Analysis: It is evident from the above table 4.55 that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co- integration between Sensex and Moex as Trace values and Max-Eigen values are less than critical values.

UNRESTRICTED VAR FRAME WORK

TABLE 4.48

TABLE SHOWING VECTOR CORRECTION EQUATION

Co integrating EQ:	SENSEX	MOEX
SENSEX(-1)	0.996680	0.037318
	(0.06238)	(0.00491)
	[15.9768]	[7.60427]
SENSEX(-2)	-0.000494	-0.034393
	(0.06406)	(0.00504)

	[-0.00771]	[-6.82499]
MOEX_RUSSIA(-1)	1.508283	1.103312
	(0.72977)	(0.05741)
	[2.06679]	[19.2182]
MOEX_RUSSIA(-2)	-1.388525	-0.148421
	(0.71519)	(0.05626)
	[-1.94148]	[-2.63802]
C	46.79763	9.751345
	(103.066)	(8.10797)
	[0.45406]	[1.20269]
R-squared	0.992409	0.990417
Adj. R-squared	0.992290	0.990266
Sum sq. Resids	2.10E+08	1296606.
S.E. equation	906.4323	71.30729
F-statistic	8334.220	6588.447
Log likelihood	-2136.874	-1475.819
Akaike AIC	16.47595	11.39092
Schwarz SC	16.54443	11.45939
Mean dependent	14958.35	1112.163
S.D. dependent	10322.92	722.7641
Determinant resid covariance (dof adj.)		4.12E+09
Determinant resid covariance		3.97E+09
Log likelihood		-3610.950
Akaike information criterion		27.85346
Schwarz criterion		27.99041

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*MOEX_RUSSIA(-1) + C(4)*MOEX_RUSSIA(-2) + C(5)

MOEX_RUSSIA = C(6)*SENSEX(-1) + C(7)*SENSEX(-2)+ C(8)*MOEX_RUSSIA(1) + C(9)*MOEX_RUSSIA(-2) + C(10)

TABLE 4.49

TABLE SHOWING ERR0R CORRECTION TERM

SENSEX = C(1)*SENSEX(-1) + C(2)*SENSEX(-2) + C(3)*MOEX_RUSSIA(-1)+ C(4)*MOEX_RUSSIA(-2) + C(5)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.996680	0.062383	15.97679	0.0000
C(2)	-0.000494	0.064058	-0.007714	0.9939
C(3)	1.508283	0.729772	2.066786	0.0398
C(4)	-1.388525	0.715188	-1.941483	0.0533
C(5)	46.79763	103.0656	0.454057	0.6502
R-squared	0.992409	Mean dependent var		14958.35
Adjusted R-squared	0.992290	S.D. dependent var		10322.92
S.E. of regression	906.4323	Akaike info criterion		16.47595
Sum squared resid	2.10E+08	Schwarz criterion		16.54443
Log likelihood	-2136.874	Hannan-Quinn criter.		16.50348
F-statistic	8334.220	Durbin-Watson stat		2.025516
Prob(F-statistic)	0.000000			

Analysis: It is evident from the above Table 4.57 that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and Moex. However, lag 1 of M0ex is statistically significant meaning that there is short run relationship between Sensex and Moex but for lag 2 it is not statistically significant.

In order to understand the joint effect of lags Wald statistics have been run. The following table presents the results

TABLE 4.50

TABLE SHOWING WALD TEST- FOR JOINT IMPACT

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	2.144305	(2, 255)	0.1193
Chi-square	4.288610	2	0.1171
Null Hypothesis: C(3)=C(4)=0			

Analysis: In order to investigate the Joint impact of the Independent variable Moex with Sensex that is dependent variable, Wald test has been run. It is evident from the above Table 4.58 that the p value is not less than 0.05, there is no joint impact of Moex on Sensex.

