A Study of Foreign Institutional Investors' (FII) Investment in Indian Equity market

A Thesis submitted to Gujarat Technological University

for the Award of

Doctor of Philosophy

in

Management

by

Joshi Mrunal Chetanbhai

[Enrollment No. 139997292006]

under supervision of

Dr. Jayesh N. Desai

GUJARAT TECHNOLOGICAL UNIVERSITY

AHMEDABAD

December – 2019

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ABSTRACT

Before the new Industrial policy, 1991 private foreign capital was not permitted and Indian financial market did not get the exposure of international finance. Being a capital scarce country, India was dependent on the multilateral institution like IMF and World Bank to meet with her current deficit requirement. With liberalisation, privatisation and globalisation the new industrial policy opened ups the doors for foreign investment in India. On September 14, 1992, FIIs allowed to invest in the Indian capital market. As prerequisite action Government of India established SEBI in the month of April 1992 as a regulatory body to the capital market. SEBI is performing its vital roles in managing foreign investment by various regulations for FIIs and time to time amendments to them. Growth of FIIs in the Indian capital market advocates the success of Government of India in attracting and maintaining a foreign investment in India. By the year 2017-18 there were 9146 FIIs operating in India and all of them found registered with SEBI. FII investment increased at CAGR of 26.05%, 33.08% and 27.43% in the Indian equity, debt and in total investment respectively in India. Turnover of FIIs was found 21% of total turnover of cash segment of the Indian equity market and 13.7% of F&O's segment during the year 2016-17. USA is leading country in FII investment, as USA FII investment in India is 33.03% of the total asset under custody and 35.73% of the asset under custody in the equity market. Banking and Other financial services were found the most favourable sector followed by Software & Services sector for investment by FIIs recorded as on March 2019. In certain case like HDFC FIIs have invested more than 70% i.e. up to the sectoral limit.

As it is observed that since the permission of foreign investment in India, FIIs has shown their phenomenal interest in the Indian financial markets and their investment has increased significantly year by year. Even the turnover of FII investment also become significant to the total turnover of the Indian equity market and thus FII investment may affect the performance of the Indian equity market significantly. As FII investment also affect foreign exchange to the great extent, it is not only important for the Indian investors to frame their investment strategy based on FII investment but also for government of India to form a policy to monitor and organise the FIIs flow of investment in the Indian equity market. Thus, it signifies the study of FII investment in the Indian equity market. Problem statement of the

study is “A study of Foreign Institutional Investors' (FIIs) Investment in Indian Equity Market”

On the basis of the above problem statement, objectives of study i) to study the investment pattern of FII investment in the Indian equity market, ii) to study the determinants of investment decision in the Indian equity market and iii) to study the effect of FII investment in the Indian equity market are derived. Towards the achievement of these objectives, design descriptive research has been designed in which required data from primary as well as the secondary sources are collected. For the study, secondary data has been collected from various online sources during the period 1997-98 to 2018-19. Data related to economic parameters were collected from the website of RBI, sectoral indices related data are extracted from NSE and BSE websites and data related to FII investment are collected from the websites of SEBI, NSDL, CDSL and Moneycontrol.com. Primary data were collected through a structured questionnaire, conducting a personal interview as well as a mail survey.

All the data collected through the primary and secondary well processed with the purpose of preparing them for the analysis. Required editing and tabulation is done for both primary and secondary data. Primary data were also processed through the reliability test and secondary data were processed through the stationery check and the normality test.

On the way to achieve the first objective to study the trend and patter on FII investment in the Indian equity market, the ARIMA (1,1,1) model is selected on the basis of Akaike information criteria, SIC and Hannan-Quinn criterion, for time-series data of FII investment in India. For the better result, SARIMA model that is ARIMA (1,1,0) (1,0,1) derived using the expert-modeller of SPSS.

In order to achieve my second objective to study the determinants of FII investment in the Indian equity market, primary data is analysed using factor analysis. Factor analysis is used to reduce the number of determinants to a small number of grouped determinants. Once the primary data analysed through factor analysis certain factors are derived, for which secondary data were collected and causality study is done to confirm the relationship between various determinants and FII investment. VAR lag order criteria were used to find the lag order at which Granger causality test is done to study the causality. In order to study the effect of FII investment on the Indian equity market, again Granger causality test is applied to study the causality between FII investment and various constituents of the Indian

equity market. Finally, the time-series model is established considering the performance of the Indian equity market as the dependent variable and FII investment as an independent variable. To evaluate the regression model, t-test is used to check whether the dependent variables are significant or not, F-statistics is used to check whether the overall model is significant to affect the dependent variable, Adjusted R-Squared used to know how much percentage change in the dependent variable is explained by the regression model, Durbin-Watson test is used to check autocorrelation, Correlogram is used to check serial correlation in residuals, Breusch-Pagan-Godfrey, Harvey, Glejser and Autoregressive Conditional Heteroscedasticity (ARCH) tests are used to check Heteroscedasticity, Jurque-Bera Test is used to check whether residuals are normally distributed or not.

As a result of my study, it is found that FIIs prefers large-cap companies considering their EPS and DPS. They also prefer to invest in Oil & Gas, Information Technology and Banking related scrip than other sectors in the Indian equity market. The major six factors with which FIIs are more concern while investing in India are 1. Ineffective implementation of economic policy. 2. The challenges posed by the international environment. 3. The purchasing power of Indian rupee i.e. Inflation related Issues, 4. Opportunities and challenges in the domestic country of FIIs 5. The attractiveness of economic policy and 6. The financial ease initiated by the government.

It is also found that not only FII investment affect various constituents of the Indian equity market, but there is bidirectional causality exist between FII investment and various constituents of the Indian equity market. In causality study, the following list of constituents were found with which FII investment has bidirectional causality.

1. Market Capitalisation of NSE
2. Market Capitalisation of BSE
3. Turnover of NSE
4. Turnover of BSE
5. Bankex
6. Health Index
7. Consumer Durable Goods Index

it can be observed that Auto index is affecting FII investment but at the same time FII investment does not cause Auto index. It is also found that FII investment affects the performance of Nifty 50 but not a vice versa. Thus the relationship between FII investment

and the performance of the Indian equity market is studied. In this analysis, it is found that FII investment is not only significant to affect the performance of the Indian equity market but also the volatility of one period affects the volatility of other period. The major cause of these changes in the performance of the Indian equity market is also structural breaks in FII investment in the Indian equity market.

Thus, it is concluded that to stabilize the performance of the Indian equity market government should continuously strive to maintain the attractiveness of economic policy towards FII investment, continually well-performing economic indicators indicating healthier economic strength. It helps to uphold the interest FII investment in the Indian financial market. All the investors should also take into consideration the movement of FIIs in the Indian equity market while determining their investment strategies.

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Mrunal Joshi

Table of Content

List of Abbreviation

ACF	Autocorrelation Function
ADF	Augmented Dicky-Fuller
ADR	American Depository Receipt
AMC	Asset Management Company
AMFI	Association of Mutual Funds in India
ARCH	Autoregressive Conditional Heteroskedasticity
ARIMA	AutoRegressive Integrated Moving Average
ASBA	Application Supported by Blocked Amount
AUC	Asset Under Custody
AUM	Asset Under Management
BO	Beneficiary Owner
BRICS	Brazil, Russia, India, China, South Africa
BSE	Bombay Stock Exchange
CAGR	Compounded Annual Growth Rate
CDG	Consumer Durable Goods
CDSL	Center Depository Services (India) Limited
CG	Capital Goods
CM	Clearing Member
CNX	CRISIL NSE Indices
DDP	Designated Depository Participants
DIIs	Domestic Institutional Investors
DP	Depository Participant
DPS	Dividend Per Share
EPS	Earnings Per Share
ETF	Exchange-Traded Funds
F&O	Future and Option
FDI	Foreign Direct Investment
FEMA	Foreign Exchange Management Act
FIIs	Foreign Institutional Investors
FMCG	Fast Moving Consumer Goods
FPI	Foreign Portfolio Investor
FPO	Further Public Offering
GAAR	General Anti-Avoidance Rules
GARCH	Generalize Autoregressive Conditional Heteroskedasticity
GDP	Gross Domestic Product
GDR	Global Depository Receipt
GOI	Government of India
G-Sec	Government Securities
GST	Goods and Service Tax
IAF	Indian Air Force

INR	Indian Rupee
IRDA	Insurance Regulatory and Development Authority
IT	Information Technology
KYC	Know Your Client
MAT	Minimum Alternate Tax
MF	Mutual Fund
MoF	Ministry of Finance
MWPL	Market Wide Position Limit
NBFC	Non-Banking Financial Company
NRI	Non-Resident Indian
NSDL	National Security Depository Limited
NSE	National Stock Exchange
OCB	Overseas Corporate Body
OCI	Overseas Citizens of India
ODI	Offshore Derivative Instruments
OTC	Over The Counter
P/E	Price Earning Ratio
PACF	Partial autocorrelation Function
PAN	Permeant Account Number
PNs	Participatory Notes
PSU	Public Sector Unit
QDP	Qualified Depository Participant
QFI	Qualified Foreign Investor
QIBs	Qualified Institutional Buyers
RBI	Reserve Bank of India
RI	Resident Indian
S&P	Standard & Poor's
SARIMA	Seasonal Autoregressive Integrated Moving Average
SEBI	Securities and Exchange Board of India
SENSEX	Sensitivity Index
TARCH	Threshold Autoregressive Conditional Heteroskedasticity
USD	US Dollar
US	United State
USA	United State of America

CHAPTER: 1. INTRODUCTION

1.1. Introduction

New economic policy 1991 transformed Indian financial market and brought great reforms. If we see the historical perspective since independence India followed policy in which foreign private capital was not attracted. For financial support she used to depend on foreign multilateral institutions viz. IMF, World Bank, but new Industrial policy provided new source of non-debt capital flow. On 14th day of September in 1992 Foreign Institutional Investors (FIIs) were permitted to invest in the Indian financial market. Growth and compounding of FII investment gave new edge to Indian financial market in terms of its size, depth and character. To provide the regulatory framework to these foreign investors the government of India took precautionary action in terms of establishment of SEBI in the month of April 1992. As a regulatory body to the capital market, since the establishment, SEBI has provided number of guidelines through regulations and amendments for this foreign investment which has also shown ups and down in foreign investments. In June 2014 SEBI introduced new class of foreign investors "Foreign Portfolio Investors (FPI)", through merging tall classes of foreign investors specifically, FIIs, Qualified Foreign Investors (QFIs), and the FIIs' sub-account. The second section of the chapter provides insight into the growth of FIIs in India. By the year 2017-18 in India 9136, all FPIs, were found registered with SEBI, which was only 1,444 (17.58%) registered FPIs out of 8,214 FPIs working in India in the year 2014-15. Since the inception FII investment in the Indian equity market, the debt market and total investment has increased at CAGR of 26.05%, 33.08% and 27.43% respectively by the end of the last financial year 2018-19. Turnover of FIIs to total turnover of the Indian equity market was found 21% in cash segment and 13.7% in Future and Option (F&O) segment in the year 2016-17. United State of America (USA) found leading investors as 33.08% of total Asset Under Custody (AUC) of FIIs and 35.73% of investment of AUC in the Indian equity market. Banking and other financial services were found as the most favourite sectors for investment by FIIs as recorded in March 2019. Though there is limit specified by SEBI for foreign investment of 24% of total share capital with sectoral limit of foreign investment, FIIs found very aggressive towards certain Indian companies like HDFC, where they have invested more than 70%. In the third section of the chapter, the

rationale of the study and the problem statements are mentioned. Whereas the last part of the study provides detailed research methodology based on the objectives of the study. The objectives of the study provide three major purposes for conducting this research and research methodology provides an in-depth plan about how the research is planned, conducted and analysis is done to draw the conclusion. This chapter is divided into five parts. The first part provides details of the development of the regulatory framework of FII investment in India. The second section discusses the growth of FII investment in India. The third section discusses the rationale of the study. The fourth section provides a description of the research methodology and the fifth and the last section provides details chapter scheme of the thesis.

1.2. Development of the Regulatory framework for FIIs Investment in India

After announce of new economic policy 1991, Security exchange board of India (SEBI) established in the month of April of the year 1992. SEBI was established to regulate the Indian capital market as well as to protect the interest of investors in the Indian capital market. As a part of the liberalization policy, foreign investors were allowed in different forms of investments. From 14th of September 1992, with appropriate limits, FIIs and Overseas Corporate Bodies (OCBs) were legitimate to invest in financial instruments. First guidelines about Foreign Institutional Investors (FIIs) was issued on 15th October 1993 in the form of Guidelines for dealing by foreign Brokers in India on behalf of Registered Foreign Institutional Investors issued by SEBI to promote and increase their role in India. Regulations related to foreign investment were provided by SEBI time to time and provided the meaning of various terms as below.

1.2.1. Regulations and Guidelines for FII investment in India

Table 1.1. Terminologies and Meaning under SEBI regulations for FIIs

Terminology	Meaning
Foreign Institutional Investor	an institution established or incorporated outside India which proposes to make an investment in India in securities
Sub-Account	any person resident outside India, on behalf whom investments are offered to be made in India by a foreign

	institutional investor and who is registered as a sub-account under these regulations
Foreign Portfolio Investors	any FIIs or sub-account or qualified foreign investor (QFI) holding a valid certificate of registration till the termination of the block of 3 years for which fees have been paid as per the Securities and Exchange Board of India (Foreign Institutional Investors) Regulations, 1995
Qualified Foreign Investor	a person who has opened an account of dematerialized with a qualified depository participant (QDP) as a QFI
Qualified Depository Participant	a depository participant (DP) approved by the Board to act as QDP
Investment Manager	an entity carrying out the role of investment management, investment advisory or any alike role, including trustees. It also considered the meaning of a person, NRI and RI under the Foreign Exchange Management Act, 1999 (FEMA)

Guidelines provided by SEBI is provided in terms of various updated regulations and their amendments in those regulations. A brief timeline of such guidelines is mentioned below.

Table 1.2. Timeline of SEBI regulations and amendments

Date of Announcement	**Regulation**	**Details of the Regulation**
15th October 1993	First guidelines about Foreign Institutional Investors (FIIs)	• Both SEBI's registration and RBI's general approvals under FERA were to hold good for 5 years and were to be renewed after 5 years.
December 1995	Securities and Exchange Board of India (foreign institutional investors) regulations, 1995	• procedure for FIIs as well as Sub-account to get register with SEBI • Responsibility of FIIs
1996-97	SEBI (Foreign Institutional Investors) Regulations, 1995 Amendment	• Various institutions registered with a legislative body in their country of establishment having at least trail record of 5 years were allowed as FIIs. • Limit of FIIs, as well as sub-account, were determined up 10% in any company with subject to 24% overall limit of other foreign investment including other FIIs, NRIs and

		OCBs and this limit can be raised from 24% to 30% with shareholders' approval. • FII investment permitted in unlisted securities and proprietary funds • FIIs allowed investing their 100% of their portfolios in debt securities, who obtain specific approval from SEBI. It consists of corporate debt securities as well as government securities and is treated to be part of the total limit on external commercial borrowing. • SEBI and RBI took care to make the registration procedure of FIIs easier.
30th June 1998	The SEBI (Foreign Institutional Investors) Regulations, 1995 Amendment	• Provided the revised procedure of registration of sub-accounts of registered FIIs
18th May 1998	The SEBI (Foreign Institutional Investors) Regulations, 1995 Amendment	• FIIs permitted to invest in Treasury Bills • allowed to invest through 100% debt route as well as to the equity route where up to 30 % investments can be made in debt instruments
29th February 2000	The SEBI (Foreign Institutional Investors) Regulations, 1995 Amendment	• Indian portfolio managers and approved asset management companies who are registered portfolio managers get a deemed Foreign Institutional Investor (FIIs) status - only to manage the foreign funds including sub-accounts. • Foreign firms and high net worth individuals allowed to invest as sub-accounts of FIIs.
13th February 2001	Securities and Exchange Board of India (Foreign Institutional Investors) (Amendment) Regulations, 2001	• Provided guidelines for disinvestment by FIIs as well as their sub-account in case of does not desire to renew their

		registration or failed to make an application for renewal
19th July 2002 Circular No. FITTC/FIIs/04/2002	regulation 16 (2) (b) of the Securities and Exchange Board of India (Foreign Institutional Investors) Regulations, 1995	• FIIs were asked to submit the details of their transactions on a daily basis.
December 2002	The SEBI (Foreign Institutional Investors) (Amendment) Regulations, 2002	• Made registration procedure easier for FIIs
19th February 2004	Securities and Exchange Board of India (Foreign Institutional Investors) (Second Amendment) Regulations, 2004	• Provided precise guidelines for FII to Issuance of Offshore Derivative Instruments by them
26th June 2006	Securities and Exchange Board of India (Foreign Institutional Investors) (Amendment) Regulations, 2006	• Reduced registration fees of FIIs
21st August 2006	SEBI announced Securities and Exchange Board of India (Foreign Institutional Investors) (Second Amendment) Regulations, 2006	• Provided a revised format for registration of FIIs "Form A" Application Form for Grant of Certificate of Registration as Foreign Institutional Investor (FIIs)
22nd May 2008	Securities and Exchange Board of India (Foreign Institutional Investors) (Amendment) Regulations, 2008	• Provided norms for Know Your Client (KYC) procedure for FIIs and their Sub-accounts • An AMC, investment manager or advisor or an institutional portfolio manager set up and/ or owned by non-resident Indians (NRIs) shall be qualified to be registered as FIIs subject to the condition that they shall not invest their owner funds
January 07, 2014	SEBI announced the Securities and Exchange Board of India (Foreign	• Introduced new class of foreign investor Foreign Portfolio Investor merging

	Portfolio Investors) Regulations, 2014	FIIs, QFIs and sub-account of FIIs. • Also provided Criteria for the registration of FPIs. • Provided a list of institutions under major three different categories, who can register them as FPI • Provided a list of securities in which FPIs are permitted to invest • Provided criteria for QFI • Defined qualified depository participant • KYC norms for Offshore derivative instruments issue by FPIs • All FPIs have to obtain Permanent Account Number from the Income Tax Department. • SEBI may suo motu or upon receipt of information or complaint appoint one or more persons as inspecting authority to undertake inspection FPI account. • Form A, Application Form for Grant of Certificate of Registration as Foreign portfolio investor (FPI) provided.
8th Jul 2016	SEBI announced the Securities and Exchange Board of India (Foreign Portfolio Investors) (Amendment) Regulations, 2016	• Announced that the requirement of prior approval of FPI before the transfer of offshore derivative instruments issued by or on behalf of it.
25th May 2017	SEBI (Foreign Portfolio Investors) (Third Amendment) Regulations, 2017	• Announced that FPIs shall not be issued to or transferred offshore derivative instruments to resident Indians or non-resident Indians person and entities that are beneficially owned by resident Indians or non-resident Indians.

20th July 2017	SEBI (Foreign Portfolio Investors) (Fourth Amendment) Regulations 2017	• Intimated FPIs to collect a regulatory fee, for the block of three years, from every subscriber of offshore derivative instrument issued by them and deposit the same with SEBI.
31st December 2018	SEBI notified the Securities and Exchange Board of India (Foreign Portfolio Investors) (Third Amendment) Regulations, 2018	• Introduced new term "Investment Manager"

As foreign investment deals in foreign exchange FIIs need to deals with RBI too. But time to time these compliances were liberalised by the government

Table 1.3. Regulations and Guidelines provided by RBI

Date	**Regulation and their details**
October 15, 1993	First guidelines about Foreign Institutional Investors (FIIs) under FERA, to get an approval of RBI to operate as in India
May 3, 2000	Regulation 5(2) of FEMA Notification No.20
December 17, 2003	RBI announced its decision to do away with the constraint of gaining clearance from RBI and SEBI separately
September 11, 2007	RBI also provided guidelines to clearing members of FIIs regarding Derivatives and New Products Department. In which FIIs are required to deposit the collateral with the clearing members, in which at least 50% of the liquid assets, shall be in the form of cash or cash equivalents, and the rest can be in the form of non-cash components.

1.2.2. Limit / Restrictions of FII investment in India

Government of India revised the limit of FII investment in various categories of investment, especially in case of Government Securities (G-Sec), State Development Loans (SDL) and Corporate debts. Timeline of revision on these limits are briefly mentioned below.

- 15th Oct 1993, Limit of FIIs was determined up 5% in any company with subject to 24% overall limit of other foreign investment including other FIIs, Non-resident Indians (NRIs) and OCBs.
- In March 2001, FIIs ceiling under special procedure enhanced to 49 per cent.
- In September 2001, FIIs ceiling under special procedure rose to a sectoral cap.
- In November 2004, Outstanding corporate debt limit of USD 0.5 billion was prescribed.
- In April 2006, Outstanding corporate debt limit raised to the USD 1.5 billion. The limit on investment in G-Sec was enhanced to the USD 2 billion.
- In November 2006, FII investment up to 23 per cent permitted in market infrastructure institutions in the securities markets, such as stock exchanges, depositories, and clearing corporations.
- FIIs allowed investing USD 3.2 billion in G-Sec (limits were raised from the USD 2 billion in two phases of USD 0.6 billion each in January and October 2007).
- In June 2008, the government raised the aggregate debt investment limits from the USD 3.2 billion to the USD 5 billion and from the USD 1.5 billion to the USD 3 billion for FIIs investments in G-Sec and corporate debt, respectively.
- In October 2008, the government raised the aggregate debt investment limits from the USD 3 billion to the USD 6 billion for FIIs investments in corporate debt. Regulation for FIIs pertaining to the restriction of a 70:30 ratio of investment in equity and debt, respectively also removed.
- In November 2010, Investment cap for FIIs raised by the USD 5 billion each in G-Sec and corporate bonds to the USD 10 billion and the USD 20 billion, respectively.
- At the end of the financial year 2010-11, in March the limit of USD 5 billion in corporate bonds issued by companies in the infrastructure sector with a residual maturity of over five years raised by an additional limit of USD 20 billion, taking the total limit to the USD 25 billion.
- January 07, 2014, Limit for the equity shares of each company holding by a single foreign portfolio investor (new term replaced FIIs) or an investor group determined to be below 10% of the total issued capital of the company.
- On 27th March 2019, the limit of FPI raised to Rs. 3,384 billion in G-Sec, Rs. 568 billion in State Development Loans (SDL) and Rs. 3,031 billion for corporate bonds, which were earlier Rs. 3,156 billion, Rs. 452 billion and Rs. 2,891 billion in G-Sec, SDL and corporate bonds respectively.

1.2.3. Guidelines for FIIs' derivative/financial instruments

As FIIs were allowed to invest in Indian financial market, by the time SEBI observed that many FIIs were issuing derivative instruments in name of Participatory Notes, Capped Return Notes, Participating Return Notes Equity-Linked Notes, etc. Considering it SEBI started issuing guidelines to manage them as follow.

- In October 2001 SEBI intimated FIIs to provide time to time (monthly) report of issued or renewed or cancelled or redeemed such instruments.
- On May 15, 2002, SEBI intimated FIIs to report regarding the write off of the securities held by them and Sub-Accounts.
- On August 2003 the format of submission of the report of issued or renewed or cancelled or redeemed such instruments was revised.
- In November 2003, a time period of reporting was determined to fortnightly.
- From April 2004, SEBI decided to modify the frequency from fortnightly to monthly.
- On February 2004, the scope of FIIs was more precisely defined with reference to Issuance of Offshore Derivative Instruments(ODIs) by them.
- On 22nd May 2008, following detailed guidelines provided for ODIs
    - Allotted only to individuals who are delimited by an appropriate foreign supervisory authority after acquiescence with KYC norms
    - No ODIs shall be issued by or on behalf of FIIs with derivatives tradable on any recognised stock exchange in Indi as underlying.
    - The total value of ODIs issued against securities held by FIIs or a sub-account as on the 13th day of September 2007 is less than 40%. And in any period of 12 months shall not exceed 5%.
    - No sub-account shall, directly or indirectly, issue offshore derivative instruments.
- January 07, 2014, Offshore derivative instruments issue by FPIs (under Category I) can be issued only to persons who are regulated by an appropriate foreign supervisory authority after compliance with KYC norms and any information regarding the terms of and parties to ODIs must be fully disclosed to SEBI.

1.2.4. Other announcements and guidelines

- September 11, 2007, provided the circular about acceptance of Foreign Sovereign Securities as collateral from Foreign Institutional Investors (FIIs) for Exchange Traded Derivative Transactions. In which FIIs are required to deposit the collateral with the clearing members, in which at least 50% of the liquid assets, shall be in the form of cash or cash equivalents, and the rest can be in the form of non-cash components
- In August 2009, FIIs were permitted to participate in Interest Rate Future.
- In March 2009 FIIs were disapproved to lend share abroad. During the same period of time E-biding platform provided to FIIs.
- In April 2010, FIIs allowed issuing domestic G-Sec and foreign sovereign securities with AAA rating as security (in addition to cash) to recognized stock exchanges in India for their dealings in the cash segment of the market.
- On June 16, 2014, with circular no. CIR/IMD/FIIC/11/2014 SEBI made emphasised on the role of Designated Depository Participants (DDPs) towards verification, check and providing information of KYC of FPIs.
- From June 2014 SEBI introduced a new class of foreign investors in India i.e. Foreign Portfolio Investors (FPIs) which was formed through merging the existing classes of foreign investors, namely, FIIs, QFIs, and the sub-accounts of FIIs.
- Through circular no. SEBI/HO/MRD/DP/CIR/P/2016/143 as on December 27, 2016 SEBI determined the position limits of Stock Brokers / FPIs (Category I & II) / Mutual Funds for stock derivatives contracts i.e. the combined futures and options position limit should be 20% of the applicable Market Wide Position Limit (MWPL).
- On September 26, 2017, through circular no. SEBI/HO/CDMRD/DMP/CIR/P/2017/106 FPIs allowed participating in Commodity Derivatives in IFSC.
- On March 08, 2018 through circular no. IMD/FPIC/CIR/P/2018/46, SEBI provided a separate limit of Rs. 5,000crore to FPIs for taking a long position in Interest Rate Futures (IRFs). But at the same time, no FPI can acquire a net long position in excess of Rs. 1,800 crores at any point in time.
- On April 10, 2018, through circular no. CIR/IMD/FPIC/CIR/P/2018/64 SEBI notified that FPIs should provide the list of actual beneficiary owners (BOs) certified by themselves as per KYC norms and also clarified that NRIs and Overseas Citizen of India are not eligible to invest through FPI.