IMPULSE RESPONSE FUNCTION (CHOLSKY'S CRITERIA)

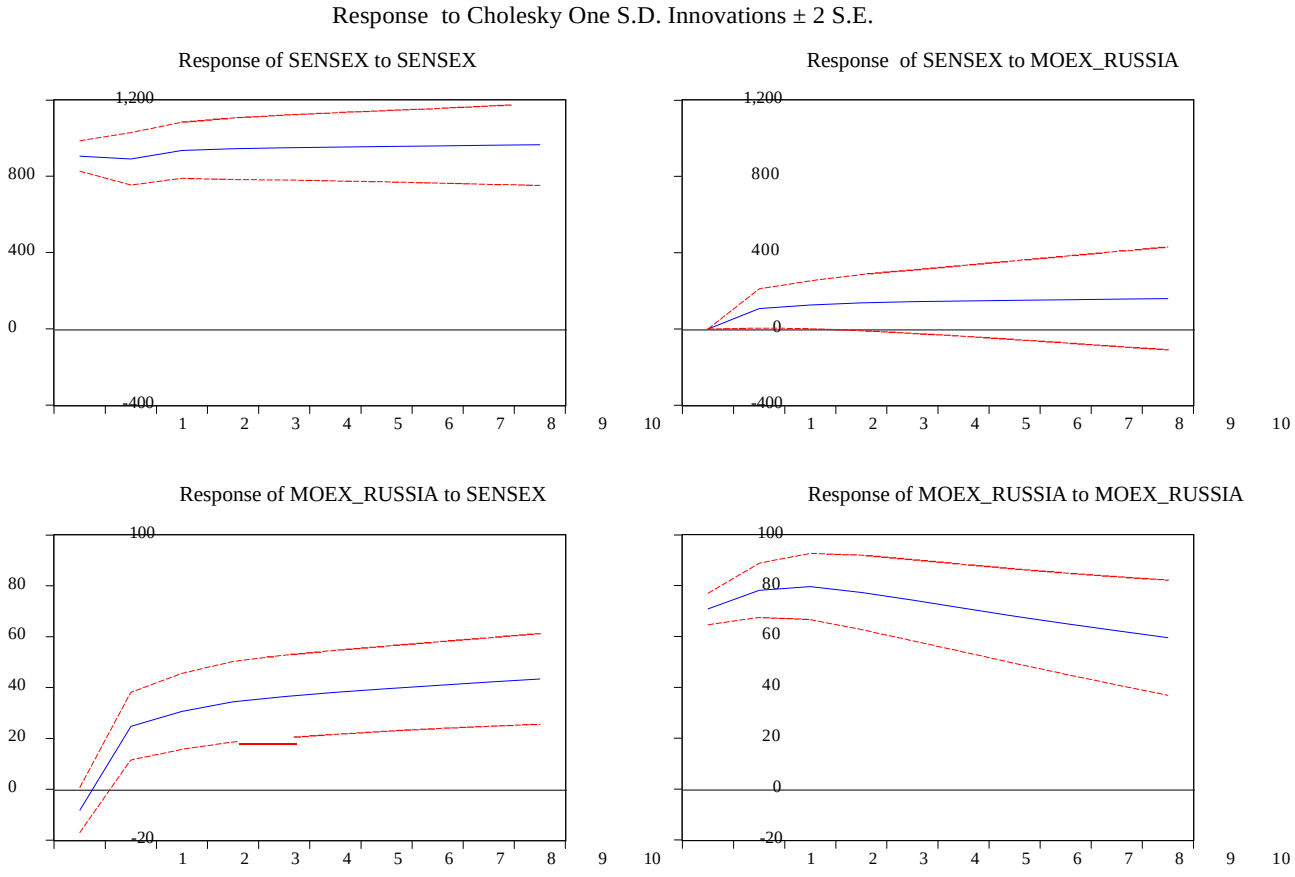


TABLE 4.51

TABLE SHOWING VARIANCE DECOMPOSITION FUNCTION

Period	S.E.	SENSEX	MOEX
1	906.4323	100.0000	0.000000
2	1275.512	99.29848	0.701521
3	1587.315	98.91693	1.083072
4	1852.205	98.65571	1.344290
5	2086.683	98.47305	1.526952
6	2299.104	98.33423	1.665769
7	2494.929	98.22225	1.777752
8	2677.754	98.12762	1.872379
9	2850.081	98.04493	1.955075
10	3013.727	97.97087	2.029128
Variance Decomposition of Moex			
Period	S.E.	SENSEX	MOEX
1	71.30729	1.332077	98.66792
2	108.6475	5.761574	94.23843
3	138.1743	8.466712	91.53329
4	162.0460	10.65896	89.34104
5	181.9587	12.46519	87.53481
6	199.0381	14.07878	85.92122
7	214.0146	15.58778	84.41222
8	227.3791	17.03904	82.96096
9	239.4738	18.45700	81.54300
10	250.5470	19.85466	80.14534
Cholesky Ordering: Sensex and Moex			