- On September 21, 2018, through circular no. CIR/IMD/FPIC/CIR/P/2018/132 SEBI allowed NRIs/OCIs/Resident Indians (RIs) to be constituents of FPIs subject to certain conditions. The major condition is that Contributions by NRI/OCI/RI as well as Investment Manager of NRI/OCI/RI controlled should be below 25% from a single NRI/OCI/RI and in total should be below 50% to the total fund invested by FPI.
- As the latest regulations and updated information SEBI (Foreign Portfolio Investors) Regulations, 2014 [Last amended on December 31, 2018] is available. It provides all the details regarding the latest development in various Chapters.
    - Chapter I explains definitions of various terms used in regulation related to FPI.
    - Chapter II talks about registration of FPI which consists application, eligibility criteria for FPIs, detailed explanation of Categories I, II and III of FPIs, furnishing information, clarification and personal representation, Procedure and Grant of certificate, Application to conform to requirement, Procedure where certificate is not granted and finally Suspension, cancellation or surrender of certificate.
    - Chapter III talks about the approval of DDPs,
    - Chapter VI talks about Investment conditions and restriction. Chapter V talks about general obligations and responsibilities of FPIs. Chapter VI talks about general obligations and responsibilities of DDPs. Chapter VII talks about inspection,
    - Chapter VIII talks about action in case of default and
    - at last Chapter IX is about miscellaneous aspects.
    - In the end, three schedules provide various details like Format of Applications, Details of various fees and Details of various Amendment in different Regulations. The first schedule consists format of Form A, i.e. Application Form for Grant of Certificate of Registration as Foreign portfolio investor (FPI) and Form B i.e. the format of Registration Certificate. The second schedule consists Part A: Payment of Fees applicable to FPIs, Part B: Payment of Fees applicable to DDPs and Part C: Collection of Regulatory Fees by FPIs from ODI (Overseas Derivative Instruments) subscribers. Third Schedule consist Code of Conduct for FPIs. Forth Schedule consists of various amendments in various regulations.

1.3. Growth of FIIs Investment in India

In order to study the growth of FII investment in India, this section elaborates increase in number of FIIs in India, FII investment in equity, debt and in total, percentage of FIIs turnover to total turnover of the Indian equity market, sector-wise and country-wise asset under custody of FIIs and top Indian companies with highest FII investment.

1.3.1. Number of FPI/FIIs in India

Time to time increased in a number of FIIs and FIIs registered with SEBI show inclination of foreign investment in the Indian financial market. Figure 1.1 shows a year-wise increase in the number of FPI/FIIs working in India, a number of FPI/FIIs registered with SEBI and per cent of registered. It helps me to know a professional approach developed by SEBI to registered all FPI/FIIs.

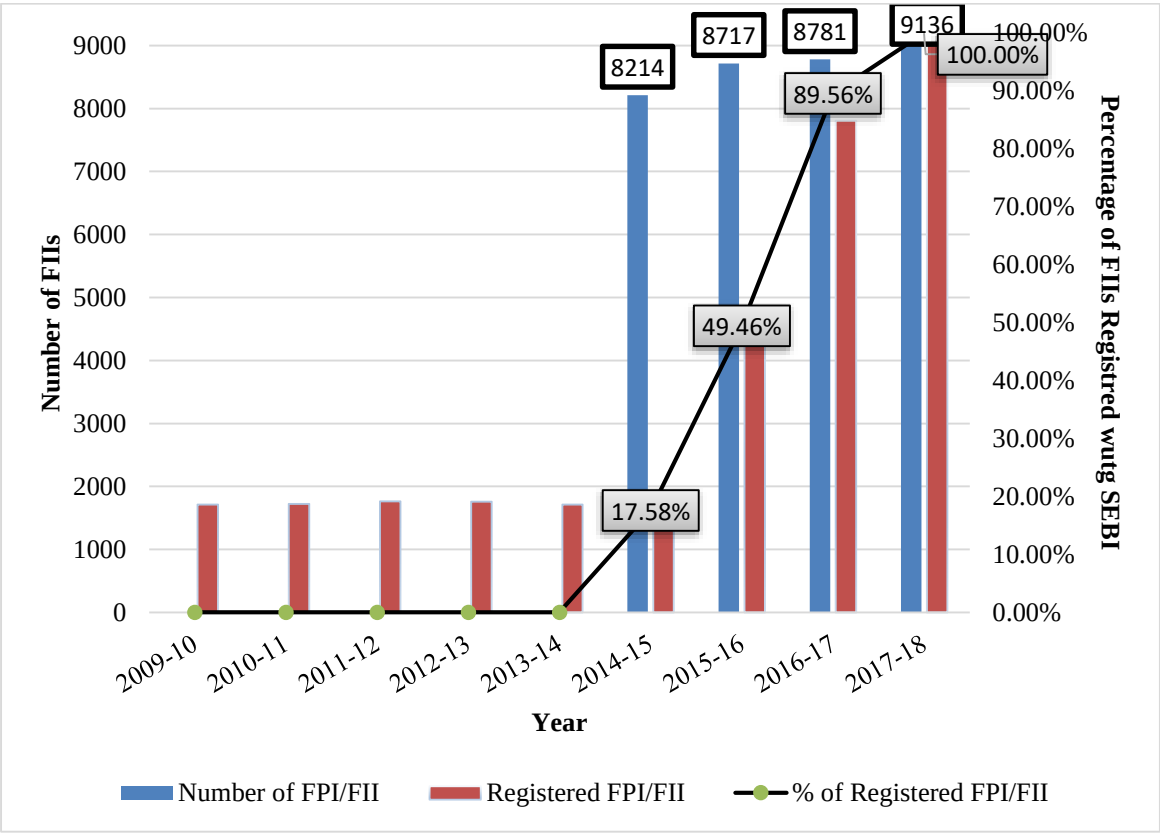


Figure 1.1. Number of FPI/FIIs in India

(Source: Indian Securities Market, A Review 2014 & 2019, Data about the total number of FPs were not available before the year 2014-15 **)**

In August 1996 there were 396 and October 1996 there were 412 FIIs operating in India. From Figure 1.1, it can be observed that they increased year after a year. Not only that but also found that from the year 2017-18 all FPIs/FIIs are registered with SEBI i.e. 100% registered FPI/FIIs. It indicates that not only SEBI is interested in regulating foreign investment in India, but even FPI/FIIs are also showing their interest by fulfilling various norms required for registering in the Indian financial market. Increasing compliance of SEBI rules, followed by FIIs indicates strong interest and commitment of FII to the Indian market, signals these investments are not short term but FII will remain for long term.

1.3.2. FIIs Investment in Equity, Debt & Total in India

Initially, when FIIs permitted to invest in the Indian equity market record of FII investment in equity, debt and in total were not provided systematically. Systematic data made available by SEBI after the financial year 1997-98. Later on, NSDL and CDSL were made responsible for maintaining this data. Before 1997-98 SEBI provided these data reported on various dates as follow.

- June 3, 1994: Gross Monthly Purchase Rs. 962.5 Crore, Gross Monthly Sale Rs. 160.4 Crore, Net monthly investment Rs. 802.1 Crore, Net monthly investment USD258.7 million and Net cumulative investment USD2023.9 million.
- By the end of the financial year on March 15, 1995: Gross Monthly Purchase Rs. 402.4 Crore, Gross Monthly Sale Rs. 201.7 Crore, Net monthly investment Rs. 200.7 Crore, Net monthly investment USD64.7 million and Net cumulative investment USD3141.3.
- At the end of 1996: FIIs registered with SEBI where 396 and cumulative investment was USD 6.669 billion.
- October 11, 1996: total 412 FIIs were registered and investment reached USD 6.860 billion.

SEBI initiated providing data of FII investment in India, bifurcated into two contingents i.e. equity and debt in the year 1997-98. Table 1.2 provides a yearly increase in FII investment in equity, debt and total in India from 1997-98 to last financial year i.e. 2018-19.

Table 1.4. Yearly net flow (Rs. in Crores) of FIIs in India (1997-98 to 2018-19)

Year	Cum_FIIs_Eq	Cum_FIIs_Debt	Cum_FIIs_Total	%_FIIs_Eq	%_FIIs_Debt	%_FIIs_Total
1997-98	5267.0	691	5957.2			
1998-99	4549.8	-176	4373.2	-13.62%	-125.47%	-26.59%
1999-00	14219.3	276.6	14495.3	212.53%	-257.16%	231.46%
2000-01	24426	3.3	24428.7	71.78%	-98.81%	68.53%
2001-02	31340.4	1046.8	32386.6	28.31%	31621.21%	32.58%
2002-03	33867.4	1208.8	35075.6	8.06%	15.48%	8.30%
2003-04	73827.1	7013.8	80840.3	117.99%	480.23%	130.47%
2004-05	117949.8	8772.4	126721.6	59.76%	25.07%	56.76%
2005-06	166750.3	1438.6	168188.3	41.37%	-83.60%	32.72%
2006-07	191986.0	7043.3	199028.7	15.13%	389.59%	18.34%
2007-08	245389.8	19818.6	265207.8	27.82%	181.38%	33.25%
2008-09	197683.6	21713.8	219396.8	-19.44%	9.56%	-17.27%
2009-10	307904.0	54151.5	362054.9	55.76%	149.39%	65.02%
2010-11	418024.8	90468.8	508493	35.76%	67.07%	40.45%
2011-12	461762.4	140456.7	602218.5	10.46%	55.25%	18.43%
2012-13	601794.0	168790.7	770585.3	30.33%	20.17%	27.96%
2013-14	681502.0	140729.7	822234.3	13.25%	-16.62%	6.70%
2014-15	792834.0	306855.7	1099695.3	16.34%	118.05%	33.74%
2015-16	778665.0	302852.7	1081520.3	-1.79%	-1.30%	-1.65%
2016-17	834368.0	295559.7	1129931.3	7.15%	-2.41%	4.48%
2017-18	860001.9	414597.1	1274611.9	3.07%	40.28%	12.80%
2018-19	858372.4	371645.7	1233542.6	-0.19%	-10.36%	-3.22%

(Source: Data compiled from SEBI and NSDL Website)

From Table 1.4, it can be observed the cumulative flow of FII investment in Indian equity, debt and total market. As absolute data are difficult to understand and interpret, three more columns of the percentage change in these investments are added. These data have been shown inline chart in three different diagrams for equity, debt and total investment. To summarize these data, CAGR and Standard deviation (of yearly percentage change) of yearly FII investment are calculated and presented in Table 1.5. the Indian equity market, the debt market and total investment has increased at CAGR of 26.05%, 33.08% and 27.43%

Table 1.5. CAGR and Variance

	FIIs_Eq	FIIs_Debt	FIIs_Total
CAGR	26.05%	33.08%	27.43%
Standard Deviation of yearly percentage change	0.5157	68.9175	0.56149

(Source: Authors Calculation)

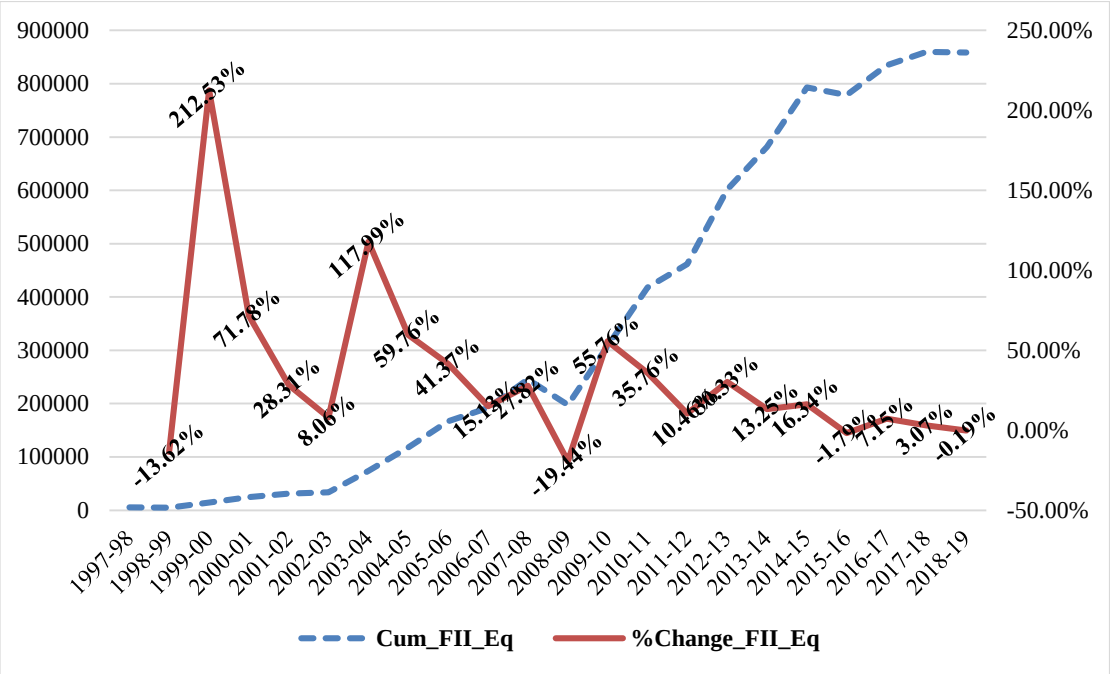


Figure 1.2. FIIs Investment in Indian equity and per cent change Year on Year (YoY)

From Figure 1.2 it can be observed that during the year 1999-00 the growth of FII investment in the equity market was maximum in terms of percentage increased i.e. 212.53%. In this year FII investment increased by approximately Rs. 1400 crores. From the line graph of cumulative investment by FIIs, it can be observed that actual change in slope from the year 2002-03 up to the year 2007-08, during 2007-08 due to subprime crises downfall inflow can be observed. Cumulative Average Growth rate during the period was observed as 48.6%. Whereas from 1997-98 to 2002-03 CAGR was 45.09%. From 2008-09 onwards again FII investment rose in the Indian equity market which continues up 2014-15. During this period CAGR was 26.05%. In the last four years i.e. from 2014-15 to 2018-19 CAGR is reduced to 2% only.

In the case of the debt market, the maturity level is fixed as well as secondary market operations are also allowed to liquidate the investment. Hence it can be observed a high amount of fluctuations in percentage change in FII investment in the Indian debt market. As debt market comparatively provides little fluctuations in interest or yield even during the subprime crises also FIIs flow in the debt market is not affected much. It has been observed that the FIIs limit in debt markets was also fixed by the government from time to time. But most of the time FIIs exploited maximum level of permission in debt security, especially in case of government security.

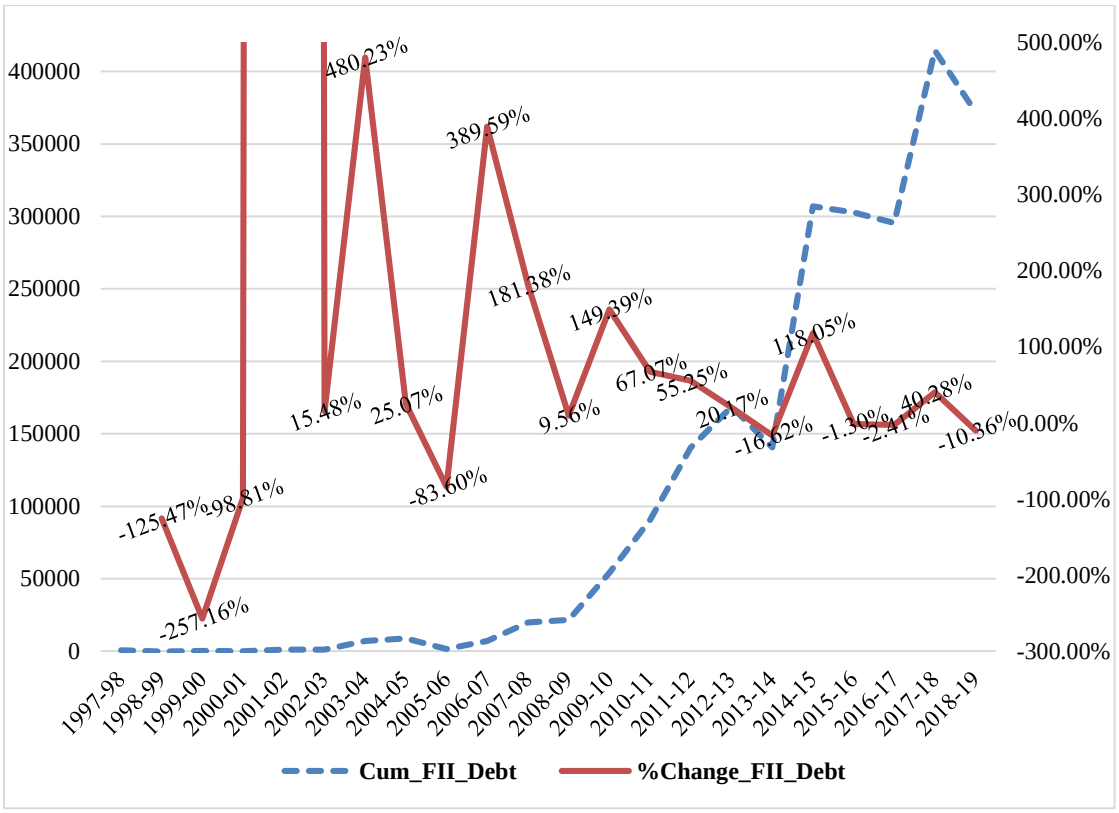


Figure 1.3. FIIs Investment in Indian Debt Market and per cent change Year on Year (YoY)

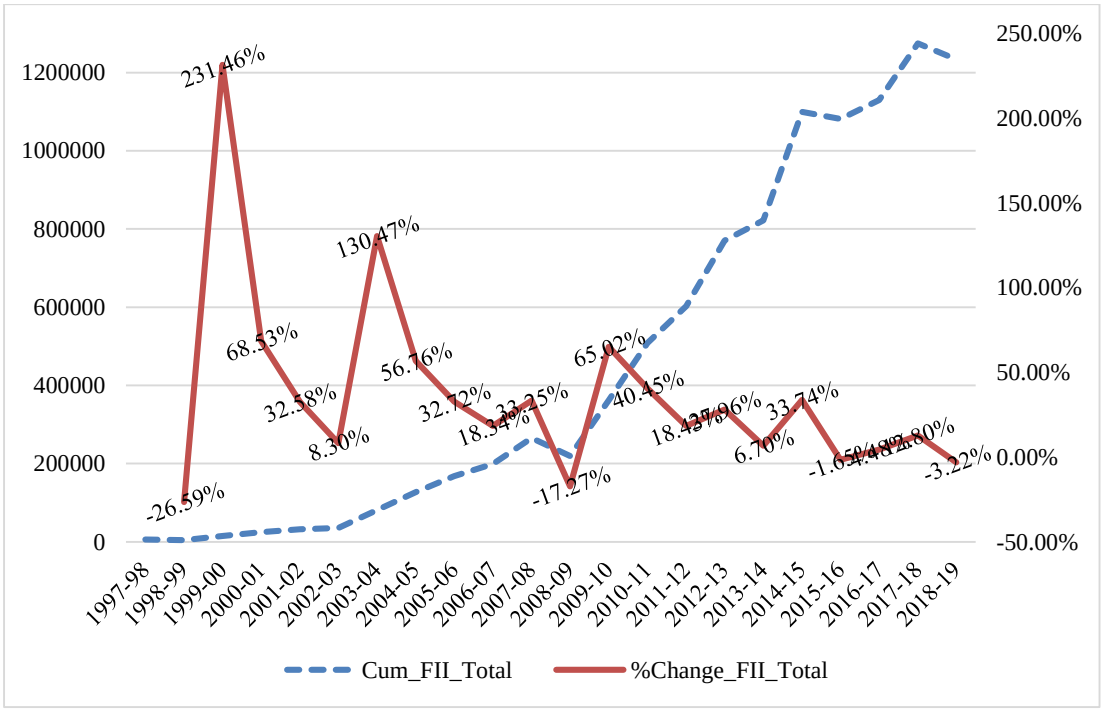


Figure 1.4. FIIs Total Investment and per cent change Year on Year (YoY)

From Figure 1.4 of line chart of FIIs total investment in Indian capital market and a line chart of the percentage change in FIIs total investment, it can be observed that from last few years (from 2014-15) FII investment in Indian financial market is slow down. Not only that but out of the last four years in two years (2015-16 and 2018-19) percentage change is negative. It shows that FIIs started disinvestment from the Indian financial market. It may be due to factors related Indian financial market or due to international factors or event both factors may be responsible for it. Further discussion about these factors is done in later chapters. Sometimes FII investment in the equity market may be caused to disinvestment and vice versa. To check this relationship between FII investment in the equity market and FII investment in the debt correlations coefficient is calculated between these two investments i.e. 0.9509 (yearly data). Figure 1.5 also advocates the same.

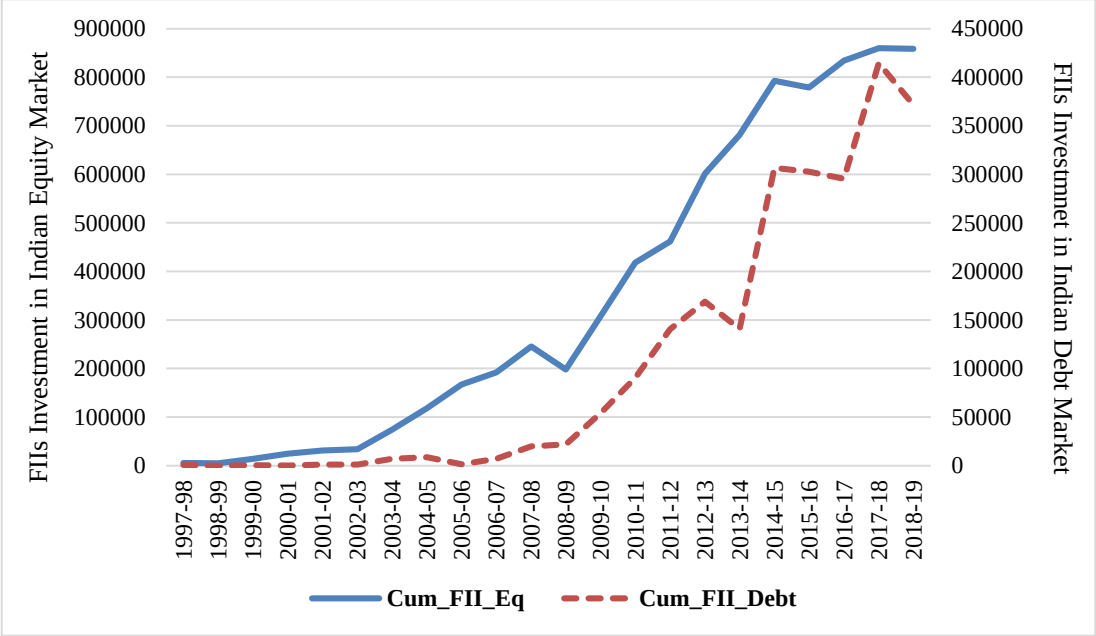


Figure 1.5. FIIs Investment in Indian Equity and Debt Market

From Figure 1.5 the direction of both line of FII investment in equity and FII investment in debt and correlation coefficient of 0.95, it can be said that there is a strong correlation between FII investment in the equity market and the debt market. But still, in certain cases, it can be observed that when there is a decrease in the debt market through there is an increase in the equity market and vice versa. For better study scatter plot diagram can be used for these two types of FII investment. Figure 1.5 provides insight as a scatter plot chart.

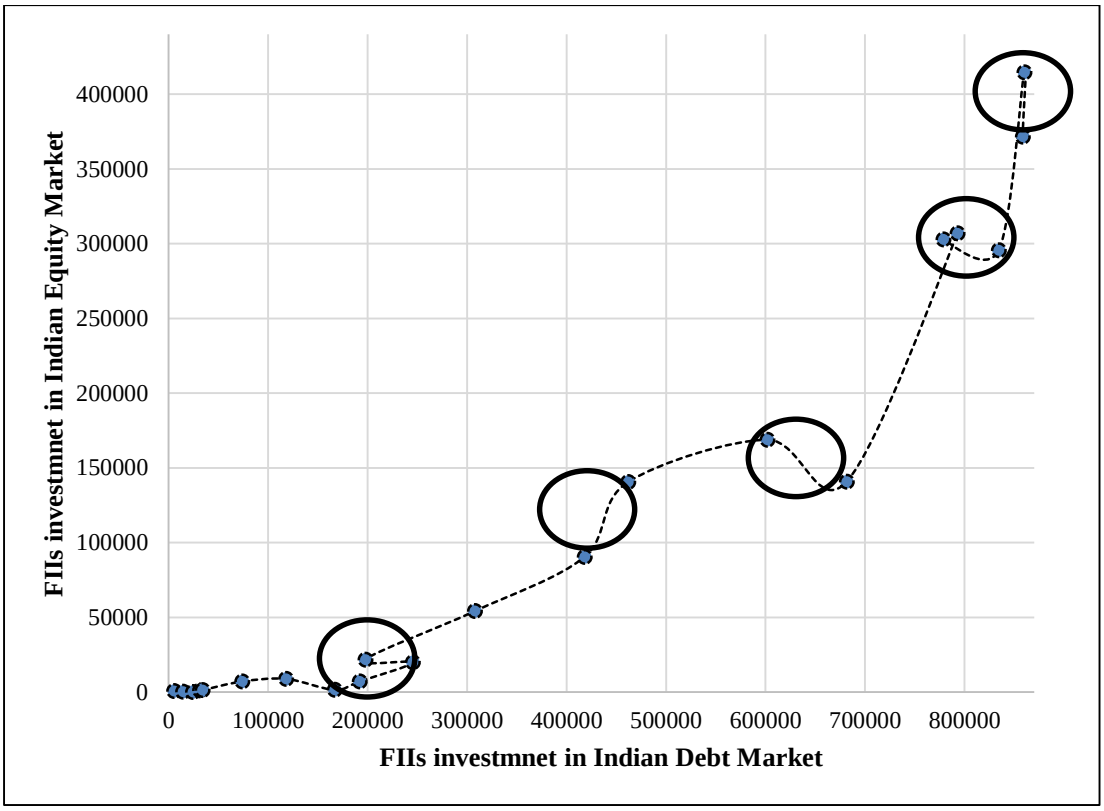


Figure 1.6. Scatter plot between FII investment in Equity and Debt

From Figure 1.6, it can be interpret that in long-term there is a positive relation between FII investment in the Indian equity market and debt market. But during certain phases (circle marked) there is a deviation from long-term trend between the investment of FIIs in equity and debt market. Thus in the short term and in long term relationship between FII investment in equity and debt market may vary due to various reasons. Further investigation about factors affecting FII investment is discussed in the following chapters.

From the above figure, it can be interpreted that in long-term there is a positive relation between FII investment in the Indian equity market and debt market. But during certain periods (circle marked) negative or no correlation can be observed between the investment of FIIs in equity and debt market. Thus in the short term and in long term relationship between FII investment in equity and debt market may vary due to various reasons. Further investigation about factors affecting FII investment is discussed in the following chapters.

After observing continuous increasing FII investment in Indian capital market, to study the trend of FII investment in India it should also be observed that how much FIIs is dominating in Indian financial markets. Following discussion of this chapter will throw light on FIIs

turnover inequity and the derivative market is how much percentage of the total turnover of equity and turnover of derivatives market in India.

1.3.3. Proportion of FIIs turnover in the India equity market

Following table and figure show FIIs turnover to total turnover of NSE and BSE in terms of percentage and FIIs turnover to total F&O (derivative) turnover on NSE in terms of percentage.

Table 1.4 and Figure 1.7 presents the dominance of FIIs in the cash segment and the derivative segment of India. On the basis of the availability of data from 2006-07 to 2016-17, it can be observed that the dominance of FIIs is continuously increasing. Especially in case of cash segment, more than one fifth i.e. 20-22% of the total turnover of NSE and BSE is dominated by FII investment. Hence FII investment and the Indian equity market must have significant relation. This relation is also discussed in detail in later chapters.

Table 1.6. Gross Turnover of FIIs in the Equity Market Segment of NSE and BSE and F&O Segment of NSE

Year	FIIs turnover to total turnover of NSE & BSE (%)	FIIs turnover to total F&O turnover on NSE (%)
2006-07	15.8	8.7
2007-08	16.6	9.6
2008-09	15	9
2009-10	11.6	9.8
2010-11	15.3	10.7
2011-12	17.7	14.5
2012-13	19.0	15.7
2013-14	20.6	15.2
2014-15	21	11.3
2015-16	22	11.8
2016-17	21	13.7

(Source: Data compiled from Indian Stock Market A Review, 2013, 2014 & 2017)

In case of FII investment in F&O segment can be done for the hedging as well speculation or arbitrage, a sudden increase in the dominance of FIIs in F&O segment from 8.7% (2006-07) to 15.7% (2012-13) within 6 years is observed. But suddenly it fell down to 11.3% (2014-15) again started increasing. In the year 2016-17, it was 13.7%.

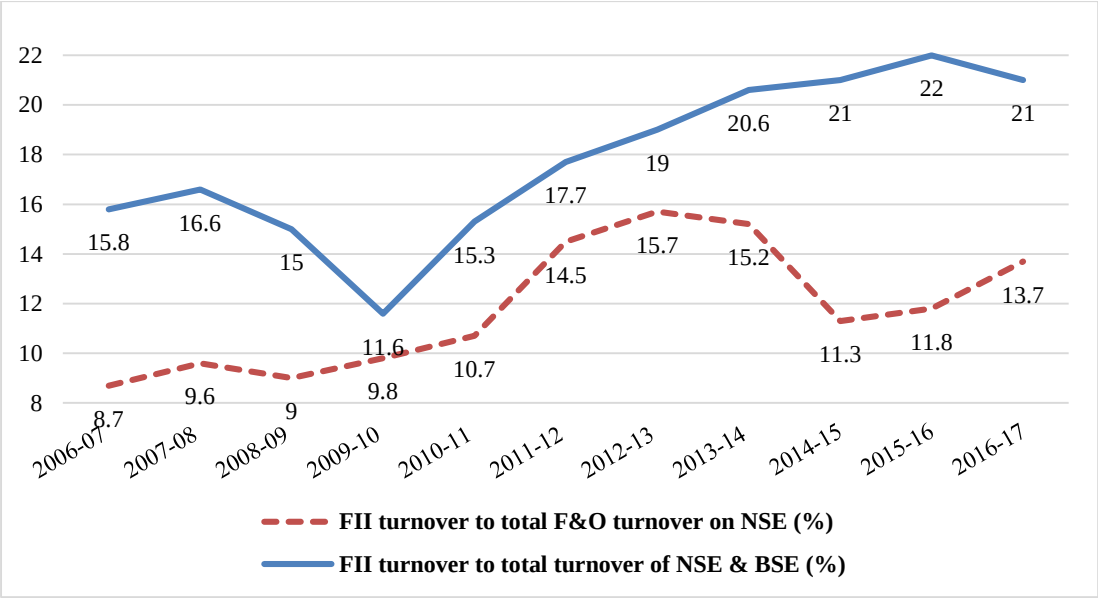


Figure 1.7. FIIs turnover % to the turnover of Indian Equity and Derivative Market

Once about FII investment in various part of Indian financial markets is studied awareness of its major source should be there. Next discussion of the chapter is about dominating countries who have shown their interest in investing in Indian financial markets.

1.3.4. Country-wise Asset Under Custody (AUC) of FIIs/FPI

Table 1.7 and Figure 1.8 emphasizing on major countries who have invested and played a significant role in FII investment in India. The following table shows the major 10 countries who have major FII investment in Indian financial market.

From the Table 1.5 and Figure 1.8, it can be observed that in Indian capital market the United State of America (USA) is dominating in total (33.08%) as well as in equity (35.73%) investment in India as per the record of May 2019. After USA Mauritius, Luxembourg and Singapore are major investors in India. They have invested 13.27%, 9.78% and 9.23% of total FII investment in Indian capital market respectively and 14.05%, 8.76% and 6.87% investment in the Indian equity market respectively. Thus, in all types of investment USA, Mauritius, Luxembourg and Singapore are a dominant investor and about 60% FII investment in India is done by these four countries out which the USA has the highest contribution. Over here it can also be observed that Mauritius, Luxembourg and Singapore

are considered as Tax Haven country(Consultancy.eu, 2018), the original source of a fund may be different viz. European country.

Table 1.7. FPI/FIIs AUC Country-wise (top 10 countries) data

Sr. No.	Country	AUC (INR Cr.)			
		Equity	Debt	Hybrid	Total
1	United States of America	1,072,359	56,305	1,782	1,130,447
2	Mauritius	421,819	31,623	176	453,618
3	Luxembourg	262,945	70,688	555	334,189
4	Singapore	206,167	105,433	3,964	315,563
5	United Kingdom	153,275	2,944	625	156,844
6	Ireland	112,943	4,144	516	117,604
7	Japan	95,811	19,023	51	114,886
8	Canada	96,362	12,839	530	109,732
9	Netherlands	55,512	23,400	0	78,912
10	Norway	68,414	10,274	0	78,688
11	Other	455,691	70,540	966	527,196
	Total	**3,001,299**	**407,214**	**9,166**	**3,417,679**

Source: www.fpi.nsdl.co.in (Data as provided by DDPs), Here FPIs includes FIIs, Sub Accounts & QFIs.

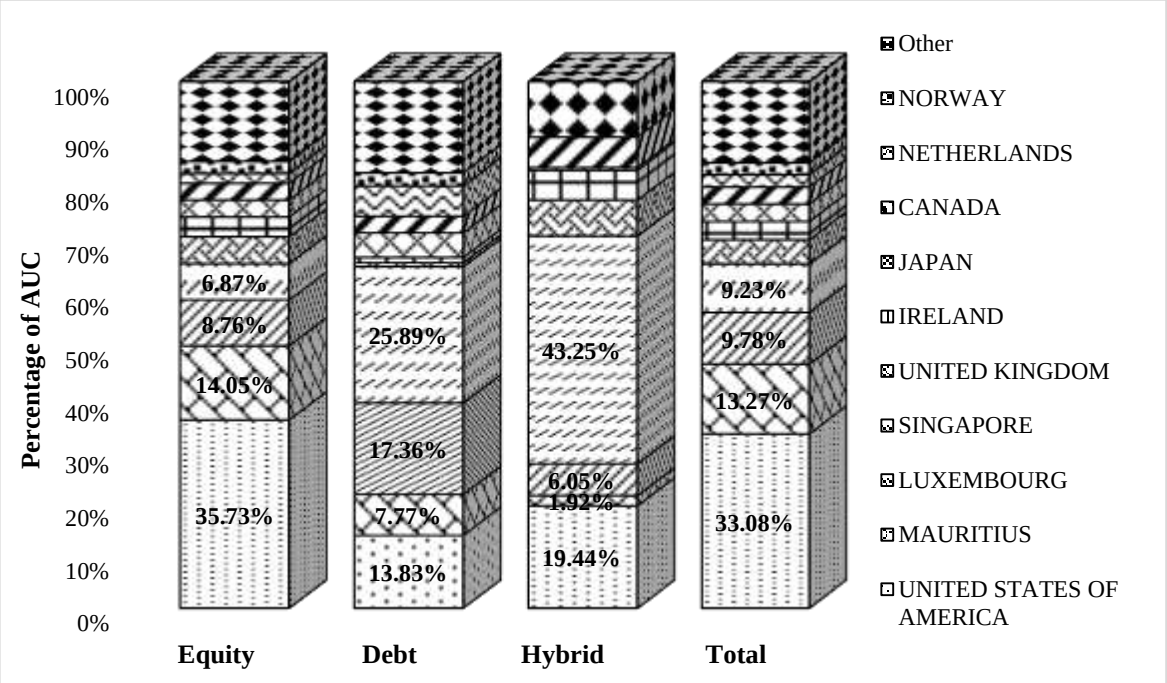


Figure 1.8. FPI/FIIs AUC Country-wise (INR Cr.) May 2019

After knowing about the source of FIIs from various countries, awareness about their investment in various sectors in India should be there. Following discussion talks about FII investment in various sectors of India.

1.3.5. Sector-wise AUC of FIIs/FPI

After liberalisation, privatization and globalization in the Indian economy dominance of the service sector has increased over time. Especially the development of financial services and information technology have achieved remarkable growth in recent years. Figure 1.9 also depicted the interest of FIIs in such dominating sectors.

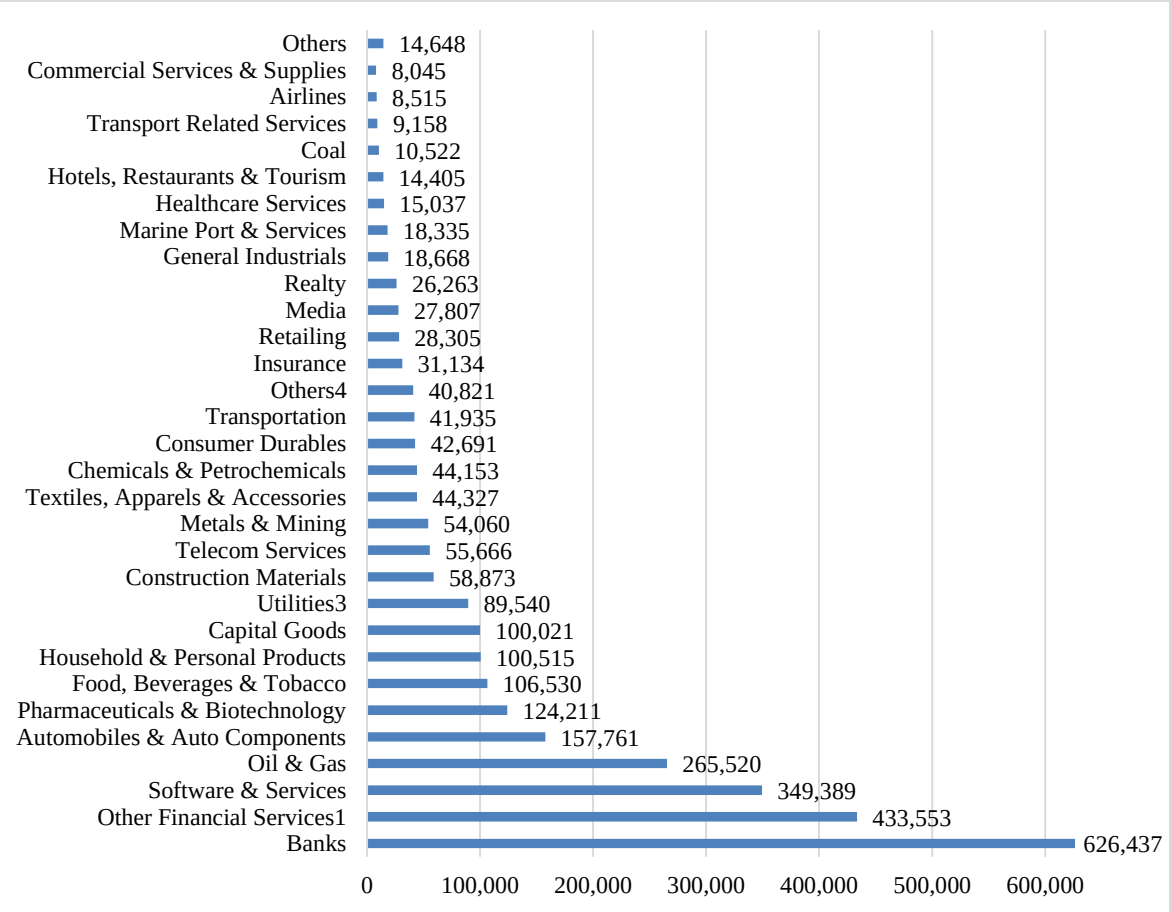


Figure 1.9. Sectors-wise AUC as on March 31, 2019 (INR Cr.)

From Figure 1.9, it can be identified that FIIs has a major investment in the Banking and Financial Sectors followed by Software & services and Oil & Gas sectors. Being a developing country, for Indian economy financial sector is considered as the backbone. Development of the economy is directly contributed by the growth of financial sectors. At

the same time, software & services sectors are a major source of income of foreign currency through getting business from outsourcing of developed countries. In the case of the Oil & Gas industry is the base of the fuel-related requirement of all other industry and major outflow from the Indian economy is also due to the import of Oil. Thus these three sectors have a significant role in the development of the Indian economy too. Hence looking at the growth of Indian economy and development in said sectors emphasize of FII investment in these sectors is obvious. Further investigations in terms of the causality between FII investment and performance of these sectors is done in the sixth chapter.

After a discussion about FII investment in various sectors in the Indian market, the following section discusses the investment of FIIs in various companies in the Indian equity market.

1.3.6. FIIs in various Indian companies

Figure 1.10 shows the investment of FIIs in various Indian companies. This information are collected form the website of economic times. It shows data of FIIs stake % in various companies in March 2018. It also provides detailed information on Median and Means value of the last 40 quarters up to March 2018.

Actually, there is limit up to 24 per cent of the total paid-up capital of Indian company FIIs can invest and in case of public sectors banks, this limit is 20 per cent ("Investment in Indian Companies by FIIs/NRIs/PIOs,"). But this limit can be raised up to the limit allowed in the sectoral cap for foreign investment by passing a special resolution. Various companies have passed resolution in their meeting time to time to raise their limit considering the sectoral limit for foreign investment.

Figure 1.9 and Figure 1.10 collaborate that FIIs have shown more interest in Banking and Non-Banking Financial Institutions (NBFCs). From Figure 1.10 it can be observed that in top 15 companies four companies belong to banking sector viz. IndusInd Bank, Axis Bank, ICICI Bank, HFC Bank and Kotak Mahindra Bank. HDFC being a leading housing finance NBFC have a maximum contribution from FIIs i.e. 74% in March 2018

	March 2018	FII holding (40 qtrs)	
Company Name	FII stake (in%)	Median	Mean
HDFC	74	73	69
IndusInd Bank	52	38	36
Axis Bank	50	41	39
Shriram Transport Finar	49	41	37
Apollo Hospitals	49	42	37
ICICI Bank	48	39	41
KPIT Technologies	46	26	25
PVR	44	22	21
Hero MotoCorp	42	33	34
Mindtree	42	25	26
NIIT Technologies	41	27	25
HDFC Bank	40	33	33
Cyient	40	30	30
UPL	40	37	38
Kotak Mahindra Bank	40	31	32
Tech Mahindra	39	16	19
Redington (India)	38	31	29
Page Industries	36	20	22
Gateway Distriparks	35	25	28
Mahindra & Mahindra	34	33	31
PTC India	33	26	24
Info Edge (India)	33	27	27
Eicher Motors	31	14	18
City Union Bank	30	22	24
Dr. Reddys Laboratories	30	29	30
Max Financial Services	29	29	28
Phoenix Mills	29	22	22
Tata Power Company	28	25	23
Kajaria Ceramics	28	17	15
Hindalco Industries	28	27	24
Godrej Consumer Produ	28	28	25
Grasim Industries	27	23	23
Marico	27	26	25
Piramal Enterprises	27	25	24
Idea Cellular	27	17	17

[Source: ETMarkets.com| (Oberoi, 2018)]

Figure 1.10. FII investment in Indian companies (March 2018)

1.4. Rationale for the study

In 1991 the government introduce a policy of liberalisation, privatisation and globalisation (LPG). Implementation of these policies, FIIs received permission to invest in Indian financial markets. Since then FIIs have continuously increased that investment in the Indian market. It has been observed that their market actions have a great impact on the Indian financial markets and their performances. Though investment of FIIs has increased over the period of time it has not been continuous and in one direction. At the time of FIIs outflow, not only Indian financial markets event foreign exchange markets have also got adversely affected. India is a capital scarce economy and contributes substantially to deepen Indian financial capital markets. Due to these reasons government makes attempts to encourage more and more FIIs. However, it is extremely important to evaluate and to understand the behaviour of FIIs to make the right kind of policy decisions. FII investment as discussed substantially influences market performances, Indian retail and institutional investors also makes that investment strategy by studying actions of different market participants. FIIs being very important participants in the Indian market even it is important for an investor for a different category at the decision based on scientific study rather than perceive notion. In this context, this study aims to understand FII investment in the Indian equity market.

1.5. Research methodology

1.5.1. Problem Statement

A study of Foreign Institutional Investors' (FIIs) Investment in Indian Equity Market

1.5.2. Objectives

To study FII investment in the Indian equity market following objectives are established.

- To study the investment pattern of FIIs in the Indian Equity Market
- To study determinants of FII investment decision in the Indian Equity Market
- To study the effect of FII investment in the Indian Equity Market

1.5.3. Research Methodology

1.5.3.1. Research Design

To achieve the first objectives to study the investment pattern of FIIs in the Indian equity market the history of foreign investment in India is explored. During this exploration, it is found that actual segregated data for FII investment in the equity market is made available from the year 1997. The pattern of FII investment in the Indian equity market is studied science from this data is made available by the Security Exchange Board of India (SEBI). To study the pattern of investment efforts are made to develop a time series forecasting model. In the study of the trend in FII investment in the Indian equity market, many ups and downs are found. To find the reasons for these ups and downs started working on second objective of the study of determinants of FII investment in the Indian equity market.

To identify major determinants of FII investment in the Indian equity market literature review is explored. Literature review helped me to identify major variables to frame a questionnaire for the primary study. Initially considering the experts' opinion, major variables for secondary data analysis is confirmed. Finally, a causal study is conducted between determinants identified through primary study and FII investment in the Indian equity market. During the study of determinants of FII investment, it is found that equity market performance itself is also one of the determinants of as well as influenced by FII

investment. Hence on the last objective of the effect of FIIs in the Indian equity market is done.

To study the relationship between FII investment in the Indian equity market and performance of the Indian equity market during the literature review is identified that both of them may have bidirectional relation. Hence a causal study between FII investment and various indicators of the Indian equity market i.e. Capitalisation, Turnover and Major Sectoral Indices is conducted.

Thus in nutshell, a descriptive research design is used in this research work. This research is an attempt to describe the investment of FIIs in the Indian equity market. Attempt is also made to identify and describe various determinants of FII investment i.e. factors which influence FIIs flow in the Indian equity market. Finally, a causal study between FII investment in the Indian equity market and various factors affecting it and the performance of various aspect of the Indian equity market viz. market capitalisation, market turnover and performance of various sectoral indices is also conducted.

1.5.3.2. Scope of the Study

After the permission of FII investment in India in the financial year 1992 the segregated data of FII investment in the Indian equity market made available from March 1997. Thus the scope of the study in terms of the time frame is from March 1997 to the last financial year i.e. March 2019. To study the various factors affecting FII investment in the Indian equity market determinants are identified based on a primary study, the Scope for this determinants is also limited to the time frame selected as well as available for FII investment in the Indian equity market. In a study of the relationship between the performance of the Indian equity market and FIII investment in it, various indicators viz. Capitalisation, Turnover and Sectoral indices are identified. The scope for this market indicators is limited to the Indian equity market during the selected period of the study as well as the availability of the data related to respective indicators.

1.5.3.3. Sources of Data

To achieve the above objectives, various data have been collected from various sources. In this study, data collected from primary as well as secondary sources. Initially, secondary data is used to know the trend of FII investment in the Indian equity market. It helped me

know changes in trend FII investment due to various cause. To know this causes of factors affecting FII investment in the Indian equity market data were collected from primary sources. Analysis of this primary data helped in identifying major factors affecting FII investment in the Indian equity market. Further study is done after collecting again secondary data related to various factors as well as equity market-related data from government and stock market's websites.

1.5.3.4. Sampling

To the trend of FII investment in the Indian equity market, monthly data have been chosen from March 1997 to last financial year-end March 2019 available on the website of SEBI and depositories i.e. NSDL and CDSL.

After a study of the trend in FII investment, primary data has been collected from 200 brokers, sub-brokers and their employees. These respondents are representative of individual investors in the Indian equity market. Thus, judgmental sampling is used to identify respondents for the primary data collection. For further investigations economic indicators viz. GDP, WPI, Exchange rate for US dollar, Call rate and Forex Reserves are selected as samples, affecting FII investment in the Indian equity market.

Towards the achievement of the third objective of the relationship between FII investment in the Indian equity market and performance of the Indian equity market various indicators viz. The capitalisation of NSE and BSE, Turnover of NSE and BSE, sectoral indices of BSE (*selected from the list) and Nifty 50 are selected as a sample on the basis of judgmental sampling. BSE consist of more number of sectoral indices compare to NSE and as well BSE has oldest indices in the Indian equity market. Hence BSE sectoral indices were chosen as the sample for the study. Following lists of the sectoral indices of NSE and BSE provides information about the availability of a number of sectoral indices in NSE and BSE.

Sectoral Indices in NSE

1. NIFTY Auto Index
2. NIFTY Bank Index
3. NIFTY Financial Services Index
4. NIFTY FMCG Index
5. NIFTY IT Index

6. NIFTY Media Index
7. NIFTY Metal Index
8. NIFTY Pharma Index
9. NIFTY Private Bank Index
10. NIFTY PSU Bank Index
11. NIFTY Realty Index

Sectoral Indices in BSE

1. S&P BSE Basic Materials Index
2. S&P BSE Consumer Discretionary Goods & Services Index
3. S&P BSE Energy Index
4. S&P BSE Fast Moving Consumer Goods* Index
5. S&P BSE Finance* Index
6. S&P BSE Healthcare* Index
7. S&P BSE Industrials* Index
8. S&P BSE Information Technology* Index
9. S&P BSE Telecom* Index
10. S&P BSE Utilities* Index
11. S&P BSE AUTO* Index
12. S&P BSE BANKEX* Index
13. S&P BSE CAPITAL GOODS* Index
14. S&P BSE CONSUMER DURABLES* Index
15. S&P BSE METAL* Index
16. S&P BSE OIL & GAS* Index
17. S&P BSE POWER
18. S&P BSE REALTY* Index
19. S&P BSE TECK* Index

In the study, data of various sectoral indices of BSE (*identified from the above list), the market capitalisation of NSE and BSE and turnover of NSE and BSE, for the period from March 1997 to March 2019, are considered as a sample. Thus, judgmental sampling is used to identify sectoral indices as samples. It means FII investment in various sectors is considered as the base to select the BSE sectoral indices sample for the study.

1.5.3.5. Data Collection:

Initially various reports, various articles from newspapers viz. The Economic Times,

Business Standard etc., notifications and regulations issued by Indian authorities like Reserve Bank of Indian (RBI), Security Exchange Board of India (SEBI) and the stock exchanges in India i.e. National Stock Exchange as well as Bombay Stock Exchange are referred to update the knowledge and to be aware of various events related to FII investment India and the Indian equity market. Various research papers related to the topic are also referred from the literature review viewpoint and enlisted in the bibliography.

To serve the first objective to study the trend of FII investment monthly value of FIIs in investment in India in Equity, Debt and Total are collected from SEBI website, National Securities Depository Limited (NSDL) website and Central Depository Services Limited (CDSL) website mentioned below.

1. http://www.sebi.gov.in/sebiweb/investment/statistics.jsp?s=fii (Since June 01, 2014, the data on FPI investments is being disseminated on the websites of NSDL and CDSL)
2. https://www.fpi.nsdl.co.in/web/Reports/Yearwise.aspx?RptType=6

To achieve the second objective related to study the determinants of FII investment in the Indian equity market collected primary data has been collected. To collect the primary data, a structural questionnaire is designed using variables identified through the literature review. Personal survey method and mailed survey method were applied to collect the data from sample respondents. After the analysis of the primary data, certain determinant of FII investment in the Indian equity market were identified.

For further analysis in the research towards second objectives, secondary data related to identified determinants and the Indian equity market-related indicators are used. The data related to them, like Gross Domestic Product (GDP), Index of Industrial Production (IIP), Wholesale Price Index (WPI), Exchange Rate for US dollar, Call Rate, and Forex Reserve (USD) were collected from website of RBI (https://dbie.rbi.org.in/DBIE/dbie.rbi?site=home) to study their relations with FII investment in the Indian equity market. In the cases of GDP, IIP and WPI government has changed base year in their calculation. Hence in this study, data have been extrapolated using the same base year of 2011-12. Domestic Institutional Investors (DIIs) data are collected from the website of Moneycontrol, reproducing the data collected from SEBI.

Towards the third objective related to the effect of FII investment in the Indian equity market,

monthly data of Nifty 50 & S&P BSE Sensex, the market capitalisation of NSE & BSE and turnover of NSE & BSE are collected from the following RBI website

https://dbie.rbi.org.in/DBIE/dbie.rbi?site=statistics

Monthly data of selected sectoral indices of BSE are collected from the website of www.bseindia.com.

1.5.3.6. Data Processing:

Before the analysis of data, data cleaning and processing essential. Secondary data related to FII investment in Indian capital market were in absolute term, generally having the problem of stationarity, autocorrelation and non-normality. This problem can be avoided through data transformation. Data transformation can be done through taking the difference, log transformation or difference of log transformation. The initial difference of log transformation is used to determine the ARIMA model of time series data. In the case of primary data, missing data were collected from the respective respondent through revisit or telephonic talk. The printed data sheet was checked to identify any missing data.

In casual study first difference of data is used to make all-time series data stationary, which is essential before the causality test.

1.5.3.7. Data Analysis:

To fulfil the first object, in data analysis of Investment pattern of FII investment in the Indian equity market simple trend line method is used. The trend line is useful to know upward (bullish) or downward (bearish) trends. Different phases of the bullish segment and bearish segment were found using this trend line. The correlation coefficient is also used to study the unity of direction of FIIs flow and index of the Indian equity market. Staked Column graph is used to show the proportions of various countries' weight in total FII investment in Indian equity, debt and total capital market.

Number of FIIs operating in Indian financial market can also provide information about the interest of foreign investors in India equity market. For the data analysis of the number of FIIs in India simple tabulation, percentage and Bar graph is used to study the trend. The simple line chart and mean and standard deviations are used to study FII investment in Indian equity, debt and total capital market. Scatter plot is used to show the direction of the

relationship between FII investment in the Indian equity market and FII investment in the Indian debt market.