CHAPTER 5

SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

5.1 SUMMARY OF FINDINGS

Sensex

- It is evident from the mean of SENSEX was 14875.39 with a standard deviation of 10326.89, Kurtosis of 2.155131 and a skewness of 0.515021. The maximum range reached during the study period was 39031.55 and minimum range was 2810.660. with a range of 36220.89.
- In order to check the stationary of the time series data of Sensex (Adjusted closing price) it was tested by using ADF test. It is evident from that ADF test statistics -2.258671 is less than the three critical values i.e., at 1% with -3.993608, at 5% with -3.427137 and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -16.38401 which is greater than the three critical values indicating there is no unit root in the time series data.
- It is evident from the Mean of Sensex Returns was 0.010750 with a standard deviation of 0.067453, Kurtosis of 4.157974 and a skewness of -0.079530. The maximum range reached during the study period was 0.282551 and minimum range was -0.238901.
- In order to check the stationary of the time series data of Sensex (Returns) it was tested for the stationary by using ADF test, that ADF test statistics -15.45971 is greater than the three critical values at 1% with -3.993746, at 5% with -3.427203, and at 10% with - 3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data.

SENSEX AND DJIA

- It is evident from the mean of DJIA was 13116.19 with a standard deviation of 4699.499, Kurtosis of 3.819335 and a skewness of 1.274378. The maximum range reached during the study period was 26592.91 and reported minimum was 7062.930.
- In 0rder to check the stationary 0f the time series data of DJIA (Adjusted closing price) it was tested by using ADF test. It is evident from that ADF test statistics - 0.634415 is

less than the three critical values i.e., at 1% with -3.993608, at 5% with - 3.427137, and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -16.65037 which is greater than the three critical values indicating there is no unit root in the time series data.

- It is evident from the Table 4.6 the mean of DJIA Returns was 0.005401 with a standard deviation of 0.042072, Kurtosis of 4.163179 and a skewness of -0.574443. The maximum range reached during the study period was 0.106047 and reported minimum was - 0.151320.
- In order to check the stationary of the time series data of DJIA (Returns) was tested for the stationary by using ADF test that, ADF test statistics -15.96486 is greater than the three critical values at 1% with -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data. Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria.
- It is evident from the that majority of the criteria LR, FPE, AIC and SC were of the opinion that the VAR lag order was 1. Therefore, lag order for the analysis is 1 for Sensex and DJIA.
- It is evident from the that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co- integration between Sensex and DJIA as Trace values and Max-Eigen values are less than critical values.
- It is evident from the that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and DJIA. However, lag 1 and lag 2 of DJIA are not statistically significant meaning that there is no short run relationship between Sensex and DJIA.

- In order to investigate the Joint impact of the Independent variable DJIA with Sensex that is dependent variable, Wald test has been run. It is evident from the that the p value is not less than 0.05, there is no joint impact of DJIA on Sensex.
- In order to investigate the Joint impact of the Independent variable DJIA with Sensex that is dependent variable, Wald test has been run. It is evident from the that the p value is not less than 0.05, there is no joint impact of DJIA on Sensex.