Compound Annual Growth Rate (CAGR) is useful to know year on year growth rate. To know the growth rate of FII investment in the Indian equity market during the various period of time, CAGR is calculated using the following formula.

$$CAGR = \left(\frac{End\ Value}{Begning\ Value}\right)^{\left(\frac{1}{n}\right)} - 1$$

This formula is applied using MS-excel application.

Auto-Regressive Integrated Moving Average (ARIMA) model is useful for analysing and forecasting time series data. To forecast FII investment in the Indian equity market, the ARIMA model is developed using Eviews software. Before the development of the ARIMA model various transformation like the first difference, log transformation and first difference of log transformation is used to get mean value near to zero and minimum standard deviation. To check whether the time series data are stationary or not Augmented Dickey-Fuller (ADF) test is used. To check autocorrelation Durbin Watson statistic is checked. To identify the best data transformation Akaike Information Criteria (AIC) is used. Jarque-Bera test (for sample sizes that are sufficiently large, violation of the normality assumption is virtually inconsequential (Brooks, 2008)) is used to check the normality of the residuals. In the application of the ARIMA model to identify Auto-Regressive (AR) and Moving Average (MA) Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) are used. Finally, on the basis of AIC, SIC and Hannan-Quinn criteria, the ARIMA model is established.

Expert Modeler option in SPSS software provides the best model out of all probable thousands of models. After the ARIMA model establishing expert modeller to check the suggestion of SPSS software on the ARIMA model. On the application of expert modeller of SPSS is applied, the existence of Seasonal Auto-Regressive Moving Average (SARIMA) is found. In this analysis Ljung-Box Q test is used to check the normality of the residuals, Mean Absolute Percent Error (MAPE) is used to know the average possibility of error in the prediction, Outliers are studied for their significant effect on model, t-static is used to check significance of AR and Seasonal AR and Seasonal MA, ACF and PACF used to check serial

autocorrelation and the final line chart is used for the forecast and fit of FII investment.

After analysing the trend in FII investment in the Indian equity market, to check whether the coefficient of time series model is stable or not, Cumulative Sum (CUSUM) test and CUSUM of Squares test are used with help of Eviews. As the CUSUM test and the CUSUM of Squares test suggested that the coefficient of time series model is not stable, it leads to the possibility of the existence of structural break. Structural break suggests abruptly change in time series data. Structural break tests help me to determine when and whether there is a significant change in our data (Gupta, 2008). Break selection under Minimize Dickey-Fuller t-statistic is done to identify major structural breaks in time series data of FII investment in the Indian equity market.

Structural breaks can be studied by applying two alternative approaches. In one of the approach, it can be done initially by identify a significant change in time series data through the appropriate test and then find the cause for the same. In an alternative approach, once being aware about the events, its significant effect is confirmed on the trend of time series data. Both of the approaches are applied to identify major reasons for changes in FII investment in the Indian equity market. In the first approach, the Bai-Perron (1998, 2003) test is applied to identify multiple structural breaks without being aware of causing the events. In the alternative approach, the Chow (1960) test is applied to confirm the significance of time period for the identified events, causing structural breaks in the time series data of FII investment in the Indian equity market. Eviews is used to apply Bai-Perron and Chow tests.

Cronbach (1951) suggested the value of Cronbach's Alpha, the level of acceptance to check the instrument reliability. Cronbach alpha is used to check the reliability of the questionnaire used to collect the primary data. To identify various factors affecting FIIs flow in the Indian equity market the primary data were collected and analysed. To check the reliability of the instrument used in the study for the collection of the primary data Cronbach Alpha is used. Kaiser-Meyer-Olkin (KMO) and Bartlett (1950) test are useful to check the adequacy of the sample. In the study, KMO and Bartlett's test were used to measure the sampling adequacy in primary data collection, which essential for undertaking the factor analysis. Factor analysis is useful to reduce the number of factors considered for the study on the basis of correlation among them. In the study factor analysis is applied to reduce the number of

factors affecting FII investment in the Indian equity market and grouped them on the basis of their homogeneity. SPSS software is used to apply factor analysis and calculation of Cronbach alpha and KMO statistics.

Granger (1980) had found significant important to study causality and provided a theoretical framework to study two-way causality. Thus, the granger causality test facilitates to check the causal relation between two variables. The Granger causality test is uded to study the causality between FIIs flow and various factors affecting FII investment and performance of various sectors in the Indian equity market. Granger causality test was applied after applying an Augmented Dickey-Fuller test to check the stationarity of the time-series data. Lag order identification is a precondition for the Granger causality test. The VAR Lag Order Selection Criteria is applied to identify the appropriate lag order to check the causality. Log Likelihood (LgLk), sequentially modified LR test statistic (SqLR), Final prediction error (FPEr.), Akaike information criterion (AIC), Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HQn) are used in identification lag order for causality. Granger causality is also done in the environment of Eviews software.

To achieve the last objective to study the effect FII investment on the Indian equity market, again Granger causality test is applied to study the causality between FII investment and Capitalisation of NSE and BSE, Turnover of NSE and BSE, selected sectoral indices of BSE and S&P BSE Sensex and Nifty 50. Granger causality under VAR provides better comprehensive causality. Granger causality test under VAR is applied to study the causality between FII investment in the Indian equity market and S&P BSE Sensex and Nifty 50. It helped me to know the effect of FII investment on Nifty 50.

To established and understand the relationship between the dependent and independent variable, the regression model is crucial. It explains the causes of change in the dependent variable due to a change in the independent variable. The regression model is applied under the ordinary least square method to establish the relationship between FIIs Investment in the Indian equity market (Independent Variable) and Nifty 50 (Dependent Variable). To evaluate the regression model, t-test is used to check whether the dependent variables are significant or not, F-statistics is used to check whether the overall model is significant to affect the dependent variable, Adjusted R-Squared used to know how much percentage change in the dependent variable is explained by the regression model, Durbin-Watson test

is used to check autocorrelation, Correlogram is used to check serial correlation in residuals, Breusch-Pagan-Godfrey, Harvey, Glejser and Autoregressive Conditional Heteroscedasticity (ARCH) tests are used to check Heteroscedasticity, Jurque-Bera Test is used to check whether residuals are normally distributed or not. Threshold ARCH (TARCH) model is used in case of Heteroscedasticity of ARCH family was found. All these analyses are also done in using Eviews software.

1.5.4. Limitations and future scope of the study

1. A major part of the study depends upon the quality of the secondary data viz. data of FII investment, DIIs data, GDP data etc. Hence limitations of all secondary like differ in the purpose of data collection, manipulation of data, accuracy in maintaining data etc. could be the limitations of the study.
2. Future application of the study would be limited as the Indian financial market and international scenario are vulnerable.
3. Effectiveness of the secondary data analysis depends on its frequency. In this study, monthly data is used. Daily data can give a better result; as more frequent data provides better results. But due to the limitation of sources as well as other that FII investment-related monthly data is used.
4. In the various analysis, data were transformed in various other forms like first difference, log transformation, a difference of log transformation etc. which reduces the power of forecasting, but it prerequisites to conduct a various test.

Due to the time spent in data analysis and publication of the thesis, the relevance of the study may be reduced at the time of publication and presentation.

1.6. Organisation of Thesis / Chapter Scheme

Toward the study of the FII investment in the Indian equity market, this thesis is organised into seven chapters.

This first chapter of introduction brief information about the inception of foreign investment in the Indian financial markets and its regulatory framework. It also provides information about the number of FIIs working and registered with SEBI, FII investment in equity, debt and total in India. It also provides information about FIIs turnover % to cash and a derivative

segment of the Indian equity market, country-wise and sector-wise asset under custody of FIIs. In the third part, it provides the rationale of the study. In for the and fifth part problems, statement and research methodology is discussed in detailed.

In the second chapter, a discussion about the Indian financial system is done. It talks about the various components viz. regulatory bodies, financial markets, financial institutions and financial markets. It also focuses on the history of the Indian stock market and its current operations. At the end of the chapter, current performances are discussed.

In the third chapter, a detailed literature review is discussed. A literature review is divided into various parts as it discusses the importance of capital formation, the crucial role of FDI and FIIs towards the economic growth, FII investment and Stock market, Positive and Negative role of FIIs in the stock market and FII investment and the performance of the Indian equity market.

The fourth chapter emphasis on the achievement of the first objective of the study the pattern of FII investment in the Indian equity market. It talks about the establishment of the time-series model using ARIMA and SARIMA models for FII investment in the Indian equity market. Further, it also talks about the structural breaks in FII investment in the Indian equity market.

The fifth chapter emphasis on the achievement of the second objective of the study of the determinant of FII investment in the Indian equity market. In this chapter first of all primary data is analysed to derived major factors affecting investment decision of FIIs in the Indian equity market. For further study causality between different determinant and FII investment is studied. In this chapter domestic institutional investor, gross domestic product, index of industrial productivity, inflation, the exchange rate for USD, call money rate, and foreign exchange reserves of USD are considered as determinants of FII investment in the Indian equity market for the causality study.

In the sixth chapter, the emphasis is made on the last objective of the study of the effect of FII investment on the Indian equity market. To study the effect of FII investment on the Indian equity market first of all causality between various constituents of the Indian equity market and FII investment is done. In causality study market capitalisation, turnover and various sectoral indices were considered representing the performance of the Indian equity market. At last, to measure the effect of FII investment regression model is derived

considering FII investment as the independent variable and Nifty 50 as the dependent variable. In the study of the effect of FII investment volatility-related study is also done to derive the conclusion.

The seventh and the last chapter provides a summary and conclusion of the outcome of the whole study about the FII investment in the Indian equity market.

CHAPTER: 2. THE INDIAN FINANCIAL SYSTEM

2.1. Introduction

For any emerging country like India, foreign investment is crucial as it is a source of foreign exchange as well it provides capital formation which directly affects the growth of the economy. The strong and robust financial system not only facilitate resource mobilisation for economic growth but also creates attractiveness for foreign investment. This chapter consists of a discussion about the Indian financial system and its various components. As the problem statement consists of the study of FII investment in the Indian equity market, Asia's oldest history of the Indian equity market is discussed. At the end of the chapter, the contemporary position of the Indian equity market is discussed.

2.2. Indian Financial System and Economic Growth

The Indian financial system performs a decisive role in economic growth in India through the savings-investment process, also known as capital formation. A high rate of capital formation is an indispensable condition for rapid economic development. The process of capital formation depends upon 1. Increase in savings, 2. Mobilization of savings and 3. Investment. The financial system of India refers to the system of borrowing and lending of funds or the demand for and the supply of funds of all individuals, institutions, companies and of the government (Datt & Sundharam, 2010). Thus, for capital formation, the general public should be encouraged to save their money, which is mobilized through banking and financial institutions. Indian financial system (Figure 1.4) provides support in capital formation.

Indian financial system can be divided into majorly two parts i.e. formal (organised) and informal (unorganized). Indian economy considers only formal part of the Indian financial system which consists of five pillars: Regulators, Financial Institutions, Financial Markets, Financial Instrument and Financial Services.

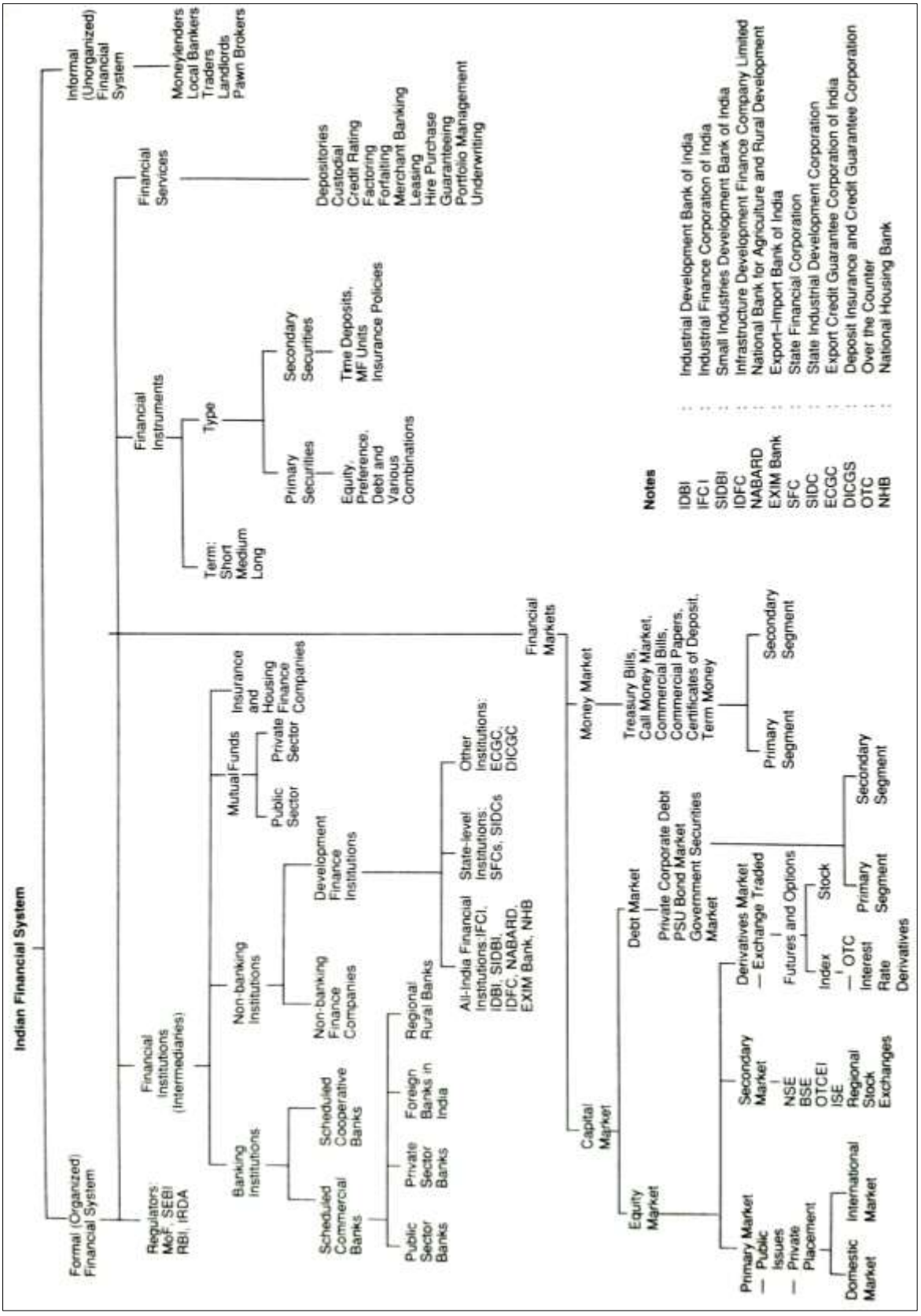


Figure 2.1. Indian financial system [Source: (Pathak, 2014)**]**

Regulators in Indian financial system are Ministry of Finance (MoF), Reserve Bank of India (RBI), Security Exchange Board of India (SEBI), and Insurance Regulatory and Development Authority (IRDA).

Indian financial system can be divided into majorly two parts i.e. formal (organised) and informal (unorganized). Indian economy considers only formal part of the Indian financial system which consists of five pillars: Regulators, Financial Institutions, Financial Markets, Financial Instrument and Financial Services.

Regulators in Indian financial system are Ministry of Finance (MoF), Reserve Bank of India (RBI), Security Exchange Board of India (SEBI), and Insurance Regulatory and Development Authority (IRDA).

Financial Institutions can be broadly classified into Banking institutions, Non-banking companies and institutions (development institutions at national and state level), Mutual Funds and other financial institutions like Insurance and Housing Finance Companies.

The financial market can be divided into two parts capital and money market. The capital market provides long term funds whereas money market deals with short-term funds.

Capital market is a major market which provides funds to industries for their growth and development in terms of equity and borrowed funds. Further discussion is done in the latter part of this chapter.

Financial instruments can be also called as financial products or financial assets against which all borrowing and lending process take place. The financial instrument can be classified on the basis of a time period (short, medium and long) or type of their contribution to industry i.e. primary or secondary securities. Primary securities directly provide finance to all kind of businesses whereas secondary securities are an indirect instrument for investment through providing scope for buying and selling securities already issued in the primary market.

Lastly, financial services provide ease in doing business and investment in the economy. They facilitate various services like dematerialization of securities, custodial service, credit rating to financial instruments, business operations related services like factoring and forfeiting, financing-related services like higher purchase and leasing, guaranteeing, investment-related services like portfolio management, new issues related services like

underwriting, merchant banking etc. All these services play an important role in running various businesses in an effective manner.

Thus, these various components of the Indian financial system provide great support to the economy in smooth performance and achieving sustainable growth. One of the important components of the Indian financial system is the capital market, which deals with the long term securities which provide scope for long term investment as well as long term capital to the business and industry. The following section of the chapter provides detailed aspects of the capital market.

2.3. Indian Capital Market

The Indian capital market is the market for long term financial instruments and regulated by SEBI. Long-term instruments can be divided on various basis i.e. on the basis of their features in terms of equity and debt, in terms of issuer i.e. industry (companies), banking institutions and government and in terms of their contribution to providing finance to issuer i.e. primary market and secondary market. It can be further categories in terms of instruments for domestic investment and foreign capital.

Firstly, on the basis of features capital market consists of two types of instruments equity and debt. Equity includes equity and preference share i.e. share capital contributing to owners' capital for public and private sector companies. Owners' capital is with the high-risk high return nature. Debt instruments like bonds, debenture, deposits and loans are borrowed capital for industries as well as the government. Debt instruments are having fixed interest with less amount of the risk, as they are backed up with some collaterals in case of default in timely repayment of interest or principal amount.

Secondly, on the basis of contribution in financing i.e. Primary Market and Secondary Market. Primary market deals with the issue of instruments like shares, debentures and depository among investor (retail investor or financial institutions).

Primary market provides various option through which issuer (company) can collect their funds through various modes like initial public issue (IPO), follow-on public issue (FPO), right issue or preferential issue. IPO is the first time issue of share to the investor by issuing new shares or offer for sale by an unlisted company. FPO is an issue of new shares or offers

for sale of shares by a listed company to the investors. The right issue is an offer to an existing shareholder on pro-rata basis of their investment in the company before offering shares to the general public. A bonus issue is an issue of bonus share among existing shareholders to capitalize on reserve and surplus. Preferential issues are done with the prior permission of existing shareholders in which shares are issued to a various small group of investors like promotors, foreign partners, private equity funds, technical collaborators etc. An Indian company can also raise their fund from the foreign market through the issue of American Deposit Receipt and Global Depository receipt, in the same way, a foreign company can go for Indian Depository Receipt, which enables them to raise the fund without getting listed in another country.

Secondary markets provide liquidity to various investors to sell their stake in an open market. Secondary markets are also known as stock exchanges, where investors can buy and sell shares and securities of listed companies. Next section of the chapter discusses in detail about the stock market in India.

> Contribution in the capital market can be further divided on the basis of types of investors i.e. retail individual investors, qualified institutional investors and non-institutional investors. As per notification of SEBI (26th August, 2009) **"non-institutional investor"** means an investor other than a retail individual investor and qualified institutional buyer. **"retail individual investor"** means an investor who applies or bids for specified securities for a value of not more than two lakhs rupees. **"qualified institutional buyer"** means: (i) a mutual fund, venture capital fund, Alternative Investment Fund and foreign venture capital investor registered with the Board; (ii) a foreign portfolio investor other than Category III foreign portfolio investor, registered with the SEBI; (iii) a public financial institution as defined in section 4 A of Companies Act, 1956; (iv) a scheduled commercial bank; (v) a multilateral and bilateral development financial institution; (vi) a state industrial development corporation; (vii) an insurance company registered with the Insurance Regulatory and Development Authority; (viii)a provident fund with minimum corpus of twenty five crore rupees; (ix) a pension fund with minimum corpus of twenty five crore rupees; (x) National Investment Fund set up by resolution no. F. No. 2/3/2005-DDII dated November 23, 2005, of the Government of India published in the Gazette of India; (xi) insurance funds set up and managed by army, navy or air force of the

Union of India; (xii) insurance funds set up and managed by the Department of Posts, India.

2.4. Indian stock market

This section of the chapter discusses the details of the development of the stock market in India.

2.4.1. History of Stock Exchange India

In India first time five stockbrokers gathered under banyan trees in front of Mumbai Town Hall in 1855. Due to an increase in the number of brokers they have to change their meeting place many times. In 1875 finally they fixed their place and become formal organization is known as "The Native Share & Stock Brokers Association" at Dalal street, a place known as such due to brokers are known as Dalal. The organisation later become popular as Bombay Stock Exchange (BSE). BSE is the first stock exchange recognised by Government of India under the Securities Contracts Regulation Act on August 31, 1957. It was followed by the Ahmedabad stock exchange 1894, Calcutta Stock exchange in 1908, Madras Stock Exchange is 1937 and so on. The Calcutta Stock Exchange (CSE) was the largest stock exchange in India till the 1960s. However, during the latter half of the 1960s, the relative importance of the CSE declined while that of the BSE increased sharply

Till early 1990s Indian stock exchanges comprised regional stock exchanges with the BSE heading the list bearing many constraints as follow.

- Lack of transparency in price determination of contract
- Long and uncertain settlements
- High transaction cost
- Lose control of the regulatory system
- Scope of off-market transactions
- Scams

After reforms in the year 1991, in 1992 Over the Counter Exchange of India (OTCEI) and in 1994 National Stock Exchange (NSE) was established. Currently, there are 23 stock exchanges in India. Among them, two are national-level stock exchanges namely Bombay

Stock Exchange (BSE) and National Stock Exchange of India (NSE). The rest 21 are Regional Stock Exchanges (RSE). In 1992 under the Securities exchange board of India Act, Security Exchange Board of India (SEBI) established to protect investors' interest and promote and regulate the securities market. As a latest development SEBI recognised Metropolitan Stock Exchange of India Limited (MSE) MSE is acquainted a "recognised stock exchange" under Section 2(39), the Companies Act, 1956 by Ministry of Corporate Affairs, Government of India, on 21st December 2012("About Us | Metropolitan Stock Exchange of India Ltd. Limited (MSE)," 2019).

2.4.2. Stock Exchanges in India

Above discussion explained about various stock exchanges established before and after liberalisation. Following table provides information regarding establishments of various stock exchanges and their address to contact most of them are now sluggish in their operations.

Table 2.1. Stock Exchanges in India and their establishment

Name	Address	Establishment
The Bombay Stock Exchange (BSE)	Phiroze Jeejeebhoy Towers, Dalal Street, Mumbai- 400 001.	9th July 1875
The Ahmedabad Stock Exchange Association Ltd.	Manek Chowk, Ahmedabad - 380 001	1894
Bangalore Stock Exchange Ltd.	'M' Block, First Floor, Unity Building, J.C. Road, Bangalore - 560 002.	1963
Bhubaneswar Stock Exchange Assn Ltd.	217, Budhraja Building, Jharpada Cuttack Road, Bhubaneswar, Orissa - 751 006.	17th April 1989
The Calcutta Stock Exchange Association Ltd.	7, Lyons Range, Calcutta - 700 001.	1908
Cochin Stock Exchange Ltd.	Veekshanam Road P.B. 3529, Ernakulam, Cochi - 682 035.	1978
The Delhi Stock Exchange Assn. Ltd.	3&4/4B, Asaf Ali Road, New Delhi 110 002.	1947
The Gauhati Stock Exchange Ltd.	Saraf Building Annexe A.T. Road, Guwahati - 781 001.	29th November 1983

The Hyderabad Stock Exchange Ltd.	Bank Street, Hyderabad - 500 001.	1941
Jaipur Stock Exchange Ltd.	Rajasthan Chamber Bhawan, M.I. Road, Jaipur - 302 003.	1989
Mangalore Stock Exchange Ltd.	4th Floor, Rambhavan Complex, Kodialbail, Mangalore - 575 003.	31st July 1984
The Ludhiana Stock Exchange Assn. Ltd.	Lajpat Rai Market, Clock Tower, Ludhiana 141 008.	1983
Madras Stock Exchange Ltd.	'Exchange Building', Post Box No.183, 11, Second Line Beach, Chennai - 600 001	1937
Madhya Pradesh Stock Exchange Ltd.	67, Bada Sarafa, Indore - 452 002.	1919
The Magadh Stock Exchange Association Ltd.	Bihar Industries Assn. Premises, Sinha Library Road, Patna - 800 001.	1986
Pune Stock Exchange Ltd.	1177, Budhwar Peth, Bank of Maharashtra Bldg., 2nd Floor, Bajirao Road, Pune 411 002.	1982
Saurashtra Kutch Stock Exchange Ltd.	4, Swaminarayan Gurukul Bldg., Dhebarbhai Road, Rajkot - 380 002.	1989
The Uttar Pradesh Stock Exchange Assn. Ltd.	Padam Towers, 14/113, Civil Lines, Kanpur - 208 001	27th August 1982
Vadodara Stock Exchange Ltd.	101, Paradise Complex, Tilak Toad, Sayaji Gunj, Vadodara - 390 005.	1990
Coimbatore Stock Exchange	Chamber Tower, 8/732, Avvinashi Road, Coimbatore 641 018.	1991
Meerut Stock Exchange Ltd.	Kingsway Building, 345, Bombay Bazar, Meerut Cantonment - 250 001.	1956
Over The Counter Exchange of India.	Maker Towers "F" Cuffe Parade, Bombay - 400 005.	1990
National Stock Exchange of India Ltd. (NSE)	Mahindra Towers, A-Wing, RBC, Worli, Mumbai 18	1992

Inter-Connected Stock Exchange of India Limited (Ise)	International Infotech Park, Tower No 7, 5th Floor, Sector 30-A Vashi, Navi Mumbai - 400 703.	January 1998
Metropolitan Stock Exchange of India Limited (MSEI)	4th floor, Vibgyor Tower, Opposite Trident Hotel, Bandra-Kurla Complex, Mumbai, - 400098	21st December 2012

As per the SEBI report ("SEBI | Handbook of Statistics," June 12, 2018) most of the regional stock exchanges are defunct. The Hyderabad Securities and Enterprises Ltd (erstwhile Hyderabad Stock Exchange), Coimbatore Stock Exchange Ltd, Saurashtra Kutch Stock Exchange Ltd, Mangalore Stock Exchange, Inter-Connected Stock Exchange of India Ltd, Cochin Stock Exchange Ltd, Bangalore Stock Exchange Ltd , Ludhiana Stock exchange Ltd, Gauhati Stock Exchange Ltd, Bhubaneswar Stock Exchange Ltd, Jaipur Stock Exchange Ltd, OTC Exchange of India , Pune Stock Exchange Ltd, Madras Stock Exchange Ltd, U.P.Stock Exchange Ltd, Madhya Pradesh Stock Exchange Ltd and Vadodara Stock Exchange Ltd have been granted exit by SEBI vide orders dated January 25, 2013, April 3, 2013, April 5, 2013, March 3, 2014, December 08, 2014, December 23, 2014, December 26, 2014, December 30, 2014, January 27, 2015, February 09, 2015, March 23, 2015, March 31, 2015, April 13, 2015, May 14, 2015, June 09, 2015 and November 09, 2015 respectively. Delhi stock exchange has been derecognized vide SEBI order dated November 19, 2014, whereas nowadays Ahmedabad Stock Exchange and Calcutta Stock Exchange are non-operational. Only NSE, BSE and MSEI are in functional in stock market operations.