SENSEX AND S&P500

- It is evident from the mean of S&P500 was 1485.906 with a standard deviation 521.6386, Kurtosis of 3.353017 and a skewness of 1.128227. The maximum range reached during the study period was 2945.830 and reported minimum was 735.0900.
- In order to check the stationary of the time series data of S&P500 (Adjusted closing price) it was tested by using ADF test. It is evident from that ADF test statistics -0.569006 is less than the three critical values i.e., at 1% with -3.993608, at 5% with -3.427137, and at 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -16.32138 which is greater than the three critical values indicating there is no unit root in the time series data
- It is evident from the mean of S&P500 Returns was 0.005263 with a standard deviation of 0.042952, Kurtosis of 4.155834 and a skewness of -0.663588. The maximum range reached during the study period was 0.107723 and reported minimum was -0.169425
- In order to check the stationary of the time series data of S&P500 (Returns) was tested for the stationary by using ADF test that, ADF test statistics -15.18086 is greater than the three critical values i.e., at 1% with -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data. Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria
- It is evident from the table that majority of the criteria LR, FPE, AIC, SC and HQ were of the opinion that the VAR lag order was 1. Therefore, lag order for the analysis is 1 for Sensex and S&P500.
- It is evident from the table 4.15 that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co-integration between Sensex and S&P500 as Trace values and Max-Eigen values are less than critical values.

- It is evident from the that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and S&P500. However, lag 1 and lag 2 of S&P500 are not statistically significant meaning that there is no short run relationship between Sensex and S&P500
- In order to investigate the Joint impact of the Independent Variable S&P500 with Sensex that is dependent variable, Wald test has been run. It is evident from the that the p value is not less than 0.05, there is no joint impact of S&P500 on Sensex.

SENSEX AND FTSE100

- It is evident from the mean of FTSE100 was 5828.096 with a standard deviation 957.2063, Kurtosis of 2.423303, skewness of -0.263848 The maximum range reached during the study period was 7748.800 and reported minimum was 3567.400.
- In order to check the stationary of the time series data of FTSE100 (Adjusted closing price), it was tested for the stationary by using ADF test. It is evident from that ADF test statistics is -2.161130 which is lesser than three critical values i.e., at 1% with -3.993608, at 5% with -3.427137 and for 10% with -3.136859 indicating acceptance of null hypothesis. Therefore, there is unit root in the time series data. After differencing (first) the ADF test statistics was -16.61297 which is greater than three critical values indicating there is no unit root in the time series data
- It is evident from the mean of FTSE100 Returns was 0.002371 with a standard deviation 0.039474, Kurtosis of 3.503144 and a skewness of -0.510249. The maximum range reached during the study period was 0.088573 and reported minimum was -0.130238.
- In order to check the stationary of the time series data of FTSE100 (Returns) was tested for the stationary by using ADF test, ADF test statistics -16.05212 is greater than three critical values i.e., at 1% -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of null hypothesis. Therefore, there is no unit root in the time series data. Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria.
- It is evident from the table that majority of the criteria LR, FPE, AIC, SC and HQ were of the opinion that the VAR lag order was 1. Therefore, lag order for the

analysis is 1 for Sensex and FTSE100

- It is evident from the that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co-integration between Sensex and FTSE100 as Trace values and Max-Eigen values are less than critical values
- It is evident from the that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and FTSE100. However, lag 1 and lag 2 of FTSE100 are not statistically significant meaning that there is no short run relationship between Sensex and FTSE100.
- In order to investigate the Joint impact of the Independent variable FTSE100 with Sensex that is dependent variable, Wald test has been run. It is evident from the Table 4.26 that the p value is not less than 0.05, there is no joint impact of FTSE100 on Sensex.
- It is evident from the table that majority of the criteria LR, FPE, AIC, SC and HQ were of the opinion that the VAR lag order was 1. Therefore, lag order for the analysis is 1 for Sensex and FTSE100
- It is evident from the that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co-integration between Sensex and FTSE100 as Trace values and Max-Eigen values are less than critical values.
- It is evident from the that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and FTSE100. However, lag 1 and lag 2 of FTSE100 are not statistically significant meaning that there is no short run relationship between Sensex and FTSE100.
- In order to investigate the Joint impact of the Independent variable FTSE100 with Sensex that is dependent variable, Wald test has been run. It is evident from the Table 4.26 that the p value is not less than 0.05, there is no joint impact of FTSE100 on Sensex.