In terms of a number of shares traded in Indian stock exchanges total 32,56,299 lacks shares traded between Apr 2017 and Dec 2017. Out of which 26,96,125 lac shares were traded in NSE, 5,60,033 lac shares were traded in BSE and only 141 lac shares traded in MSEI as per SEBI report. In terms of delivery based shares traded in Indian stock exchanges were in total of Rs. 17,66,115 crores between Apr 2017 and Dec 2017. Out of which Rs 14,70,711crore shares traded in NSE, Rs. 2,95,378 crore shares traded in BSE and only Rs. 26 crore shares traded in MSEI as per SEBI report. Thus it can be said that currently, only three stock exchanges i.e. NSE, BSE and MSEI are active in the Indian financial system for the exchange of shares.

As discussed earlier BSE established on 9th July 1878, is the oldest stock exchange in Asia. Its market cap as in March 2019 is Rs. 151,970.87 billion (USD2.2 trillion). There are 5,439 companies listed on BSE. It provides a platform for trading in equity, currencies, debt

instruments, derivatives, mutual funds. On 1st October 2018, BSE launched its commodity derivatives segment.

NSE is a comparatively young and dynamic stock exchange in India. It established in 1992 as the first demutualized electronic exchange in India. It's a market cap as in March 2019 is Rs. 1,49,342.27 billion (USD2.2 trillion). There are 1,952 companies listed on NSE. NSE is the leading stock exchange in India and the second largest in the world by nos. of trades in equity shares from January to June 2018, according to World Federation of Exchanges (WFE) report. NSE is called a pioneer for screen-based trading, derivative trading and internet trading.

Metropolitan Stock Exchange of India Limited (MSEI) is recognised by SEBI on December 21, 2012. It also provides an electronic platform for trading in the Cash Market of the equity market, Futures & Options (F&O) of equity market, Currency Derivatives and Debt Market segments. There are 1,779 companies listed on MSEI as on 4th September 2019.

As it is difficult to understand about ups and downs in the stock market with amounts in lacs and crores in an absolute manner, as an indicator of stock markets, stock market indices play a significant role in comprehending stock market movements. Next session of the chapter discusses stock indices.

2.4.3. Stock Market Indices

Stock market indices are tools which are measured on the basis of a section of various stocks in the stock market. They are computed from the prices of selected stocks in a particular segment of stock markets. The weighted average method is used to calculate the index value. There are mainly two methods i.e. total market capitalisation and free-float market capitalisation. These segments are having various basis mainly based on capitalisation and sector-specific indices. Various indices are used by investors and portfolio managers to get an idea about stock market useful in investment decisions.

Stock market indices can play vital roles in various ways. Firstly, it can be used as a yardstick to evaluate the performance of individual stocks and/or portfolios. Secondly, in forecasting future using technical analysis and other forecasting methods it provides great help in judgement regarding movements in the stock market. Thirdly, sectorial indices help in

comparative performance of various industries and intra comparison with past performance of sectoral indices. Fourthly, indices based on capitalisation also helps in analysing performances of various stocks. Lastly, at international level also can be compared the performance of the Indian stock market with other emerging economies as well as developed countries too, as it can be considered as one of the economic indicator (Pathak, 2014). Following table provides a list of various stock indices in BSE, NSE and MSEI.

Table 2.2. Stock Indices of Indian Stock Exchanges

BSE Indices	**Introduced in**
S&P CNX Sensex	1986
S&P BSE SENSEX 50 Index	December 2016
S&P BSE Smallcap Index	April 2003
S&P BSE Midcap Index	April 2003
S&P BSE SmallCap Select Index	July 2015
S&P BSE MidCap Select Index	July 2015
S&P BSE LargeCap Index	September 2005
S&P BSE AllCap Index	September 2005
S&P BSE 100 Index	April 1984
S&P BSE 200 Index	January 1991
S&P BSE 500 Index	February 1999
S&P BSE BANKEX Index	January 2002
S&P BSE Auto Index	February 1999
S&P BSE Basic Materials Index	September 2005
S&P BSE Capital Goods Index	February 1999
S&P BSE Consumer Discretionary Goods & Services Index	September 2005
S&P BSE Consumer Durables Index	February 1999
S&P BSE Energy Index	September 2005
S&P BSE Finance Index	September 2005
S&P BSE FMCG Index	February 1999
S&P BSE Healthcare Index	February 1999
S&P BSE India Mfg Index	June 2015
S&P BSE Industrials Index	September 2005

S&P BSE IPO Index	May 2004
S&P BSE IT Index	February 1999
S&P BSE Metals Index	February 1999
S&P BSE Oil and Gas Index	February 1999
S&P BSE Power Index	January 2005
S&P BSE PSU Index	February 1999
S&P BSE Realty Index	January 2006
S&P BSE TECK Index	January 2000
S&P BSE Telecom Index	September 2005
S&P BSE Utilities Index	September 2005
NSE Indices	**Base**
Nifty 50 Index	November 1995
Nifty Next 50 Index	January 1997
Nifty 100 Index	June 2009
Nifty 200 Index	January 2004
Nifty 500 Index	January 1995
Nifty Midcap 150 Index	April 2005
Nifty Midcap 50 Index	January 2004
Nifty Full Midcap 100 Index	April 2005
Nifty Free Float Midcap 100 Index	January 2003
Nifty Smallcap 250 Index	April 2005
Nifty Smallcap 50 Index	April 2005
Nifty Free Float Smallcap 100 Index	January 2004
Nifty MidSmallcap 400 Index	April 2005
Nifty Auto Index	January 2004
Nifty Bank Index	January 2000
Nifty Financial Services Index	January 2004
Nifty FMCG Index	December 1995
Nifty IT Index	January 1996
Nifty Media Index	December 2005
Nifty Metal Index	January 2004
Nifty Pharma Index	January 2001
Nifty Private Bank Index	April 2005

Nifty PSU Bank Index	January 2004
Nifty Realty Index	December 2006
Nifty Energy Index	January 2001
Nifty Infra Index	January 2004
Nifty MNC Index	December 1995
Nifty PSE Index	December 1994
Nifty Service Sector Index	May 1999
MSEI Indices	**Base**
SX40 (Base Value 10000) Index	31st March 2010
SXBANK (Base Value 5000) Index	31st March 2010

Though BSE and NSE have introduced a number of indices their major well-known indices are Sensex and Nifty 50 respectively. Normally people consider market ups and downs on the basis of these two indices. Nifty 50 is a diversified index of 50 stocks belongs to 12 different sectors of the economy. NIFTY 50 is owned and managed by NSE Indices Limited (formerly known as India Index Services & Products Limited) ("NSE - National Stock Exchange of India Ltd.," 2019). Sensex updates and calculations are provided by Asia Index Pvt. Ltd, which is having a 50-50 partnership between S&P Dow Jones Indices LLC and BSE Ltd. Sensex measures the performance of the thirty largest, most liquid and financially rigorous companies through important sectors of the Indian economy that are listed at BSE Ltd ("S&P BSE SENSEX - Asia Index Pvt. Ltd.," 2019).

2.4.4. Players in the Stock Market

In stock market operations mainly six players play important role i.e. Issuer, Investor, Broker, Bankers, Depositor and Regulator.

The issuer is an organisation, generally a company who issues securities for raising their capital. Investors are people who would like to park their savings in various investment avenues. Investors may be an individual or institutional investor.

In the stock market for market operation investors have to choose a **broker** through whom only they can deal in stock markets. Brokers may provide the facility to buy or sell through their own terminal by receiving an order on the telephone or personally. They may also provide online facility to their client to perform market operation online using the internet.

Now a day it is compulsory to convert physical shares into dematerialized form i.e. demat. **Depository and depository participant** provide demat facility to convert physical share into dematerialized form and their electronic transfer.

For monetary transfer against share and securities **Banker** provide services of transfer of funds.

For proper regulation and to take care of the interest of investor government authority plays the role of **regulator**. The regulator provides guidelines to all other plays to deal in the stock market. It includes all the authorities which facilities trade for financial instruments. In the stock market, major regulators who play an important role in trading are SEBI, Stock exchanges and Clearing Corporation. The clearing corporations are responsible for the settlement of transactions dealt on respective stock exchanges.

Thus, **Investor** needs to open at least three accounts to operate in stock market i.e. bank account for fund transfer, demat account for electronic transfer of shares and for stock market operations account with brokers who are registered with specific stock exchanges. Investors can be bifurcated mainly into two categories 1) Individual investors and 2) Institutional investor. Individual investors are small investors who invest in their own personal account. They are comparatively non-professional and may lead by behavioural biases. Individual investors are less effective to influence the market as they have a limited amount of investment in the proportion of total market capitalisation and market turnover. Institutional investor category includes institutions like mutual funds, pension funds, hedge funds, insurance companies, commercial banks, portfolio managers, foreign institutional investor and so on. Institutional investors are more sophisticated and rational compared to individual investors, who invest on behalf of their clients. They invest their huge amount of the fund and responsible for a major movement in the market.

In India stock market are significantly affected by institutional investors namely Domestic Institutional Investors (mainly includes Indian Mutual Funds) and Foreign Institutional Investors. In India, mutual funds and foreign institutional investors (FIIs) commenced their business the year 1963 and 1992 respectively. By the year 2002 most of the developments in Indian, the stock market took their shape and created India as an international platform for international investment. Following discussion emphasises on milestones of Indian stock market.

2.4.5. Milestones and Current Mechanism of Indian Stock Market Operations

Establishment and Empowerment of SEBI: SEBI established in 1988 and given statutory power in January 1992 through the SEBI Act, 1992. The basic function of SEBI is to protect the interests of investors in securities and to promote the development of, and to regulate the securities market and for matters connected therewith or incidental thereto.

During the 1980s, there was remarkable growth in the capital market due to the increasing participation of the public. This led to many misuses like Rigging of prices, an unofficial premium on new issues, violation of rules and regulations of stock exchanges and listing requirements, delay in delivery of shares etc. by the brokers, merchant bankers, companies, investment consultants and others involved in the securities market. It led to many investors grievances. Since there was not proper penal provision and legislation, the government and the stock exchanges were not able to equalize these grievances. This obliged a prerequisite for a separate regulatory body. (Kalpana, 2014). During the announcement of Budget 1987-88 Shri Rajiv Gandhi, Prime Minister and his government also realised the need of a distinct regulatory board of Indian stock exchanges – Securities and Exchange Board of India (SEBI), suggested by Finance Secretary S Venkitaraman. Their initiative towards development of regulatory body gave a boost to capital issue from just Rs 500 crore in 1980-81, to Rs 5,000 crore in 1986-87 (Virkraman, April 5, 2017). It also becomes crucial for the development of Mutual Fund in India after first Mutual Fund launched by Unit Trust of India (UTI) in 1963 (UTI was an initiative of the Govt. of India and the RBI). SBI Mutual Fund becomes the first non-UTI mutual fund in India in 1987 ("Concept and Evolution of Mutual Funds in India," February 5, 2015). A committee consisting of members like S.A. Dave Ravi Narain, Chitra Ramakrishnan, G V Nageswara Rao and Pratip Kar, formed to determine structure and role of SEBI. After analysing the securities market governing model of the UK and USA, where the Financial Services Authority had just been designed, they toiled on a draft law. But still the statutory power was absent. In mid-1990 Prime Minister V.P.Singh appointed G.V.Ramrishan and gave him charge of SEBI. Initially, the Finance Ministry's powers concerning the capital market were vested mainly in the Controller of Capital Issues or CCI. After discussion between SEBI and the ministries of Finance and Company Affairs on January 30, 1992, the government issued an Ordinance giving SEBI statutory status. In February, G.V. Ramakrishna held the first Board meeting to formulate regulations for the capital market and its intermediaries i.e. stockbrokers and merchant bankers, which were

approved by the Finance Ministry. SEBI ordinance become law in April 1992. In continuation role of SEBI become important after various scams in stock market described by Pathak (2014) in her book viz. in 1992 Harshad Mehta's scam, in March 1995 M. A. Shoes scam, in December 1997 issue Reliance share switching scam, in May 1997 scam of chartered accountant C. R. Bhansali, in 1998 price rigging in case of the BPL, Videocon and Sterlite scrips, insider trading by Anand Rathi and President of the BSE in March 2001 and scam of Ketan Parekh between up to 2001. Since various regulations followed by number of resistance from various players in Indian capital market, SEBI is emerged as successful regulator and facilitated a lot in terms of confidence of small investors as well as investment of foreign investor (Virkraman, April 5, 2017).

Introduction of National Stock Exchange (NSE): Government found BSE had a monopoly in the stock market and its brokers were belonging only some close groups. It also led to very little use of technology, transparency and openness in the market. NSE was incorporated in 1992, with best of technology available and a much more open system of admitting brokers. It was recognised as a stock exchange by SEBI in the month of April of 1993 and initiated operations in the year 1994 with the unveiling of the wholesale debt market, followed shortly after by the introduction of the cash market segment ("NSE - National Stock Exchange of India Ltd.,").

Ban on Badla Trading: Badla trading means allowing trades to be carried forward in the stock market without a settlement, it led to various scam and issues. It was also criticized by International Finance Commission and the then the esteemed firm of Arthur Andersen. Badla trading was banned by SEBI in 1993 effective from March 1994. But again permitted in 1996 with some restrictions, as BSE fell into deep with an argument of problem-related to liquidity. Finally, it again banned from July 2001 after the introduction of Derivative contracts initiated by NSE in the year 2000 which allowed trades without affecting liquidity (Maitra, March 11, 2013).

Commencement of Rolling Settlement: SEBI introduced rolling settlement as a part of risk management and to bring efficiency in the market. The rolling settlement means each trading day is trading period in which all trades executed on that day considered to determine net obligation for that day only. In the rolling settlement, settlements are done on a T+2 basis i.e. on the 2nd working day after a trade.

S.No	Day	Time	Description of activity
1	T		Trade Day
2	T+1	By 1.00 pm	Confirmation of all trades (including custodial trades).
		By 2.30 pm	Processing and Downloading of obligation files to brokers/custodians
3	T+2	By 11.00 am	Pay-in of securities and funds
		By 1.30 pm	Pay-out of securities and funds

Figure 2.2. Rolling Settlement

Electronic Trading: An electronic stock exchange refers to a stock bourse where the majority, if not all, trades take place through electronic trading platforms. As a part of reforms, the first electronic trading platform National Exchange for Automated Trading (NEAT) in India was launched by the National Stock Exchange (NSE) in 1994. BSE started its automated screen-based trading platform BSE online trading (BOLT) in 1995. Electronic trading has coined many benefits like more transparency in transactions, efficient information system, more efficient operations, better liquidity etc.

Dematerialization: In 1996 dematerialization of shares and securities introduced in India. Dematerialization is converting a physical form of shares and securities into electronic form i.e. book entry of shares ownership at depository participants of any of two depositories National Security Depository Limited (NSDL) and Central Depository Service Limited. This has eliminated a few issues like theft, fake/forge transfers, transfer delays etc.

Circuit Breaker: Circuit breaker is a halt in trading at equity and equity derivative market throughout the country. These breakers are based on SEBI Circular No. SMDRPD/Policy/Cir-37/2001 dated 28th June 2001 which modified with Circular no. CIR/MRD/DP/ 25 /2013 dated 3rd September. An index-based market-wide circuit breaker system at three stages of the index movement either way at 10%, 15% and 20% has been prescribed. The breakers are activated by the movement of either Nifty 50 or Sensex, whichever is breached earlier. For individual scrip, it is 2%, 5% and 10%. As securities which deal in the derivative market are not covered under it. But 20% price band is applicable in general.

Margin: To provide against the risk of the fluctuation in the price of securities Brokers are charged a certain amount of margin. Margin is the equity amount invested against which

limit for the financial transactions are determined. Clearing corporation determines the limit for brokers and clearing members and against their limit they determine the limit for their client. Margin amount is determined on the basis of three types of margin Value at Risk (VaR) margin, Extreme loss margin and Mark to market margin. VaR margin is a margin proposed to cover the largest loss that can stumble upon on 99% of the days (99% Value at Risk). The methodology of the VaR margin calculation is suggested by Prof. J.R. Varma. The Extreme Loss Margin is the higher of 5% or 1.5 times the standard deviation of daily logarithmic returns of the security price in the last six months. Mark to market Margin is calculated by determining each transaction in security to the closing price of the security at the end of trading.

Derivative Market: SEBI observed that due to the undesirable speculation in equity market genuine investors were losing their faith. To protect the interest of genuine investor SEBit is found that it was essential to separate speculative transactions from the equity market, but at the same time, these speculative transactions provide liquidity in the market. Thus, SEBI planned to segregate both of the markets and as an initiative, SEBI approved trading in the derivatives market after careful observation of Dr. L.C. Gupta committee in November 1996 and taking into consideration of recommendations of Prof. J. R. Varma committee. The index futures contracts trading approved followed by approval for trading in options which begun in June 2001. Options on individual securities instigated in July 2001. Futures contracts on individual stocks were flung in November 2001.

Foreign Institutional Investors: Foreign investors are important to the Indian capital market towards matching the international standard of the financial market, to get the foreign fund for further development, to get the foreign exchange without fixed liabilities, to integrate with the international financial market as well as to motivate Indian corporates to enhance their corporate governance. Considering this holistic approach from September 14, 1992, with suitable restrictions, SEBI permitted FIIs to invest in financial instruments.

All these steps and initiatives of the Indian financial system has increased the confidence of small investors to invest in Indian capital market and attracted Foreign Investor to Invest in Indian financial markets.

2.5. Current State of Indian Capital Market

Capital market assists economic development through capital formation. This capital formation can be done through Primary and Secondary market of Equity, Debt and Mutual Funds. Investors invest through any of these financial instruments and industry get the fund, directly or indirectly from them. The following discussion emphasises on the recent mobilization of financial resources for capital formation in the Indian economy.

2.5.1. Performance of Primary Market

Primary market provides the long term fund to the industry and provides financial resource mobilisation through investment in different industrial securities chiefly equity shares.

Last year remained passive in resource mobilisation through the primary market. Indian primary market is dominated by **private placement**, as it is an easy and quick method to raise the capital. In the case of private placement during the period of April – December 2018 26% declined observed compared to the same period in the year 2017. In this period in 2018 Rs. 3.4 trillion were mobilized through 1,671 issues ("Indian Security Market, A Review (ISMR)," 2019).

During the period of April – December 2018, a 40% decline found in resource mobilisation through the **public and the** right issue in the primary market in India, compared to the same period in the year 2017. In this period only 124 companies used public and right issues to raise Rs. 444 billion, compared to 153 issues to raise Rs. 728 billion, during the same period in the year 2017.

In the last financial year, a significant downturn found in the case of IPOs. Throughout the year 2018-19, there were 42 IPOs through which Rs. 36,405 crores were mobilized, which was only 37 per cent of fund mobilized through IPO in the year 2017-18 i.e. Rs. 98,984 crores and 52 per cent of the number of IPOs of the year 2017-18 i.e. 81 IPOs ("SERVICES PROVIDED UNDER PUBLIC ISSUES (IPOs, FPOs & OFS (SE))," 2019). The fund mobilisation in April month of 2019 was the uppermost, since July 2018, when two companies had raised Rs 3,925 crore from the primary market. In the financial year, 2018-19 fundraising through IPOs dropped by 81 per cent to Rs 16,294 crore from Rs 83,767 crore in the previous financial year. (Korgaonkar & Wadhwa, 2019).

During the period of April – December 2018 resource mobilisation of Rs. 70 billion through 11 **Qualified Institutional Placements (QIPs)** done by Indian companies. At the same time emphasised on the debt, the market increased as during the same period resources mobilized through **public debt** issues increased by 600% to Rs. 286 billion compared to the same in the previous year ("Indian Security Market, A Review (ISMR)," 2019).

2.5.2. Performance of Secondary Market

The secondary market provides liquidity for investors to buy and sell securities in the primary market. The stock market as a secondary market provides the direction of preference of investors and reflection of the condition of the financial market.

During the year 2018-19 Indian stock market performed well. On the last day of March 2019, Sensex and Nifty 50 closed at 38,673 and 11,624 respectively. As per the record provided by BSE and RBI, BSE average market capitalisation during the year 2018-19 remained Rs. 1,51,08,711 crores with P/E of 27.58 on March 2019. The market capitalisation of NSE was Rs. 1,49,34,227 crores as on March 2019 as per the record of RBI. During the March 2019 turnover of BSE was Rs. 80,977 crores whereas the turnover of NSE was Rs. 6,97,224 crores (RBI, 2019).

During the period from April – December 2018, Sensex and Nifty 50 increased by 17% and 15% respectively, at the same time comparatively indices of emerging countries declined by 10% and all over the world stock markets increased by 2%. During this period volatility of the Indian equity market remained lowest compared to developed as well as emerging markets. NSE and BSE both found a position in the top 10 exchanges out of all WFI member's exchanges in terms of market capitalisation. In terms of the turnover, NSE ranked second among all WFE member exchanges with 2.8 billion trades during the year 2018 and ranked 14^{th} in terms of the value of shares traded for the same period ("Indian Security Market, A Review (ISMR)," 2019).

Swamy (2019) observed that in the month of April 2019 Nifty increased by 1.1 per cent and Sensex increased by 0.9 per cent, compared to 7.7 per cent and 7.8 per cent in March 2019 respectively. At the same time, she also found that P/E of Nifty 50 climbed to 29.3 times since 1990.

Table 2.3. Domestic Market Capitalisation (USD millions)

Exchange	March 2019	% of total Capitalisation	Rank	Country
NYSE	23211054.50	28.05	1	USA
Nasdaq - US	11218242.90	13.56	2	USA
Japan Exchange Group	5608259.60	6.78	3	Japan
Shanghai Stock Exchange	5013731.00	6.06	4	China
Hong Kong Exchanges and Clearing	4307771.30	5.21	5	Hong Kong
Euronext	4268405.70	5.16	6	Europe (Netherlands)
LSE Group	3965347.90	4.79	7	UK
Shenzhen Stock Exchange	3355375.90	4.06	8	China
TMX Group	2216349.70	2.68	9	Canada
BSE India Limited	**2179095.80**	**2.63**	**10**	**India**
National Stock Exchange of India Limited	**2156171.60**	**2.61**	**11**	**India**

(Source: World Federation of Exchanges – Market Statistics)

In domestic market capitalisation in March 2019, highest market capitalisation is of USA (approx. 41.6%), then China (approx. 10.1%), Japan (6.8%), and then India (5.24% i.e. BSE + NSE) followed by Hong Kong, Netherlands, UK and Canada.

In terms of various companies listed in various stock exchanges in the world, BSE is at the top with 5,479 companies listed in it which is followed by Japan Exchange Group Inc. with 3597 companies listed on January 2018 ("Number of Listed Companies," January 2018)

In terms of a number of trading, NSE is having the second-highest number of trades i.e. 26,86,49,100 during January 2018 and at first rank Shenzhen Stock Exchange with the highest number of equity trades i.e. 28,38,73,000 ("Equity Trades," January 2018).

2.5.3. Performance of Equity Derivative Market

In the financial year 2017-18, a total turnover of derivatives in NSE continued increasing and increased by 75% compared to the previous year and reached to Rs. 1,649 trillion. But after March 2018 growth slowed down during April – December 2018 might be due to national as well as international factors. In the financial year, 2017-18 total 1,913 million

contracts were traded at NSE whereas at BSE 44,701 contracts were traded. Since 2010-11, total turnover in derivatives is about 3 times of total turnover in the cash segment of the equity market. In the year 2018-19 turnover of F&O segment (Rs. 225,700 billion) was 2.8 times of turnover of cash segment (Rs. 79,490 billion). Jency (2017) also observed the growth in Indian equity derivative market. She argued that both BSE and NSE shows the increasing trend in trading of equity derivatives throughout the period from 2011-12 to 2016-17. At the end of the year, 2017-18 at NSE was 3.8 million contracts (Rs. 2,749 billion) compare to 3.5 million contracts (Rs. 2,495 billion) at the end of the year 2016-17. ("Indian Security Market, A Review (ISMR)," 2019).

2.5.4. Performance of Mutual Fund Industry

Mutual fund providers are considered as collective investment vehicles (CIV), facilitates individual as well now SEBI allowed foreign institutional investors to invest in the Indian equity market. MF industry mobilised Rs. 1,318 billion in the year 2015-16, which was the highest since 2007-08. In the year 2016-17 MF industry mobilised Rs. 3,434 billion. In these public sectors, MFS increased from Rs. 875 billion to Rs. 2, 743 billion. In the year 2017-18 net investment of MF industry declined to Rs 2, 343 billion.

There were 45 MFs registered with SEBI as on 31st March 2018, out of the 7 were of the public sector. As on 31st March 2017, there were 2,281 MF schemes, which were declined as on 31st March 2018 to 1,998 schemes. Out of these 1,357 were Income funds, 514 were growth funds, 31 were balanced funds, 52 were liquid funds, 38 were GILT funds and 72 were ELSS schemes. There were also 12 gold ETF, 56 other ETC and 28 schemes operating as funds of funds investing overseas.

AUM of equity Mutual Funds hoisted at a record high of Rs. 7,730 billion at the end of March 2019 as against Rs. 7,500 billion in March 2018, an increase of 3 per cent. Investors pushed in more than Rs. 1,110 billion in equity-based mutual fund (MF) plans in 2018-19, a decline of 35 per cent compared to Rs 1,710 billion inflows in 2017-18 (PTI, 2019).

2.5.5. Performance of Foreign Institutional Investors (FIIs)

As a result of industrial policy 1991 capital market opened the doors for the foreign investor to invest in the Indian capital market. Foreign institutional investors (FIIs) are the major

foreign investors who are regulated by time to time guidelines provided the Indian apex regulatory bodies SEBI and RBI. SEBI introduced a new class of foreign investors in India known as the Foreign Portfolio Investors (FPIs) effective from June 2014. It was formed by merging the following existing classes of investors, namely, FIIs, QFIs, and sub-accounts of FIIs. FII investment is considered as hot money as many domestic and international factors affect their investment. At the same time, time to time FIIs has increased its investment in the Indian equity market. In the year 2018-19 FPIs dominated the Indian equity market by 28.9%.