SENSEX AND HANGSENG

- It is evident from the the mean of HangSeng was 18534.00 with a standard deviation of 5994.474, Kurtosis of 2.026405 and a skewness of 0.078106. The maximum range reached during the study period was 32887.27 and reported minimum was 7275.040.
- In order to check the stationary of the time series data of Hangseng (Adjusted closing price) was tested for the stationary by using ADF test. It is evident from that ADF test statistics -3.573867 is less than three critical values i.e. at 1% with -3.993608, at 5% with -3.427137 and at 10% with -3.136859 indicating acceptance of null hypothesis.
- It is evident from the above the mean of Hangseng Return was 0.004741 with a standard deviation of 0.069888, Kurtosis of 5.411342 and a skewness of -0.32240. The maximum range reached during the study period was 0.288132 and reported minimum was -0.294067.
- In order to check the stationary of the time series data of Hangseng (Returns), it was tested for the stationary by using ADF test that ADF test statistics -15.19152 is greater than three critical i.e., at 1% with -3.993746, at 5% with -3.427203 and at 10% with -3.136898 indicating rejection of cipher thesis. Therefore, there is no unit root in the time series data. Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up.
- Therefore, there is a unit root in the time series data. After differencing (first) the ADF test statistics was -15.49589 which is greater than the three critical values indicating there is no unit root in the time series data.
- It is perceptible from the above the mean of Hangseng Return was 0.004741 with a standard deviation of 0.069888, Kurtosis of 5.411342 and a skewness of -0.32240. The maximum range reached during the study period was 0.288132 and reported minimum was -0.294067.
- With the aim of checking the immobile of the time series data of Hangseng (Returns), it was tested for the stationary by using ADF test that ADF test statistics -15.19152 is greater than three critical i.e., at 1% with -3.993746, at 5% with -3.427203 and at 10%

with - 3.136898 indicating rejection of naught assumption. Therefore, there is no unit root in the time series data. Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria. The following table revels the lag selection criteria under VAR set up.

- It is evident from the table that LR, FPE, AIC, SC and HQ shows different lag order but AIC will be considered for analysis purposes i.e., lag 3 as it is more reliable and the VAR lag order was 3. Therefore, lag order for the analysis is 3 for Sensex and Hangseng.
- It is obvious from the that Unrestricted Co integration Rank Test (Trace) indicates 1 cointegrating equation at the 0.05 level and rejecting barren premise. Maximum Eigen value statistics accepting the null hypothesis as Max-Eigen values are lesser than critical values indicating no long run co-integration.
- It is evident from the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and HangSeng. However, lag 1 and lag 2 of Hangseng are not statistically significant meaning that there is no short run relationship between Sensex and Hangseng but lag 3 indicates there is short run relationship between Sensex and HangSeng.
- For the purpose of investigating the Joint impact of the Independent variable HangSeng with Sensex that is dependent variable, Wald test has been run. It is evident from the Table
- 4.42 that the p value is less than 0.05, there is a joint impact of HangSeng on Sensex.

SENSEX AND SSEC

- It is evident from the mean of SSEC was 2302.200 with a standard deviation of 916.6709, Kurtosis of 4.127009 and a skewness of 0.947041. The maximum range reached during the study period was 5954.765 and reported minimum was 1060.738.
- In order to check the stationary of the time series data of SSEC (Adjusted closing price) was tested for the stationary by using ADF test. It is evident from that ADF test statistics -4.357213 is greater than three critical values i.e., at 1% with -3.994310, at 5% with -3.427476 and for 10% -3.137059 indicating rejecting of null hypothesis.

Therewith, there is not likely unit root in the time trends data. However, we found an intercept and the trend component in the time series data, therefore, to eliminate the trend and the intercept component the researcher converted that data into first differenced. Later the researcher was able to eliminate the trend component and it became stationary.