In 2016-17 and 2017-18, FPIs invested Rs. 484.1 billion and Rs. 1450.7 billion in the Indian equity market but during the year 2018-19 FPIs became net sellers. During the period of April – December 2018 FPIs sold securities of Rs. 941.8 billion (Rs. 470,260 million in the equity market and Rs 470,260 million in debt market). The probable reasons for this sale are several macroeconomic factors including an increase in the US Fed rate, a decline in world economic growth, ongoing US-China trade war and a rise in the probability of no-deal Brexit. ("Indian Security Market, A Review (ISMR)," 2019).

2.6. Summary

Financial markets are the backbone of the economy of any country. Indian capital market facilitates mobilisation of financial resources leads to capital formation in India. These capital formation leads to feed the Indian economic growth. Due to this rigour financial system the Indian economy could move with effective growth rate compare to other developed as well other developing countries in the difficult phase of international challenges. In the capital market, the primary market provides direct support to capital mobilisation during the issue of securities but the stock market provides continuous indirect assistance to the overall financial market. It provides a measure to the performance of the various business through their major indicators of stock indices mainly Sensex and Nifty. Movement in Sensex and Nifty guide the investors to evaluate the performance of the Indian market as a whole. Sensex and Nifty gave 17% and 15% return respectively in the year 2018-19, during which there was a heavy outflow of the FIIs. It signifies the study of FIIs Investment in the Indian equity market. Next chapter throws more light on literature review related to FII investment in the Indian equity market.

CHAPTER: 3. LITERATURE REVIEW

3.1. Introduction

Indian is a capital scarce country, since its independence, it is following policy for being self-reliance in her capital requirements. From the year 1991, to boost the economic growth of the country, the Indian government has taken several measures to boost the Indian financial system. Since India is relatively capital-scarce country, the purpose of liberalisation, was to increase the availability of capital sources in Indian Financial Markets. In this process, foreign capital was invited, so that foreign funds augment Indian capital sources and deepen Indian Financial Market. Liberalised foreign investment supplemented scarce capital resource. In the latter half of the twentieth-century lot of other countries also allowed foreign investment in their economy. This phenomenon is studied and evaluated by different researchers from time to time. In this chapter, an effort is made to review related literature on it.

3.2. Role of Financial System in Economy

Financial System is the backbone of the economy of developed as well as developing countries. Well-developed financial market leads to economic growth (Duisenberg, 2001). Financial markets aid the process of economic growth by performing certain functions viz. increase the liquidity and traceability of assets in an economy, provide openings for economic mediators to diversify their risk, reduce information asymmetry by assembling information on deficit units, promote savings mobilization and the attraction of foreign capital and improve the corporate governance of businesses. Hassan, Sanchez, and Yu (2011) found robust long-run relations between financial development and economic growth and in the short-run bidirectional causality between finance and growth. They found a positive association between finance and economic growth for developing countries but inconsistent results for high-income countries. However, Sawalha, Elian, and Suliman (2016) found that financial market determines the strength of the financial system. In developed country financial market tend to be more active and efficient in approving growth. Agarwal (2016) suggested that GDP is an extremely fundamental factor in predicting the

financial growth of an economy. Greenwood, Sanchez, and Wang (2013) added that world output could increase somewhere between 65 and 88% of all countries adopted the best financial practice in the world.

This relationship between financial system and economic growth is studied by different researchers for different economy in different economic phases. Pradhan, Arvin, Hall, and Nair (2016) found that innovation in financial market and financial development result into substantial increase in per capita income in Euro Zone countries. Batuo, Mlambo, and Asongu (2018) found that in their research in African countries, financial development and financial liberalization have a positive impact on financial instability and economic growth also reduces financial instability. Asteriou and Spanos (2019) studied financial development financial and economic growth and found that during normal (non-crisis) period financial development promotes economic growth but during the crisis, it has an adverse effect on economic activity.

The success of financial market depends upon the efficiency of intermediaries and Greenwood et al. (2013) suggested that that financial intermediation is key for economic development and they also found that about 30% of U.S. growth can be credited to technological advance in financial intermediation. Busch, Bauer, and Orlitzky (2016) found that banks and investors are key participants of the financial market and in they play a dominant role in the allocation of capital through their functioning for economic development. The robust financial system is useful to attract capital which leads to finally economic development. Strong financial markets are needed for private capital flows to impact economic growth positively (Agbloyor, Abor, Adjasi, & Yawson, 2014).

Thus, the development and efficiency of the financial market lead to the growth of the economy.

3.3. Capital Market and Economic Growth

The formal financial markets have major two components i.e. Capital Market and Money Market. Capital market deals with long-term finance whereas Money market deals with short-term finance and credits. So developments in capital market strengthen the financial market which leads to economic development. Capital market development depends on capital formation and flow of capital and its investment. Durusu-Ciftci, Ispir, and Yetkiner

(2017Durusu-Ciftci, Ispir, and Yetkiner (2017) argued that the capital market does capital formation through mainly two modes i.e. debt (long-term) and equity (ownership) which is essential for economic growth. Credit market and stock markets are two major factors which contribute to the development of financial sectors and accelerate economic growth.

The equity market is significant for capital market development and it includes primary (new issue) and stock (secondary) market. The equity market development contributes to the development of the economy. Well-developed and efficient stock market contributes well to economic growth. The secondary market contributes to economic growth by channelizing funds into the most efficient channel through the process of disinvestment to reinvestment (Pathak, 2014). Stock market and New issue market both are being a part of the capital market contribute towards the providing liquidity as well as the allocation of capital for economic development.

H.-J. Chang (2011) emphasised the role of institutions and intermediaries and argued that Liberalized institutions that provide maximum business freedom and the strongest protection of private property rights are the best for economic development. Asteriou and Spanos (2019) described that banking sectors being a part of financial sectors play a significant role in financial markets, its strength determines the stability in the financial system. During the sub-prime crises, the capital adequacy of banks promoted the stability of the financial system.

Some researchers have observed the stock market and its parameters like market capitalisation, depth of the market, trading volume etc. have impact on business and economy. Kolapo and Adaramola (2012) found that GDP and Value of new issue have a bidirectional relationship. At the same time, they also found that market capitalization and number of listed securities and government stocks have a positive impact on the growth of the economy though it is not significant. But they could not find market capitalization and a number of listed securities and government stocks and are correlated with GDP. Sawalha et al. (2016) found that in case of developed and developing both nations total value of stock market play important role in the growth of economy whereas trading in stock market leads to a negative impact on it. Agarwal (2016) also found market capitalization is one of the important indicators of economic growth. NSE market capitalization as a strong indicator of the overall financial growth of an economy. However, there are limits to the usage of stock market and its performance as an indicator of economic performance in all cases. Pan and

Mishra (2018) highlighted this aspect of their study in China. They said that the stock market cannot represent the whole economy as China is a very large emerging economy and its stock market constitutes only a small fraction of the whole economy. Rousseau and Wachtel (2011) in the context of financial crisis have expressed fear that due to excess financial deepening may have dampening the effect on growth. According to them rapid growth of credit may lead to both inflation and weakened banking system, which may lead to financial crisis.

3.4. Foreign Investment

Mill (1965) emphasised on importance of foreign capital in simulative economic development. Foreign capital not only helps in increasing employment, output and income but also smoothens the balance of payments and inflationary pressures (Jhingan, 2014). Hence in 1991 we opened up the economy and initiated with liberalisation.

Durham (2004) explained that FDI and Equity Foreign Portfolio Investment (EFPI) are positively related but it is not unconditional. Foreign capital flows improve capital accumulation and technological diffusion thus promoting economic growth (Agbloyor et al., 2014). Albulescu (2015) studied the impact of FDI and FPI in long term Central and Eastern European countries for the time-span of 2005-2012 and found that both FDI and FPI exercise an influence on the long-term economic growth. FDI is most relevant to growth, where equity flow is smaller and less stable (Aizenman, Jinjarak, & Park, 2013).

The flow of foreign investment plays an important role in a boost of economic growth as well as financial markets of developed as well as developing countries. As a result, an inflow of Foreign Direct investments has come to be a noticeable measure of economic development in both developing and developed countries (Sultana & Pardhasaradhi, 2012). They stated that FDI and FIIs have become apparatuses of international economic assimilation and stimulus. At the onset of FDI, fast-growing economies like Singapore, China, and Korea, etc. have registered incredible growth. They finally concluded that the impact of the flow of FDI & FIIs on the Indian stock market is significant.

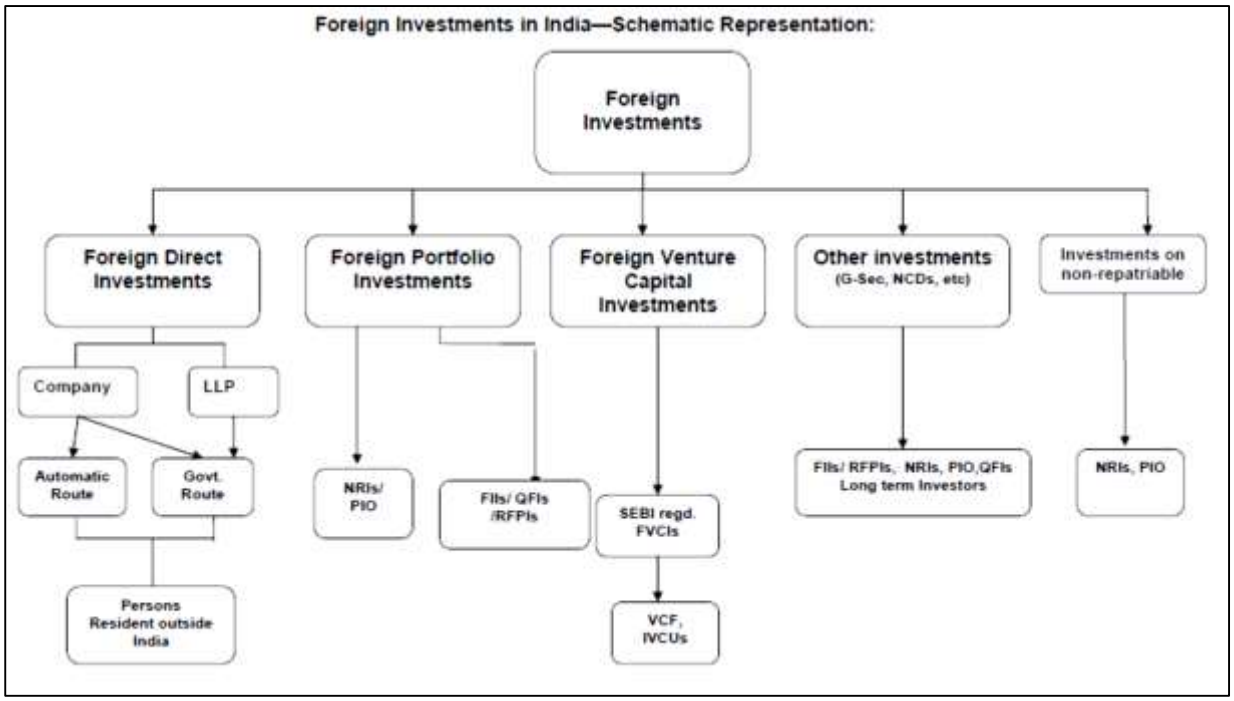
FDI and EFPI flows have a positive, significant and robust relation with income growth in developing countries (Soto, 2000). Total inflows of external finance to developing economies, corresponding to 2.4 per cent of GDP in 2015, rose to 4.8 per cent of GDP in

2017. As a source of external finance in developing economies, FDI is highest with 39 per cent, remittances with 24 per cent and FPI comes at third-highest contributor with 18 per cent. Whereas in terms of growth in 2017 FPI is having the highest growth of 110 per cent ("World Investment Report 2018: Investment and New Industrial Policies," 2018). International capital inflow played significantly in economic development Nigeria during the period of 1986 to 2016, about 71% of the growth is explained by international capital inflow (Okoro, Nzotta, & Alajekwu, 2019).

In Indian being an emerging economy foreign capital flow must emphasize as they contribute towards economic development. FDI is significant to contribute to economic growth, FPI indirectly affects economic growth whereas FIIs has a negligible but negative impact on economic growth from April 1995 to December 2004 in India (Sethi & Patnaik, 2007). There is a short and long-run equilibrium relationship between economic growth and foreign direct investment and economic growth and foreign portfolio investment and vice-versa (Sethi, 2013). FDI affects the Indian economic growth significantly whereas FIIs is not significantly related to the Indian economy during the period of 2001-2015 (Sood, 2015).

Foreign capital or investment can be bifurcated into four major categories i.e. commercial loans, official flows, foreign direct investment (FDI), and foreign portfolio investment (FPI). Until the 1980s, commercial loans from banks were the largest source of foreign investment in developing countries. However, since that time, the levels of lending through commercial loans have remained relatively constant, while the levels of global FDI and FPI have increased dramatically. Over the period 1991-1998, FDI and FPI comprised 90 per cent of the total capital flows to developing countries ("What Are the Different Kinds of Foreign Investment? | Globalization101," 2017).

As a developing country, India always needs support from foreign countries in terms of foreign capital in various forms. Foreign investment in India is regulated by the Reserve bank of India (RBI). RBI has issued circular ("Master Circular on Foreign Investment in India," July 01, 2015), which provides guidelines for foreign investment in India. Foreign Investment in India has chiefly four categories i.e. Foreign Direct Investment (FDI), Foreign Portfolio Investments (FPI) which includes Foreign Institutional Investors (FIIs), Foreign Venture Capital Investments, Other Investment and Investments on non-repatrables. The following figure shows ways of foreign investment in India.



(Source: RBI Master Circular on Foreign Investment in India)

Figure 3.1. Schematic representation of Foreign Investment in India

India uses to get funding from the IMF, World Bank and other such institutions for the economic development of the country.

Other than this kind of funds India also get capital from private investors in different forms. There are mainly two forms of investment by foreign investors to invest in India i.e. Foreign Direct Investment (FDI) and Foreign Portfolio Investment Investors (FPI). FDI is regulated by FEMR 2000. ("Foreign Exchange Management (Transfer or Issue of security by a person resident outside India) Regulations, 2000,").

A registered Foreign Institutional Investor (FIIs) may purchase shares or convertible debentures of an Indian company under the Portfolio Investment Scheme, subject to the terms and conditions specified in Schedule 2.

3.4.1. FDI and Economy

As FDI contributes to direct contribution to various industry unit establishments through technology or by acquiring assets for the business. Hence it contributes to economic growth through the development of various industries. Developing countries are always in the dearth of cost-effective capital and technology. FDI helps developing countries in the transfer of

technology hence it is better than domestic investment for the growth (Borensztein, De Gregorio, & Lee, 1998).

Effect of FDI on economic growth also depends upon the precondition of the host country. Zhang (2001) studied 11 economies in East Asia and Latin America during 1960-97 to study the link between FDI and economic growth and found that impact of FDI on host country is country-specific and host countries which adopted liberalised trade regime, improved education, export orientation and maintain macroeconomic stability are more likely to promote economic growth. FDI do not have independent influence over economic growth (Carkovic & Levine, 2005). FDI is positively correlated with economic growth but at the same time economic stability, liberalised market and human capital are significant for long-term capital inflow found in the study of 18 Latin American countries for the period of 1970–1999 (Bengoa & Sanchez-Robles, 2003). Out of FDI, portfolio investment, equity investment, and short-term debt, FDI was found most relevant to growth (Aizenman et al., 2013). In one of the studies of the Nigerian economy for the period of 1984-2016 Fashina, Asaleye, Ogunjobi, and Lawal (2018) found that foreign aid induced economic growth up to a certain point but beyond that, it affects negatively. They also found that FDI and trade openness was also a significant factor for economic development.

Until any capital is not properly employed it cannot give a fruitful result. Foreign capital may play an important role in economic development but again it depends upon absorption capacity of that country. Creative use of foreign capital and openness of economy and development itself are important to determine the role of foreign capital in economic growth (Prasad, Rajan, & Subramanian, 2007). Adams (2009) during his study of 42 Sub-Sahara Africa countries for a period of 1990-2003 also argued that FDI is important for economic growth but not sufficient for it and emphasized on level education, basic physical infrastructure, and appropriateness of institutions for economic development. GDP is the function of FDI and exports in South Africa (Sunde, 2017). With FDI and export enhance economic growth process and in addition to that labour and capital are also important determinants for economic growth (Tiwari & Mutascu, 2011).

At the same time when there is net FIIs flow is positive it also provides foreign exchange for at least a certain period of time. This helps in the maintenance of forex reserve which is crucial to any economy to deal in the international market. Borensztein, De Gregorio, & Lee

(1998) found that foreign investment is also cost-effective and also helps in the increase in foreign exchange reserves.

Though FDI is crucial to the economy, as an area of research is FII investment further review is done about the literature of FII investment.

3.4.2. FIIs and Economy

With FDI, FPI is also relevant to economic growth as it assists in capital formation. Albulescu (2015) found that FDI and FPI affected the long-term economic growth in Central and Eastern European countries during the period of 2005-2012.

To invite foreign investment, the Government have to provide them rigour platform in terms of regulations and policies. Thus overall government regulations also improve through FIIs. Li, Moshirian, Pham, and Zein (2006) observed with the growth in institutional investment in equity markets around the world, financial institutions have become the largest investor group in many countries; and are observed mostly in countries with stronger regulatory and governance structure. When any country has more suitable regulatory environment it provides an opportunity for institutional investors for investment than another country. Different financial institutions viz. mutual funds, banks, insurance companies, pension funds and foreign institutions have different investment objectives. Depending on their investment objectives and the regulatory environment, their influence on firm performance is dissimilar. For example, while there are regulatory restrictions for banks to invest in a firm's equity in the US; they are the largest shareholders in Germany and Japan; and also have significant participation on management's actions (Johnson, Schnatterly, Johnson, & Chiu, 2010).

Various components for the growth potential are Geographic Location, Tie-up with fast-growing countries, Manufacturing basic commodities and reforms in infrastructures are entail as a precondition of exploiting advantages of foreign capital. O'neil (January 2014) has studied a few of the important aspect related to MINTs while stating their advantages (Cohn, 2014). Mexico was privileged to be next to the United States while Indonesia was in a key position as it is in Southeast Asia; the centre of global growth in recent years, and links to China (Michael Klimes, 2014). Mexico, Indonesia and Nigeria of MINTS are also commodity producers. O'Neil also noted reforms in the energy market in Mexico and Nigeria. This analysis shows various important components for the growth potential are

Geographic Location, Tie-up with fast-growing countries, Manufacturing basic commodities and reforms in infrastructures.

3.4.3. FIIs and Emerging Economies

Emerging economies being capital scarce countries always strives to attract foreign capital for economic growth. Sawalha et al. (2016) found that FPI with good amount of capitalization i.e. well-developed capital market leads to positive impact on economic growth whereas FIIs flow with trading in stock market leads to negative impact on economic growth whereas in case of emerging economies FPI have significant and negative effect on economic growth, means other factors with FPI flow are important to consider.

Foreign capital also helps developing countries to know about their strengths and opportunities available. Hence they can work upon their strengths to make them strengthen and encash opportunities. In India, the various study revealed various facts for the relationship between Foreign institutional investment and economy. Mishra, Das, and Pradhan (2010) found a bidirectional relationship between FIIs and real economic growth, over a period from the first quarter of 1993 to the Second Quarter of 2009. Net FIIs inflow increases foreign exchange reserves and IIP leads to improve market sentiments and FIIs flow in India during the period of April 2003 to March 2011 (Srikanth & Kishore, 2012). Pradhan, Arvin, and Norman (2015) studied monthly data of exports as a percentage of GDP, imports as a percentage of GDP, total trade as a percentage of GDP and foreign institutional investment as a percentage of host GDP as a proxy to market openness from 1994 to 2011 and revealed that trade openness has positive impact on economic growth and bidirectional causality exists between them. FIIs have also played a considerably important role in dominating the financial sector of India during the period of 2006 to 2011 (Agarwal, 2016). Thus, FIIs being a part of FPI work on strengths of developing countries and then they invest in respective countries.

It is true that FIIs helps both the host country and investing country to get the benefit of moving the capital from low growth to high growth potentials. But in long-run, both countries have a conflict of interest during various phases of international conditions. Rey (2015) observed conflicting interest in domestic mandates and international cooperation. The monetary policy of investing country causes the risk in fluctuations in foreign investment in other countries. Adverse condition like high inflation may also affect FIIs invest. In the study

of relationship between FIIs and GDP & inflation during the period of 2000-2016 Kashyap and Thakur (2017) found that FIIs causes GDP at 10% level of significance (not at 5%) whereas in case of inflation, inflation causes FIIs at 5% level of significance and FIIs causes inflation at 10% level of significance.

Volatility in foreign investments poses various risk and put hurdles in economic development. Majumder and Nag (2015) found that foreign investment is the leading part of capital inflows, followed by loan and banking capital inflows and FIIs is the key component of FPI inflows within which equity is dominated channel of investment. They observed that grows flow FPI behave differently from Net flow, gross flows were more voluminous, more volatile, and more persistent than net inflows; FPI and banking capital were the most volatile components and finally, they also observed that after the decade of the 1990s, both FDI and FPI have become less persistent.

FDI and FIIs both could be alarming in emerging as well as developed countries during adverse economic conditions. Hlaing and Kakinaka (2019) studied quarterly data on gross capital inflows and outflows over 57 countries during the period from 2000 to 2015 and found that in developing economies, FDI is more resilient, compared to FPI, during times of high global uncertainty and also observed that FDI is as risky as FPI to uncertainty shock in advanced economies.

For developing country relying too much on FIIs or FPI for foreign capital become challenging and sometimes may jeopardizing the economy. It has been observed that many times FIIs withdraw their funds in a crucial time when developing countries really need their support. Even sometimes external forces also affect FIIs flow, which is not under the control of developing countries. In India during April 1993 to March 2004 no long-term relationship between exchange rate and stock prices found, but in short-run causality runs from a change in the exchange rate to stock returns, the exchange rate long-term Granger causes FII investment flow and not vice versa (Badhani, 2005). Vishnoi (2014) has mentioned in his article that although India is seen in a superior position than other countries such as Turkey due to its enhanced current account deficit and foreign exchange reserves, the country is being hit nevertheless. Indian markets will thus continue to be bound to global risk factors, including concerns about the Federal Reserve's withdrawal in monetary stimulus and an economic slowdown in China. FIIs inflows to India are essentially determined by the

exchange rate, domestic inflation, domestic equity market returns, returns and risk associated with US equity market (Srinivasan & Kalaivani, 2013).

Once when emerging countries get fund from FIIs that does really make them independent for their growth. It has been found that these countries become habituated to get fund from FIIs for their growth. The 'Fragile Five' Turkey, Brazil, India, South Africa and Indonesia as economies that have become excessively dependent on flappable foreign investment to finance their growth desires (Landon, 2014).

FIIs always look for a better opportunity and their flow moves from country to country, as they also want to maximize their return on investment. As per IMD WORLD COMPETITIVENESS YEARBOOK 2013, also India's ranking in competitive position has come down from 27 to 40 among 60 countries. Such changes in ranking may generate volatility in Foreign investment due to changes in their priority and opportunities. O'neill (2001) suggested Brazil, Russia, India and China (BRIC) as an emerging market on the basis of opportunities for new investments. O'Neill (2013) has recognized Mexico, Indonesia, Nigeria, and Turkey (MINT) as the new edge of the global economy. MINT has latent to replace the embryonic BRIC economies of Brazil, Russia, India and China (M Klimes & O'Neil, 2014).

3.5. Determinants of FIIs

FII investment can be predictable as they are affected by various factors. The government can consider such determinant and their study would be crucial while framing various policies to attract and regulate FIIs flow in India. Joshi (2013) stated that the Indian stock market is very sensitive and affected by many factors. He also overserved Factors like Flow of Foreign Institutional Investors (FIIs), Political Stability, Growth of Gross Domestic Product, Inflation, Liquidity and different interest rate and Global level factors are major factors responsible to create movement in Indian stock market.

Various factors are taken into consideration by FIIs even when they identify investment opportunities.

As FIIs stand for foreign investment various international factors affect it. Roszkowska and Langer (2019) found that foreign investors can be effected through both types of factors i.e.

factors related to host country as well as other global factors including factors affecting the investing country. The foreign investor should focus on local risk factors rather than global factors to identify abnormal investment opportunities in comparison with other countries. As a part of international finance stock being a part of leading index might prefer by FIIs. Ferreira and Matos (2008) found that foreign investors overweight firms in the MSCI index and firms cross-listed on a U.S. exchange. In a similar manner, other priorities may affect foreign investors to select their stock over the international platform. Abid and Bahloul (2011) found that in international market geographical distance especially in case of seven Middle East and North Africa MENA countries (Algeria, Egypt, Iran, Saudi Arabia, Morocco, Tunisia and Turkey) as a location for FPI from the G7 investors' viewpoints over the period from 2001 to 2005 is also found significant. The risks associated with US equity market encourage foreign institutional investors to invest more in host country equity markets. Chakrabarti (2001) also studied the importance of the effect of 'regional factors' as determinants of FIIs portfolio flows increasing over time. Srinivasan and Kalaivani (2015) concluded that US equity market returns have a positive and significant influence on FIIs flows in the long run but the positive and insignificant influence on FIIs flows in the short-run.

Many researchers also found crisis as an important determinant at international level to choose country or to switch the FIIs portfolio. Chakrabarti (2001) signifies that Asian crises significantly affected FIIs flow before and after in the Indian equity market. They also found that the Asian Crisis marked a regime shift in the determinants of FIIs flows to India with the domestic equity returns becoming the sole driver of these flows since the crisis. Anand (2015) reported that experts are of the opinion that selling by FIIs is more or less transitory, and they should become net buyers as and when suspicions of global slowdown recede. Singhania and Saini (2018) also observed that in developing countries crisis period (2006–2008) significantly influenced the inflow of FPIs. Oyerinde (2019) observed FIIs flow in the Nigerian stock market is sensitive to the economic crisis. In contradiction Ding, Nilsson, and Suardi (2013Ding, Nilsson, and Suardi (2013) found that in the Shanghai (SHSE) and Shenzhen (SZSE) stock exchanges during the period of April 2004 to the end of March 2012 Foreign institutional participation and liquidity remain strong before, during, and after the recent financial crisis.

FIIs choose host countries very carefully. Government regulations and policies framework are important determinants for FIIs flow. Singhania and Saini (2018) mentioned that in developed and developing both countries trade openness is significant to FIIs flow. Ekeocha, Ekeocha, Malaolu, Oduh, and Onyema (2012) found FPI has a positive long-run relationship with trade openness in Nigeria. Abid and Bahloul (2011) also found Investment freedom is significant to FPI. Bose and Coondoo (2004) have studied liberalisation policies that expanded the membership of FIIs categories and their scope of investment in the Indian market, enhanced sectoral and individual caps, made provision for hedging FII' risk of making investment in the Indian stock markets by allowing them to enter the foreign exchange and derivatives market, and made procedural simplifications and fees reduction, seem to have a significant expansionary effect on net inflows. Measures to improve the SEBI/RBI's control over the FIIs investments like banning of NRIs/OCBs and mandating stricter disclosure norms also do not show any significant negative impact on the net inflows. On the whole, it is found that these policies mostly render FIIs investments more sensitive to domestic market returns and raise the inertia of FIIs flows. Ferreira and Matos (2008) suggested that countries with strict disclosure standards are preferred by institutional investors in the international market.

Performance of the economy of the host country is the most important determinant for foreign investment. Oyerinde (2019) suggested pursuing positives measure for the economy to attract foreign portfolio investors and discourage capital flight in the country. During the study at Jordan, Al-Smadi (2018) found that during the period of 2000 to 2016, there was a significant impact between aggregate economic activity and the flow of portfolio investment.

Various economic indicators like GDP, Call Rate, Exchange Rate, Inflation rate etc. are crucial for FIIs while investing in the host country. Many research found causality between these determinants and FII investment.

Gross Domestic Product (GDP) is one of the indicators of economic activity of the host country. GDP of the host country is significant for foreign investors (Abid & Bahloul, 2011) in China (Haider, Khan, & Abdulahi, 2016). The rising domestic growth rate is conducive to FIIs flow (Garg & Dua, 2014). GDP is one of the vital instrument for the relative study of stock market development and foreign investment. Nwosa (2018) has studied Stock market development i.e. the of ratio total market capitalization to GDP and foreign portfolio investment i.e. the ratio of net foreign portfolio investment to GDP and found significant

relation. Mohanasundaram and Karthikeyan (2017) also advocated the GDP of the home country also become crucial for foreign investment, as it determines investment opportunity in the investing country. If opportunities are good in investing country foreign investor may withdraw money and go back to their domestic country for a better opportunity. USA GDP is significantly related to FIIs flows in India at 5% level.

The interest rate determines the risk-free return in the financial market as well as the cost of capital. P. Mukherjee, Bose, and Coondoo (2002a) said that if the interest rate is the high cost of capital is high as well as risk-free return is also high. When a foreign investor invests in the equity market they take risk related to the host country stock market. If the interest rate is high they prefer risk free investment or less risky investment like government security and other debt security. Thus, the interest rate is significant to FIIs. Garg and Dua (2014) also marked that Even interest rate difference between the host country and the investing country is crucial for FIIs, higher interest rate differential is conducive to FIIs flow. For developing and developed both country interest difference are significant for FIIs flow (Singhania & Saini, 2018).

The interest rate in investing country also makes the difference while institutional investors invest in the other country. Developing country money market have lesser interest compare to developing countries that will also motivate foreign investors from developed countries to invest in developing countries. 3-month UK Treasury Bills have a significant relationship with FIIs flows in India at 1% level (Mohanasundaram & Karthikeyan, 2017). Few literature studies also found interest rate is not significant (R. Kumar, 2011) to FIIs. Sudhakar and Uma (2017) found Mumbai Inter-Bank Offer Rate (MIBOR) is related to FII investment in India.

The exchange rate is one of the important factors for foreign investors (Haider et al., 2016; R. Kumar, 2011) being a cost determining factor. Increase in exchange rate decreases the value of foreign investor and decrease in exchange rate appreciate their investment value. Thus, Exchange rate and the investment value of FIIs are negatively correlated (Amita, 2014) and Lower currency risk and appreciating exchange rate is conducive for FIIs flow (Garg & Dua, 2014). The exchange rate has a significant negative impact on FIIs inflows both in the short-run and long-run implied that depreciation of currency adversely affects the FIIs flows into India (Srinivasan & Kalaivani, 2015). As currency risk affect FII investment, in the same way sudden out the flow of FIIs may also raise currency risk. Thus there is a

bidirectional relationship between exchange rate and FIIs flow (Amita, 2014). USD exchange is significantly related to FIIs flows in India at 5% level (Mohanasundaram & Karthikeyan, 2017).

Due to inflation also the value of an investment as well performance of industry gets affected. Inflation is negatively correlated with FII investment (Amita, 2014). In Jordan Al-Smadi (2018) found significant impact between inflation and the flow of portfolio investment. Rai and Bhanumurthy (2004) emphasised that not only the inflation rate of the host country host but also inflation in investing affect FIIs. Sudhakar and Uma (2017) considered Consumer Price Index (CPI) as an index to measure the inflation rate and found that there is a unidirectional relation from CPI towards FIIs flow in India. Not only inflation in the host country but also the inflation rate in the home country is one of the determinants of foreign investors' investment in the host country. In the line of that Mohanasundaram and Karthikeyan (2017) found USA PPI (Inflation Index of the US) has a significant relationship with FIIs flows in India at 1% level. But at the same time result of R. Kumar (2011) have a contradiction in their findings, they found WPI is not significant to foreign investment.

There are other economic indicators like IIP, money supply, Forex Reserve etc. which are significant to foreign investors. P. Mukherjee et al. (2002a) and R. Kumar (2011) found IIP is important for FII investment. Sudhakar and Uma (2017) found the money supply as an important factor to determine FIIs flow in India. Amita (2014) said due to exchange risk, FIIs may consider the level of forex reserve before investing in any country. But she did not find the causality between FIIs and Foreign Exchange Reserves. Abid and Bahloul (2011) found other variables of the economy like information costs, bilateral trade and institutional quality are also significant for FPI. Haider et al. (2016) studied External Debt and Population growth are also significant to foreign portfolio investor in China. In Jordan, during the period of 2000 to 2016, there was a significant impact between country creditworthiness, governance and corruption and the flow of portfolio investment (Al-Smadi, 2018).

There are certain other factors which may affect foreign investment. One of the factors is related to industry. During the study in Taiwan Chen, Wang, and Lin (2008) found that Qualified Foreign Institutional Investors (QFlls) pick up stocks, they herd on securities classified in specific industries. Other factors are firm-specific factors related to the performance of the company or image of the company in the market. As a part of fundamental analysis in investment management, analysis of the performance of individual

firm very important. Professional investors give enough weight on various aspects of firm-specific performance. S Kumar (2001) examined the effects of FIIs inflows on the Indian stock market symbolized by the Sensex using monthly data from January 1993 to December 1997 and revealed that FIIs investments are more driven by Fundamentals and do not respond to short-term changes or technical position of the market. A significant part of institutional holdings is explained by firm-level characteristics (Ferreira & Matos, 2008). Foreign investors pursue firms with a greater volume of shares held by the general public. Prasanna (2008) found among the financial performance variables, the share returns and earnings per share are significant factors influencing their investment decision. Chen et al. (2008) also found QFIIs prefer stocks with high past returns as well as large firm size as QFlIs are momentum traders in Taiwan. Anand (2015) reported that experts are of the opinion that selling by foreign institutional investors is more or less momentary, and they should become net buyers as and when a revival in corporate earnings becomes discernible

3.6. FIIs and Equity Market

Being the stock market itself is one the important factor for the attraction of Foreign Investment, many pieces of research advocate the relationship between FII investment and equity market. Oyerinde (2019) suggested that taking positives measure for the stock market attracts foreign portfolio investors in Nigeria.

The net investment made by the FIIs in the Indian stock market is a causal force of Market Capitalization but in the case of trading volume, FII investment turned as a result of the trading volume. Bodla and Kumar (2009) found the purchase and the sale of foreign investor both are having bidirectional relations with market capitalisation. When domestic investors start investment in the national market it boosts the confidence of foreign investors to invest in that country. Ekeocha et al. (2012) also found FPI has a positive long-run relationship with a market capitalization in Nigeria. Market Cap of NSE is significantly related to FIIs flows at 5% level (Mohanasundaram & Karthikeyan, 2017). There is a direct causal relationship between stock market development (the ratio total market capitalization to gross domestic product) and foreign capital inflows (foreign direct investment and foreign portfolio investment) in Nigeria (Nwosa, 2018).

The return in the host country's stock market attracts the FIIs investments (Garg & Dua, 2014; R. Kumar, 2011; Rai & Bhanumurthy, 2004) in both developing and developed

countries (Singhania & Saini, 2018), other factors are also creating impact on the arrival of FIIs but they are statistically insignificant (Prasuna, 2000). Few literature studies also found a bidirectional relationship between FIIs flow and stock market performance. Bidirectional causality was found between FIIs and Sensex during the period of 2001-02 to 2012-13 (Amita, 2014). Nifty has a significant relationship with FIIs flow at 1% (Mohanasundaram & Karthikeyan, 2017).

Return in the stock market of investing country also become important factors for foreign investors. The due saturated market developed countries institutional investors look for a better opportunity in developing country like India. In both developing and developed countries US stock market Return is significant to the inflow of FPIs (Singhania & Saini, 2018). Return of Standard and Poor (S&P) 500 (US stock market Index) and Financial Times Stock Exchange (FTSE) 100 (London Stock exchange Index) have a significant relationship with FIIs flows in India at 1% level (Mohanasundaram & Karthikeyan, 2017).

Recent history of the stock market and volatility in the stock market are few of the major determinants of FIIs flow (P. Mukherjee et al., 2002a). FIIs move smartly in equity market being a professional investor. FIIs execute the role of market makers and book their profits by investing when prices are squat and selling when they are increased (Gordon & Gupta, 2003). According to data for the past 18 months, market movements show that it has moved in direction of FIIs trend (Gupta, 2008). In India inflation, the inflow of FIIs, exchange rate and gold price are significant to affect the Bombay Stock Exchange (BSE) performance (Venkatraja, 2014). The volatility of the stock market is one of the important components to study the risk in the stock market. Indian stock market volatility (both Nifty and Sensex) are significantly related to FIIs flow (Joo & Mir, 2014). In a study of FII investment and stock market Indices of BRICS for the period of 2005-2015, it is observed that Brazil, India, and South Africa have a positive correlation in varying degree whereas, in case of China and Russia, an either insignificantly negative or negative correlation exists (Bhatia & Kishor, 2015). Kaur (2017) also found that FIIs has a significant impact on SENSEX (representing Indian Stock Market). Activities of FIIs carry more influence on returns of Indian stock as compared to DIIs and buying and selling activities of FIIs influence the behaviour of DIIs (Gahlot, 2019).

There is a phenomenon that high risk leads to high return. Being professional investors foreign investors are risk-averse and they use diversification, as an effective tool to reduce

the risk. Greater risk diversification opportunities in addition to strong domestic equity performance are conducive to FIIs flow (Garg & Dua, 2014). Risk diversification and flow of foreign portfolio investment are significantly related in Jordon (Al-Smadi, 2018).

Informational asymmetry is also found one of the major factors in the stock market affecting FPI. But foreign institutions are not informationally disadvantaged when investing in state-owned enterprises (SOEs) in Shanghai (SHSE) and Shenzhen (SZSE) stock exchanges (Ding et al., 2013). Some times in the stock market many investors, even professional investors follow each other. Even herd mentality is also found one of the major determinants for a foreign institutional investor. Chen et al. (2008) observed characteristic herding and investigative herding explains QFlls' trading behaviour in Taiwan.

As many researchers found bidirectional causality between FII investment and the equity market performance, it leads positive as well as adverse effect of FII investment in the equity market performance.

FIIs provides a boost to the stock market of host countries as well as provides liquidity which is crucial for any stock market. Thus it helps in the development of the stock market. Foreign investment in equity market helps in increasing efficiency through providing various assistance in the form of liquidity, systematic analysis and sophisticated tools for investment and stability. D. Mukherjee and Ghosh (2004) found that among the institutional investors, FIIs show consistency in stock picking as compared to DFIs who are sporadic and volatile. B. Singh (2005) stated that FII investment in India helped in achieving a higher degree of liquidity at the domestic stock market; it had increased price-earnings ratios and finally reduced the cost of capital for investment. Along with this they also help in improving the functioning of the domestic stock market. He and Shen (2014) also investigated that an increase in foreign ownership causes an improvement in price efficiency but not vice versa. In one of the Nigerian study for the period of 1980-2014 Oyerinde (2019) estimated and examined the relationship between foreign portfolio investment, stock market development and other variables such as economic growth, exchange rate and inflation rate and found the result in the same line that increases in the foreign portfolio investment increases the domestic stock market performance.

FPI and FIIs also provided good support to the Indian stock market. Srikanth and Kishore (2012) studied causes and effects of FPI flows into the Indian economy during the of April

2003 to March 2011 and found bi-directional causation between net FIIs inflows and the BSE Sensex. They found positive impact FIIs inflow on Indian stock market. To study the causal relation Granger (1980) provided a theoretical framework to study two-way causality.

Foreign investment not only provides a flow of capital but also helps in improving corporate governance and performs of the firm. Foreign investment also motivates domestic companies to perform better. FIIs invest more systematically than retail investors and analyse various aspects of various organizations. Kim and Yi (2006) studied a large sample of firms in the Korean market and found evidence that foreign investors look at firm-specific data in making investment decisions. Bushee and Noe (2000); R. Chung, Firth, and Kim (2002); McCahery, Sautner, and Starks (2016) and K. H. Chung and Zhang (2011) reported that institutional investors choose such companies with better corporate governance practices.

Firms having ownership by foreign investors and independent institutions have a higher valuation. Foreign and independent institutions associate themselves with better operating performance and reduced capital expenditures (Ferreira & Matos, 2008). Aggarwal, Erel, Ferreira, and Matos (2011) also noted that monitoring and involvement by institutions travel beyond country borders and lead to better firm performance and institutional investors are able to uphold good corporate governance practices around the world beyond the effect of government regulations. In a study of the relation between the level of foreign shares and pay-performance sensitivity in a sample of Korean firms Garner and Kim (2013) also found that foreign investors are beneficial in improving corporate governance. In India stock market Mukhopadhyay and Chakraborty (2017) studied the role of FIIs and firms performance through the study of 137 BSE listed firms for the period of 2000-2001 to 2012-2013. They studied variables viz. age of the firm, capital expenditure, firm size, leverage, cash flow and ownership concentration and found that FIIs has a positive and significant impact on the firm performance in India. But in contrast, C. Chang (2010) argued that in emerging markets the foreign investors may lack expertise in the local environment which might lead to informational disadvantage. FIIs being volatile some their outflow may unstabilised or make the stock market of host country inefficient. In against Agbloyor et al. (2014) argued that but countries with strong domestic financial markets, however, benefit more by being able to transform the negative impact of private capital flows into a positive one.

But as we know every coin has two sides. When FIIs dominate the financial market they influence the trend of the market significantly. If at that time their investment behaviour would not be rational then the overall market may get dragged in the wrong direction. Foreign investment is volatile and there is a significant effect of foreign investment on the volatility of the Nigerian stock market and Foreign Investment is sensitive to economic crises too (Oyerinde, 2019). Chen et al. (2008) identify qualified foreign institutional investors (QFlls) in Taiwan herd when picking stocks. The evidence shows that QFlls herd in Taiwan's securities market: They follow each other into and out of the same securities. They herd on securities classified in specific industries and also prefer stocks with high past returns as well as large firm size, supporting the argument that QFlIs are momentum traders. Characteristic herding and investigative herding explain QFlIs' trading behaviour in Taiwan. Garner and Kim (2013) in their study of South Korea found that only foreign investor having ownership of 10%-30% of the shares are related with significant pay-performance sensitivity, while those owning greater than 30% are more concerned in managing the firm, not monitoring the firm and having foreign ownership less than 10% are also not able to improve governance.

Emerging countries India, there has been increased liberalization of domestic financial and capital market and an opening up of the markets the market for FIIs which lead to the problem due to hot money of FIIs. FIIs moves from one country to another country it is considered as hot money and cannot play important role in the development of equity market and can destabilize equity market and due to their dominance, they may manipulate equity market. He also concluded that as (Samal, 1997). FIIs flows are vastly correlated with equity returns in India, they are more expected to get exaggerated than the cause of returns of Indian equity markets and FIIs flows can aggravate the equity market bubbles, though they do not actually initiate them (Chakrabarti, 2001). Similarly, P. Mukherjee, Bose, and Coondoo (2002b) also advocated that FIIs is affected by returns in the Indian stock market rather than influencing the Indian equity market. They also suggested that international market volatility and domestic market volatility both affect FII investment behaviour. Exchange rate and stock returns have no causality from either of the sides whereas stock return Granger causes FIIs in India during Jan 1998 to Dec 2008 (Sundaram Kumar, 2009). Bajpai (2011) observed after January 2008 due to subprime the net portfolio flows to India turned negative as FIIs rushed to sell equity stakes in a bid to replenish overseas cash balances, which had a knock-on effect on the stock market and the exchange rates through creating the supply-demand

imbalance in the foreign exchange market. But in contradiction Hiremath and Kattuman (2017) found that FIIs do not affect the efficiency of the Indian stock market as well as domestic return and degree of efficiency varying with the time, inefficiency attracts flows seeking excess returns. Liberalization, well planned monetary policy and sensible regulation protects the economy from the ill effects out the flow of FIIs.

In India to regulate the FIIs flow regulatory body like SEBI and RBI plays an important role. In the Indian stock market, FIIs invest played a significant role in the growth of market capitalization. While market capitalization of the large Indian stock exchanges is presently about 100 per cent of GDP (around USD1.3 trillion), FIIs hold about 25 per cent of the market if cumulative dividends that are rolled over are included. However, market sources suggest that around 50 per cent of FIIs flows have been via participatory notes (PNs). PNs, which are an offshore instrument against underlying Indian securities, can be issued as derivatives or cash (M. Singh, 2007). The stock markets collapsed in Eurozone, there was panic in the Indian stock markets. The foreign institutional investors (FIIs) who had invested in the Mumbai stock market suddenly withdrew their investment lead dipped the BSE Sensex. The value of Sensex dropped by more than 600 points in early trade on 29th June 2015, but managed to recoup some loses later on selective buying in the beaten-down counters and settled the day lower by 167 points at 27,645.15 (Solanki & Kachhwaha, 2010). India received accelerated FIIs flows from September 2007 to January 2008. But as the global crisis deepened and spread to the emerging economies through capital and current account of the balance of payments, the net portfolio flows to India soon turned negative as Foreign Institutional Investors rushed to sell equity stakes in a bid to replenish overseas cash balances. This had a knock-on effect on the stock market and the exchange rates by creating the supply-demand imbalance in the foreign exchange market (Bajpai, 2011). Choudhury (2014) took a broad examination into India's service sector, the main growth apparatus for the Indian economy during the past two decades. First, dealt with the endogenous multiple structural breaks developed by (Bai & Perron, 1998, 2003) and also used both the models of pure and partial structural breaks promulgated by Bai and Perron.

We (Joshi & Desai, 2015) studied the trend of FIIs flow and Sensex value from the year 1992 to 2014 through line chart and identified the various time period and we found a bullish trend and bearish trend and correlation FIIs and Sensex during those periods.

Trend	Period	Correlation Co-efficient

Bullish	Jun 2004 – Dec 2007	0.986967
Bearish	Dec 2007 – Feb 2009	0.983528
Bullish	Feb 2009 – Dec 2010	0.888427
Bearish	Dec 2010 – Dec 2011	0.206862

The study revealed that FIIs Investment and Sensex are having strong positive correlation during bullish trend than correlation during a bearish trend, which may suggest that FIIs may have a more positive role in the long-term bullish trend rather than negative role during a long-term bearish trend. Vardhan and Sinha (2016) examined the effect of FIIs investments in the Indian equity market and its role in integration with the United States (US) equity market. In the study, structural breaks were used to create sub-periods to employ different vector auto-regression models and the stability of two parameters has been tested using the Chow test (Chow, 1960).

3.7. Summary

Considering the available knowledge in the form of referred literature, it can be said that the role of the rigorous financial system, equipped with strong financial market leads to economic growth. The emerging countries like India have dearth of financial resources, which can be supplemented through foreign investment. The foreign investment may provide a boost to the economy but at same time regulatory bodies need to take into consideration certain warning signals. Governments of host countries need to cogitate certain determinants which affect the foreign investment flow. In this literature review, determinants of foreign investment are observed, they are economic indicators viz. growth of the economy (GDP), inflation rate, interest rate, exchange rate, regulation and policies of host country, financial crisis. Another important determinant of foreign investment is performance of the stock market itself. In literature review it is found that many researchers advocate the bidirectional relationship between foreign investment the performance of the equity market. Thus, it leads to significance of the study the relationship between foreign investment and the performance of the equity market.

CHAPTER: 4. FIIs INVESTMENT IN INDIAN EQUITY MARKET: TRENDS AND PATTERN

4.1. Introduction

FII investment in the Indian equity market has a large amount of variation during a different time period. In the study of FII investment in the Indian equity market is essential to have an apprehension of the trend and pattern. To study the trend and pattern in FII investment in the Indian equity market, this chapter is divided into two sections i.e. Trends of FII investment in Indian equity market without breaks and the trend with the study of structural breaks in FII investment in India. In the first section to establish the time-series model initial check of unit root is done. Unit root test provides information about the stationarity without which further analysis of time-series is not possible. With stationarity, another important aspect is the normality which tested before the determination of ARIMA model. ARIMA model provided the equation to forecast FII investment trend. ARIMA model has limitation of not capturing the seasonal trend, hence for the more accuracy in the model a SARIMA model is established using expert-modeller of SPSS software. As it is observed that slop of the trend line of FII investment is varying during different phases of time an effort is made to capture the structural breaks in trend line of FII investment to identify the pattern of FII investment during different periods. Thus, the last section of the chapter discusses the structural breaks in FII investment in the Indian equity market occurred due to various events within and outside India. To study the structural break two approaches were applied. In the first approach multiple structural tests are used to identify break period and then to identify the events associated to that break period; in another approach, various potential events cause the structural break were identified and then whether they were significant or not is checked.

4.2. Analysis of Time Series data of FII investment in the Indian equity market

Before analysis and data processing of time series data, series must be stationary and have the mean value zero (or nearer to zero) with minimum variance. Data transformation is used to make Time series data of FII investment in the Indian equity market stationary for the selected time period from March 1997 to March 2019. The following table shows the mean and variance of the original and transformed data series for the selected period.

Table 4.1. Mean, Standard Deviation and Variance of various Transformed Time Series Data

	D_FIIs_EQ	D_LN_FIIs_EQ	LN_FIIs_EQ	CUM_FIIs_EQ
Mean	3251.4105	0.0271	11.8170	329027.6478
Std. Dev.	8439.6408	0.0743	1.7079	308279.9643
Variance	71227536.4867	0.0055	2.9169	95036536394.2128

Where,

CUM_FIIs_EQ = Cumulative flow of FIIs in the Indian equity market

LN_FIIs_EQ = Log value of Cumulative flow of FIIs in the Indian equity market

D_FIIs_EQ = First difference of Cumulative flow of FIIs in the Indian equity market

D_LN_FIIs_EQ = First difference of Log value of Cumulative flow of FIIs in the Indian equity market

Looking at Table 4.1 it can be identified that comparatively, D_LN_FIIs_EQ have the mean value near to zero i.e. 0.0271 and having minimum standard deviation i.e. 0.0743. Hence the first difference of log transformation provides better time-series data for further analysis. But before conducting further study to check the stationarity of the data unit root test is conducted.

4.2.1. Unit Root Test

To check the stationarity unit root test is conducted. Augmented Dickey-Fuller (ADF) test is applied to check the following null hypothesis of a unit root.

H0 4.1. Time series data has a unit root

Table 4.2. Augmented Dickey-Fuller (ADF) test statistic

	D_FIIs_EQ	D_LN_FIIs_EQ	LN_FIIs_EQ	CUM_FIIs_EQ
t-statistic	-9.859069	-8.621614	2.397479	3.767364
P-value	0.0000*	0.0000*	0.9962	1.0000
Null	**Rejected**	**Rejected**	Accepted	Accepted
DW	2.0597	2.0415		
AIC	20.8716	-3.1121		

* at 1% level of significant

From the Table 4.2, it can be observed that original time series data and log transformation time series data are not stationary and the null hypothesis can not be reject. First difference transformation and first difference of log transformation both are stationary at a 1% level of significance. As both of the series are stationary, the next consideration is of Durbin-Watson (DW) test and Akaike Information Criteria (AIC). Considering the DW test and AIC, it can be said that time-series data with the first difference of log transformation provides better time series to determine the model for forecasting.

After conducting a unit root test, it is advisable to check the normality of the residuals of identified time series data.

4.2.2. Normality Test

Following is the null hypothesis for the normality test of the first difference of log transformation of FII investment in the Indian equity market.

H0 4.2. Time series is normally distributed

From the Figure 4.1 and result of various normality test, it can be observed that P-value of Jarque-Bera all other tests of normality is very small, which is less than 0.05. Thus the null hypothesis of normally distributed data at 5% or even at a 10% level of significance can not be accepted. But for sample sizes that are sufficiently large, violation of the normality assumption is virtually inconsequential (Brooks, 2008). Here monthly data is used from the initiation of FII investment in the Indian equity market separately made accessible by SEBI from March 1997 to March 2019 i.e. 265 months' data of 22 years. It is appealing to a central

limit theorem; the test statistics will asymptotically follow the appropriate distributions even in the absence of error normality[1].

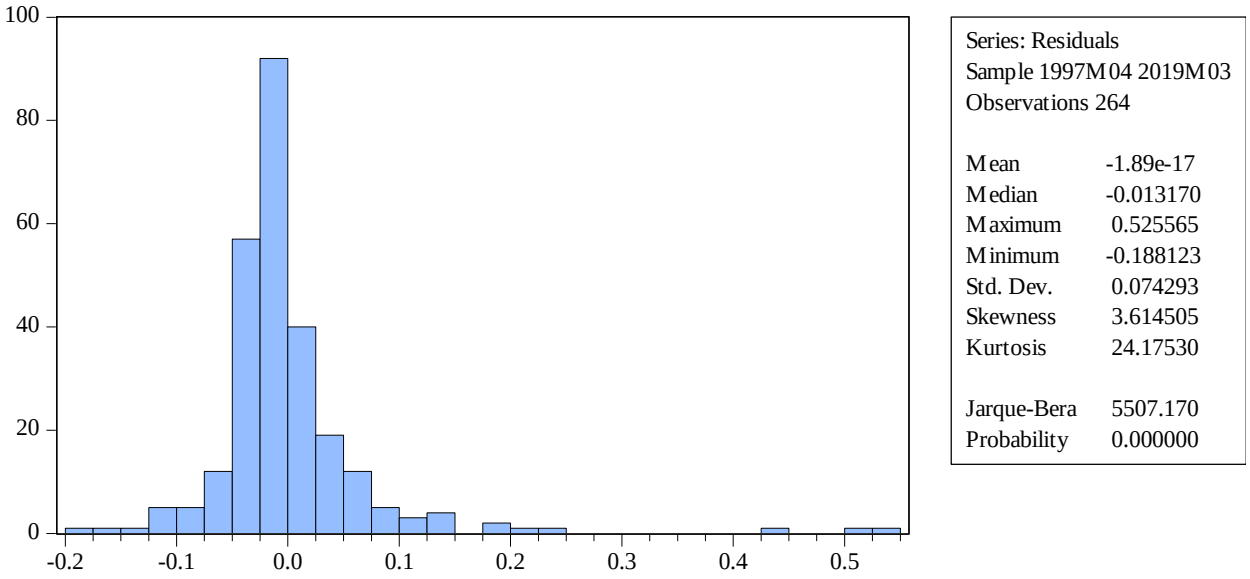


Figure 4.1. Normality Test

After all these basic checks it is needed to establish a time series model using Autoregressive and Moving-average terms.