- It is evident from the mean of SSEC was 2302.200 with a standard deviation of 916.6709, Kurtosis of 4.127009 and a skewness of 0.947041. The maximum range reached during the study period was 5954.765 and reported minimum was 1060.738.
- In order to check the stationary of the time series data of SSEC (Adjusted closing price) was tested for the stationary by using ADF test. It is evident from that ADF test statistics -4.357213 is greater than three critical values i.e., at 1% with -3.994310, at 5% with -3.427476 and for 10% -3.137059 indicating rejecting of null hypothesis. Therefore, there is no unit root in the time series data. However, we found an intercept and the trend component in the time series data, therefore, to eliminate the trend and the intercept component the researcher converted that data into first differenced. Later the researcher was able to eliminate the trend component and it became stationary.
- It is evident from the table 4.46 the mean of SSEC Returns was 0.006623 with a standard deviation of 0.077285, Kurtosis of 4.903552 and a skewness of 0.130795. The maximum range reached during the study period was 0.320561 and reported minimum was -0. 246316.
- In order to check the stationary of the time series data of SSEC (Returns) was tested for the stationary by using ADF test. It is evident from Table number that ADF test statistics
- -14.23227 is greater than three critical values i.e., at 1% with -3.993746, at 5% with -3.427203 and for 10% -3.136898 indicating rejecting of null hypothesis. Therefore, there is no unit root in the time series data
- It is evident from the table that LR, FPE, AIC, SC and HQ shows different lag order but AIC will be considered for analysis purposes i.e., lag 3 as it is more reliable and the VAR lag order was 3. Therefore, lag order for the analysis is 3 for Sensex and SSEC.

- It is evident from the that both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null hypothesis i.e. there is no co-integration between Sensex and SSEC as Trace values and Max-Eigen values are less than critical values
- In order to investigate the Joint impact of the Independent variable SSEC with Sensex that is dependent variable, Wald test has been run. It is evident from the that the p value is less than 0.05, there is joint impact of SSEC on Sensex

SENSEX AND MOEX

- It is evident from the the mean of Moex 1104.333 with a standard deviation of 725.5241, Kurtosis of 1.705890 and a skewness of -0.051891. The maximum range reached during the study period was 2521.100 and reported minimum was 20.92000.
- In an effort to check the motionless of the time series data of MOEX (Adjusted closing value) was tested for the stationary by using ADF test. It is evident from that ADF test statistics -2.298629 is lesser than three critical values i.e., at 1% with -3.993608, at 5% with -3.427137 and at 10% with -3.136859 indicating acceptance of void presumption. Thereby, in the temporal series data there is a unit origin. After differencing (first) the ADF test statistics was -14.56719 which is greater than the three critical values indicating non-existance of unit root in the historical series info.
- It is evident from the mean of Moex Returns was 0.018943, with a standard deviation of 0.109147, Kurtosis of 7.105031 and a skewness of 0.200237. The maximum range reached during the study period was 0.530358 and reported minimum was - 0.441538
- With a view to to check the steadfast of the series of time material in accordance to MOEX (Returns) was tested for the stationary by using ADF test ADF test statistics -14.00343 is greater than three critical values i.e., at 15 level -3.993746, at 5% level -3.427203 and at 10% level with - 3.136898 indicating rejection of null hypothesis. Hence, in chronological order data there is hardly unit root. Since there is a variation in the order of integration, we can verify the results only through VAR set up. Therefore, the first step is to selection of appropriate VAR lag criteria.

- It is evident from the table that LR, FPE, AIC, SC and HQ shows different lag order but AIC will be considered for analysis purposes i.e., lag 3 as it is more reliable and the VAR lag order was 3. Therefore, lag order for the analysis is 3 for Sensex and Moex.

- It is evident from the that the error correction term is not significant at conventional level that is at 5%. Therefore, there is no long term relationship between the Sensex and Moex. However, lag 1 of Moex is statistically significant meaning that there is short run relationship between Sensex and Moex but for lag 2 it is not statistically significant
- In order to investigate the Joint impact of the Independent variable Moex with Sensex that is dependent variable, Wald test has been run. It is evident from the p value is not less than 0.05, there is no joint impact of Moex on Sensex.

5.2 SUGGESTIONS

5.2.1 Out of the various stock market chosen for the purpose of the research Sensex recorded this moderate degree of volatility. However, when it compared with the returns it recorded the highest among the exchanges chosen. Although it shares low degree of correlation among these nations. Therefore, the market participants like traders, FIIs, Brokers and investors can take this sign as an advantage to convert their holdings into returns.

5.2.2 As there exists a unidirectional relationship between DJIA, S&P 500 and Sensex, FTSE 100 and Sensex, Nikkei and Sensex. It is suggested to the participants to observe these stock markets DJIA, FTSE100 and Nikkei closely for momentum as these stock markets share unidirectional relationship with Indian stock market.

5.2.3 The independent variable Hangseng and SSEC were statistically significant only for a short run relationship and were able to generate a significant volatility of the dependent variable (Sensex returns). This indicates that these variables are significant affect the other and have the competency to transmit shock on BSE (Sensex) and rest of the chosen variables were not able create both long run and short run relationship with Sensex.

Therefore, it is suggested to the participants to observe these stock markets HangSeng and SSEC closely to capture the short run relationship as both were capable of transmitting the volatility in the Indian stock market.

5.3 CONCLUSION

The study entitled Relationship among various stock markets across the globe has been undertaken to study the relationship between developing stock markets namely Indian, Chinese, Brazil and Russian stock markets with four major indices across the globe namely DJIA, S&P 500, FTSE 100, Hang Seng, Bo Vespa, Moex, SSE and Nikkei so that the investors can make decision making by understanding interrelation between different markets. On the first phase, the collected data has been tested for existence of unit root by applying ADF stats. Later, analyzed using various statistical tools such as Pearson‟s correlation, VAR framework was employed to analyze the data set to find the both long term and short run relationship between the chosen indices. In the current study we did not find any cointegrating vector between the DJIA and Sensex as both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null at most one co integrating vector or error correction term in the model. Under unrestricted VAR we were failed establish both short and long run relationship between DJIA and Sensex.

Once again we failed to establish any relationship between S&P 500 and Sensex as we did not find any cointegrating vector between the S&P 500 and Sensex as both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null at most one co integrating vector or error correction term in the model. Under unrestricted VAR we were failed establish both short and long run relationship between S&P 500 and Sensex.

With FTSE 100 again the researcher has failed to establish any relationship with Sensex as we did not find any cointegrating vector between the FTSE 100 and Sensex as both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null at most one co integrating vector or error correction term in the model. Under unrestricted VAR we were failed establish both short and long run relationship between FTSE 100 and Sensex.

With Nikkei 225 index the researcher has failed to establish any relationship with Sensex as we did not find any cointegrating vector between the Nikkei 225 index and Sensex as both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null at most one co integrating vector or error correction term in the model.

However, we found a cointegrating vector between Hang Seng and Sensex. Both Trace statistics and Max –Eigenvalue test indicate there is one error correction term in the equation. However, we failed to establish any long run relationship between Hang Seng and Sensex. But, with Hang Seng we found a short run relationship. Apart from this, we found a joint lag effects between Hangseng and Sensex.

With SSEC, the Chinese index the researcher has failed to establish any relationship with Sensex as we did not find any cointegrating vector between the SSEC index and Sensex as both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null at most one co integrating vector or error correction term in the model. Under unrestricted VAR we were failed establish long run relationship between SSEC index and Sensex. However, we were able to establish a short run relationship between the SSEC and Sensex. Apart from this, we found a joint lag effects between SSEC and Sensex.

With MOEX Russian index the researcher has failed to establish any relationship with Sensex as we did not find any cointegrating vector between the MOEX index and Sensex as both Unrestricted Co integration Rank Test Trace and Maximum Eigen value statistics are accepting the null at most one co integrating vector or error correction term in the model. Under unrestricted VAR we were failed establish both short and long run relationship between MOEX and Sensex.

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ACTIVITY CHART

Sl. No.	Activity	Activity Details	Duration
1	**Activity-1**	Understanding Structure, Culture and functions of the organization/identification of business problem from the Industry from the literature study	Week-1 [02/01/2020 TO 08/01/2020]
2	**Activity-2**	Discussion with the guide for finalization of research design and instrument and presenting the same to the guide.	Week-2 [09/01/2020 TO 15/01/2020]
3	**Activity-3**	Collection of data, editing of the collected data, coding, tabulating and presenting to the guide for suggestions for analysis.	Week-3 [16/01/2020 TO 22/01/2020]
4	**Activity-4**	Analysis and finalization of report and making presentation to the guide	Week-4 [23/01/2020 TO 05/02/2020]
5	**Activity-5**	Submission of final Report to the University before one week of the commencement of theory examination	Week-5 [06/02/2020 TO 14/02/2020]

Pallavi [PALLAVI . M]

Name and Signature of the Student

Scanned with CamScanner