4.2.3. Forecasting Model (ARIMA)

In forecasting, a model is established, which will give me the best result. ARMA (Auto-Regressive Moving Average) model is useful to determine the time series model. As the first difference is taken in time series ARMA model is replaced with ARIMA (Auto-Regressive Integrated Moving Average) i.e. 1st level integrated model.

Correlogram can be used to know the AR lag and MA lag. In following correlogram figure Autocorrelation Function (ACF) explains the lag of MA and Partial Autocorrelation Function (PACF) explains the lag of AR.

[1] The law of large numbers states that the average of a sample (which is a random variable) will converge to the population mean (which is fixed), and the central limit theorem states that the sample mean converges to a normal distribution.

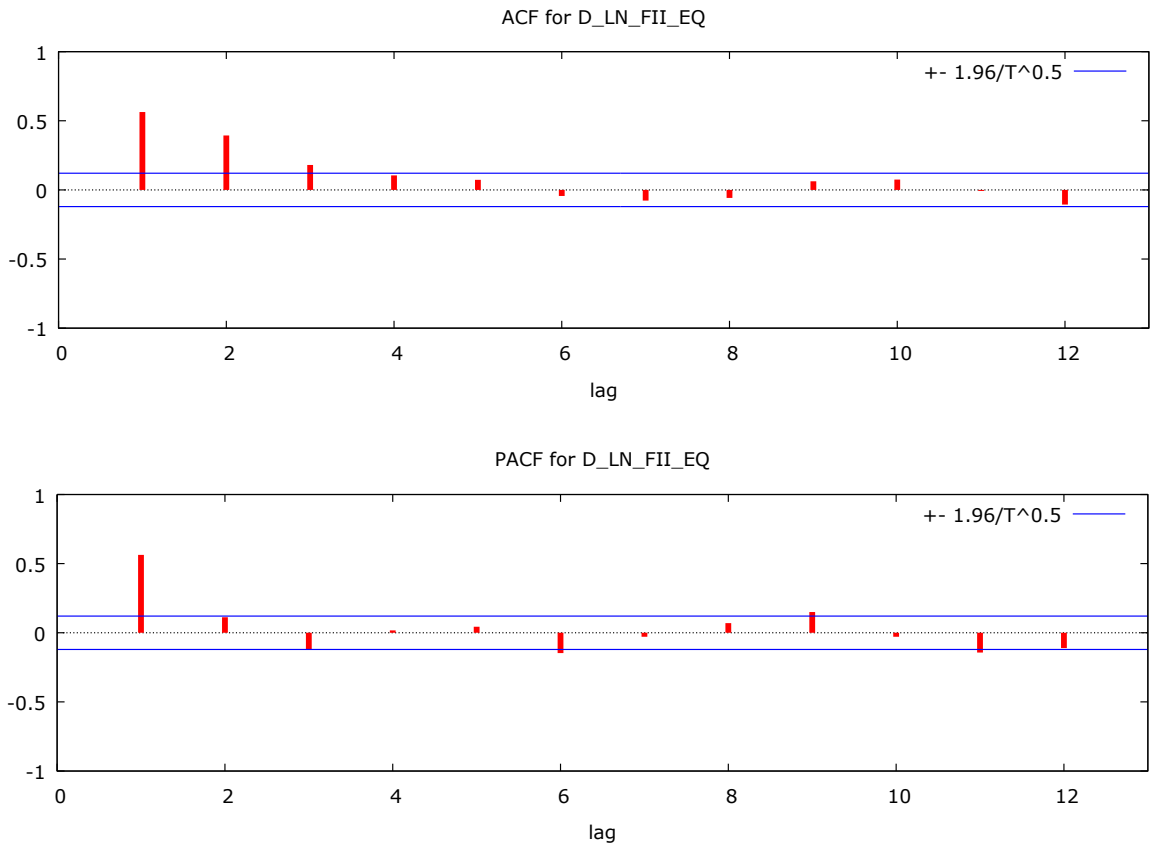


Figure 4.2. Auto Correlation Function and Partial Autocorrelation Function

Diagram of ACF (Autocorrelation Function) is the indicator of the lag of MA (Moving Average) and PACF (Partial Autocorrelation Function) is the indicator of lag AR (Auto-Regressive) process.

Looking to the Figure 4.2 of ACF and PACF it can be said that up to 3 lags of MA and up to 1 lag of AR determines the ARIMA model for giving series of D_LN_FIIs_EQ i.e. First difference of log value of FII investment in the Indian equity market.

Autocorrelation function for D_LN_FIIs_EQ ***, **, * indicate significance at the 1%, 5%, 10% levels using standard error 1/T^0.5

Table 4.3. ACF and PACF

LAG	ACF	PACF	Q-stat. [p-value]
1	0.5631 ***	0.5631 ***	84.6665 [0.000]
2	0.3938 ***	0.1123 *	126.2332 [0.000]
3	0.1804 ***	-0.1181 *	134.9937 [0.000]

4	0.1050 *	0.0172	137.9694 [0.000]
5	0.0730	0.0435	139.4156 [0.000]
6	-0.0436	-0.1472 **	139.9339 [0.000]
7	-0.0773	-0.0290	141.5677 [0.000]
8	-0.0579	0.0698	142.4865 [0.000]
9	0.0623	0.1499 **	143.5553 [0.000]
10	0.0749	-0.0287	145.1059 [0.000]
11	-0.0072	-0.1428 **	145.1205 [0.000]
12	-0.1058 *	-0.1107 *	148.2419 [0.000]

Now to identify the best model it is needed to check the result of all possible ARIMA(p,d,q) models. Here p is AR lag, q is MA lag and d is at which level data is integrated. Here d is 1 which stands for the first difference. Following are possible models for forecasting using CLS method under Least squares (NLS and ARMA) Estimation setting with Optimization Method of Eviews legacy.

Table 4.4. ARIMA Models with various criteria

Models	**Akaike Inf. Cr. (AIC)**	**SIC**	**Hannan-Quinn criterion**	**Durbin-Watson**
ARIMA (1,1,0)	-3.055911	-3.028747	-3.044994	2.367482
ARIMA (1,1,1)	-3.167272	-3.126525	-3.150896	1.898179
ARIMA (1,1,2)	-3.048689	-3.007942	-3.032313	2.348175
ARIMA (1,1,3)	-3.055331	-3.014584	-3.038956	2.39208
ARIMA (0,1,1)	-2.664926	-2.637836	-2.65404	1.733082
ARIMA (0,1,2)	-2.584884	-2.557794	-2.573999	1.062284
ARIMA (0,1,3)	-2.555073	-2.527983	-2.544187	1.239812

ARIMA model with minimum AIC, SIC & HQn and DW value closest to 2 can be considered as the best model. From the above table, it can be said that ARIMA (1,1,1) model will give me the best forecast. It is with minimum AIC, SIC & HQn and DW is 1.898. Following tables provides a regression model for the forecasting under the following environment. ARIMA model is estimated with D_LN_FIIs_EQ as Dependent Variable. Method applied is ARMA Conditional Least Squares (Marquardt - EViews legacy) where

Convergence is achieved after 13 iterations by E-views with MA Backcast of the period 1997M04

Table 4.5. Regression model of AR(1) and MA(1)

Variable	Coeff.	Sd.Er	t-stat.	Prob.
C	0.019	0.006	3.198	0.002
AR(1)	0.726	0.037	19.859	0.000
MA(1)	-0.479	0.068	-7.025	0.000
R-sqred	0.460175	Mean dependent var		0.025053
Adjusted R-sqred	0.456023	S.D. dependent var		0.066949
S.E. of regression	0.049378	Akaike Inf. Cr.		-3.167272
Sum sqred residl	0.633935	SIC		-3.126525
Log-likelihood	419.4962	Hannan-Quinncriteria.		-3.150896
F-stat.	110.8190	DW Statistic		1.898179
Prob(F-stat.)	0.000000			
Inverted AR Roots	.73			
Inverted MA Roots	.48			

From the above result, it can be identified that AR(1) and MA (1) both are significant. P-value of F-statistics is also significant; it means the overall regression model is significant for the forecasting. Adjusted R-sqred is 45.60% i.e. regression model explains about 45.60% change in an independent variable. Durbin-Watson is 1.898 which is near to 2, it means no existence of serial autocorrelation problem. Thus, the ARIMA (1,1,1) model can be written in the following way

D_LN_FIIs_EQ = 0.019 + 0.726[AR(1)] - 0.479[MA(1)]

4.2.4. Forecasting Model (SARIMA)

Applied ARIMA, but due to Seasonal effect seasonal effect also must be integrated. Hence simple ARIMA is not useful and SARIMA i.e. Seasonal Auto-Regressive Moving Average is introduced. It can be explained with ARIMA(p,d,q)(P,D,Q). Here (p,d,q) stands for simple

Autoregressive Integrated Moving average term, whereas (P, D, Q) stands for seasonal autoregressive (SAR) and seasonal moving average (SMA) terms for monthly or quarterly data with systematic seasonal (Box and Jenkins,1976). Processes with SAR and SMA terms are ARMA models constructed using products of lag polynomials. These products produce higher-order ARMA models with nonlinear restrictions on the coefficients. It is difficult to check with all probable combinations hence expert-modeller in SPSS to identify best SARIMA model is used. Followings are the results of the application of expert-modeller.

Model identified for the dependent variable FIIs_Cum_Eq is ARIMA (1,1,0)(1,0,1).

Following tables show the model statistics, SARIMA model parameters and Outliers respectively.

Table 4.6. Model Statistics

Model Fit statistics					Ljung-Box Q(18)			Number of Outliers
Stationary R-sqred	R-sqred	MAPE	MaxAPE	Normalized BIC	Statistics	DF	Sig.	
.186	0.999	3.273	24.841	18.000	11.231	15	.736	1

Table 4.7. SARIMA Model Parameters

					Estimate	SE	t	Sig.
FIIs_Cum_Eq-Model_1	FIIs_Cum_Eq	Square Root	Constant		3.404	.799	4.260	.000
			AR	Lag 1	.385	.058	6.644	.000
			Difference		1			
			AR, Seasonal	Lag 1	.956	.215	4.435	.000
			MA, Seasonal	Lag 1	.925	.259	3.566	.000

Table 4.8. Outliers

			Estimate	SE	t	Sig.
FIIs_Cum_Eq-Model_1	Jul 2007	Additive	18.130	3.530	5.136	.000

In the table of model statistics, R-sqred present percentage change in forecasting explained by the model, which is very high i.e. 99.9% as this model is identified by SPSS itself. Mean Absolute Percent Error (MAPE) i.e. the average possibility of error in the prediction is 3.273, it means the model has the power to predict at 96.727% accurately. Ljung-Box Q test has a null hypothesis of H0: Residuals are normally distributed. P-value is 0.736 which is greater than 0.05. Hence he null hypothesis is accepted, residuals are normally distributed.

In the next table parameters of AR, SAR and SMA are found significant as p-values of t-statistic are less than 0.05.

In the last table, the model has also identified the outlier i.e. on Jul 2007, which is also significant as a p-value of its t-statics is also less than 0.05.

Following figures talk about Auto Correlation Function and Partial Auto Correlation function.

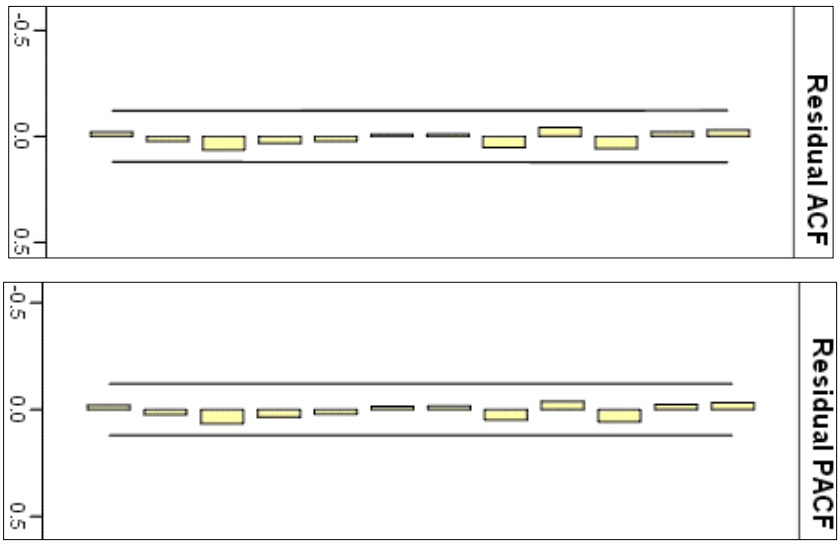


Figure 4.3. Auto Correlation Function and Partial Autocorrelation Function

As both of the ACF and PACF are under their respective limits, so there is no problem of serial autocorrelation. Following the line, charts show the actual and forecasted value of FII investment in the Indian equity market.

Thus, a SARIMA model i.e. ARIMA (1,1,0) (1,0,1) model can be written as follow

FIIs_Cum_Eq = 3.404 + 0.385[AR(1)] + 0.956 [SA(1)] + 0.925[SMA(1)]

Using the above equation, the values of FII investment in the Indian equity market can be forecasted. The forecasting next six months after March 2019 is shown in Figure 4.4.

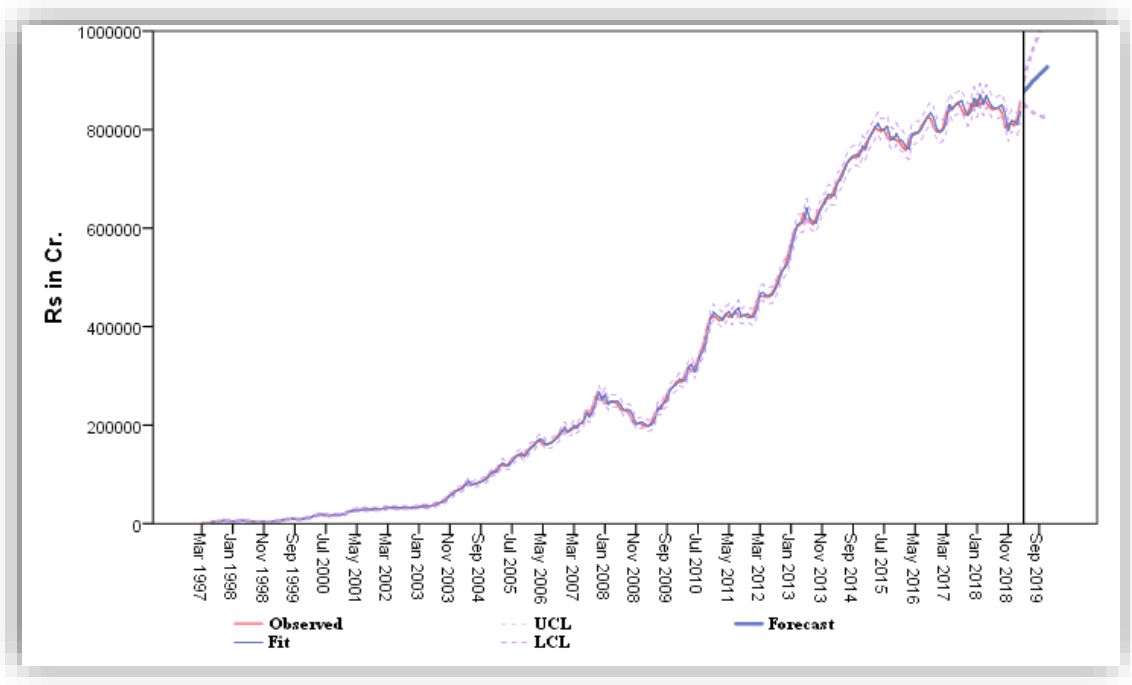


Figure 4.4. Actual and Forecast FII investment in the Indian equity market

Figure 4.4 presents line chart showing actual observed data, fit i.e. expected value, upper limit, lower limit and forecasted values for the next six months after March 2019 with an upper and lower limit.

4.3. Structural Breaks in FIIs' Investment in Indian Equity Market

This section of the chapter discusses the structural breaks in FII investment in the Indian equity market due to various events within and outside India. In this chapter first of all CUSUM and CUSUM of Square test are applied to check the stability of coefficient of time series data of FII investment in the Indian equity market. The structural break also causes stationarity related issues in time series data. The existence of structural break is checked through unit root test, Augmented Dicky-Fuller test. In later part for unknown and known causes of the structural break, Bai-Perron test and Chow test are applied.

4.3.1. Structural Break

Structural breaks are useful econometric tools to understand the paradigm shift in trend and change in the slop of any time-series data. A structural break appears when an unexpected shift in a time series data is observed. It's called a structural break when a time series abruptly

changes at a point in time. This change could involve a change in mean or a change in the other parameters of the process that produce the series. This can lead to huge forecasting errors and unreliability of the model in general. This change could involve a change in mean or a change in the other parameters of the process that produce the series. Structural break tests help me to determine when and whether there is a significant change in the data (Gupta, 2008). Following a section of this chapter discuss the cognition of structural breaks in FII investment in the Indian equity market.

4.3.2. Cognition of Structural Breaks in FII investment in Indian Equity Market

The simplest way to study any data is to study through their chart. A structural break can also be observed primarily through observing the line chart of time series data. The following figure shows the line chart of the cumulative value of FII investment in the Indian equity market (CUM_FIIs_EQ).

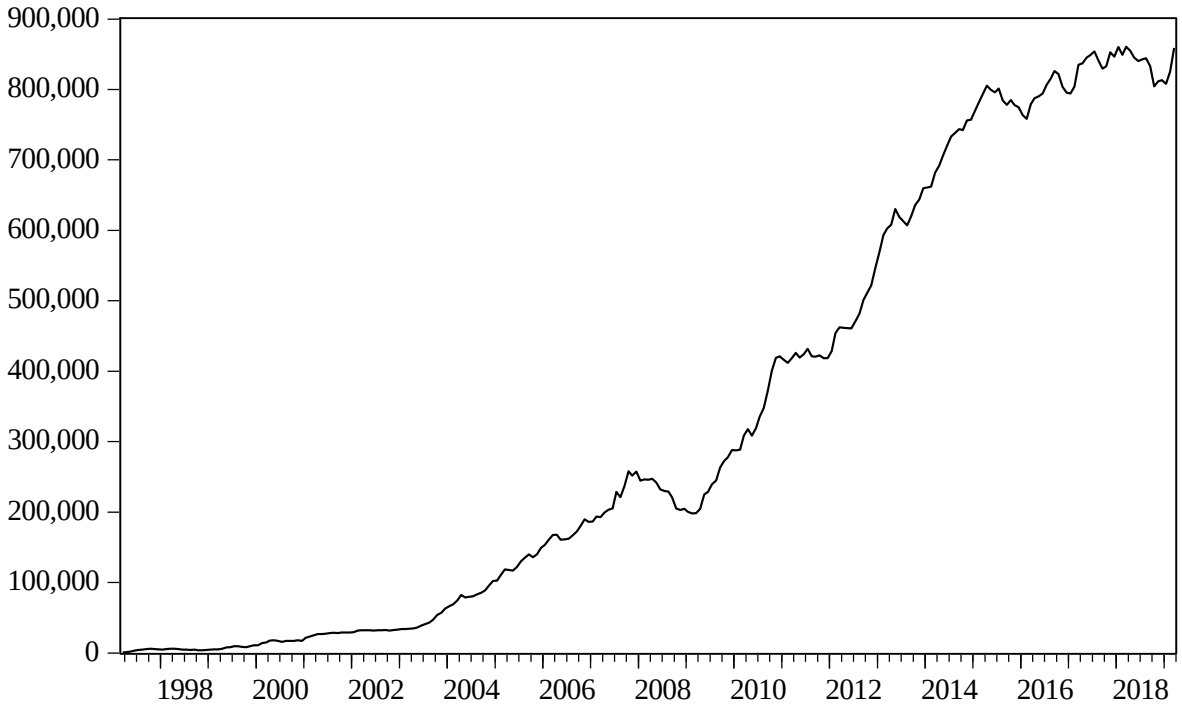


Figure 4.10. Line chart of CUM_FIIs_Eq

Looking at the Figure 4.10 trend line of FIIs flow in the Indian equity market it can be said that the flow of FIIs has a high amount of fluctuations and variations. During a

different time period, even the trend also varies. Not only variation in trend but even the slop of the same trend is also differing from time to time. For instance, up to 2008 there is a continuous upward trend can be observed, but from 2008 to mid of 2009 there is a downward trend. Again from mid-2009 to 2011 trend is upward but slop is different from the earlier upward trend. During the period from 2011 to 2012 stagnancy can be observed. But again from 2012 to 2015, there is an upward trend following a downward trend and high fluctuation of ups and downs in the last four-five years. This changes in the trend make the coefficient of time-series model instable. This instability of the coefficient of time-series leads to structural breaks. Following a discussion of the chapter throws light on the test of the stability of the coefficient of time-series data of FII investment in the Indian equity market.

4.3.2.1. Cumulative Sum (CUSUM) test and CUSUM of Squares test:

As discussed earlier if the coefficients of the time-series model are not stable, there is a possibility of structural breaks(s) in time-series data. the CUSUM test (Brown, Durbin and Evans, 1975) and the CUSUM of Squares test help to check whether coefficients of the model are stable or not. The CUSUM test (Brown, Durbin and Evans, 1975) is based on the cumulative sum of the recursive residuals. It plots the cumulative sum with the 0.05 level of significance line. If the line of the cumulative sum goes outside the two significant lines, it can be said that the parameter of the time-series data is not stable. The CUSUM of the square test (Brown, Durbin and Evans, 1975) is based on the movement of residual variance. It also plots the residual variance with the 0.05 level of significance line. If the line of the cumulative sum of the square goes outside two significant lines, it can be said that residual variance may not be stable.

First of all, original data series of cumulative FII investment in Indian Equity Market (CUM_FIIs_EQ) is checked through the CUSUM test and the CUSUM of Square test. As data transformation is useful to make time-series data stationary. Transformation of time-series data can be done by taking a difference of value or taking the log value of the time-series data. The first difference of log value could be the best transformation to minimize variance and to bring meaningful value near to zero and make time-series stationary. Hence later Xthe CUSUM test and the CUSUM of Square test is applied on transformed time-series data of the first difference of log value of cumulative FII investment in the Indian equity

market (D_LN_FIIs_EQ). Following is the hypothesis to conduct these two tests of the stability of the coefficients of the model.

H0 4.3. Coefficients of the model are stable

H1 4.3: Coefficients of the model are not stable

The following figure shows the result of the CUSUM test for CUM_FIIs_EQ.

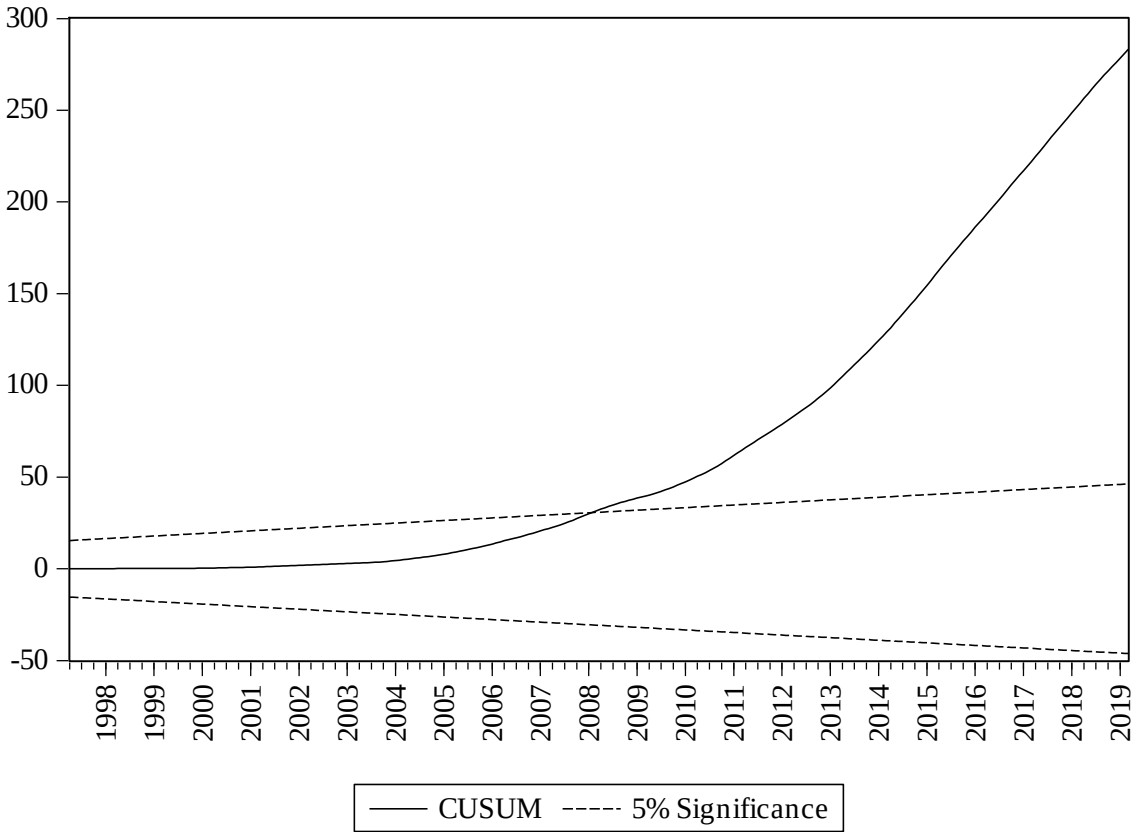


Figure 4.11. CUSUM test for CUM_FIIs_EQ

From the Figure 4.11, it can be said that the coefficient of CUM_FIIs_EQ time-series model is not constant. As the CUSUM line is not lying between 5% significant line the null hypothesis of the stable coefficient of the time-series model can not be accepted. To check to make the time-series stationary and make their coefficient stable the various transformation of original time-series data can be taken. The first difference of log value of time-series data has a good probability to make time-series stable. Hence for the next step, the first difference of log-transformed data i.e. D_LN_FIIs_EQ to conduct the CUSUM test is taken.

The following figure shows the result of the CUSUM test for transformed data series D_LN_FIIs_EQ.

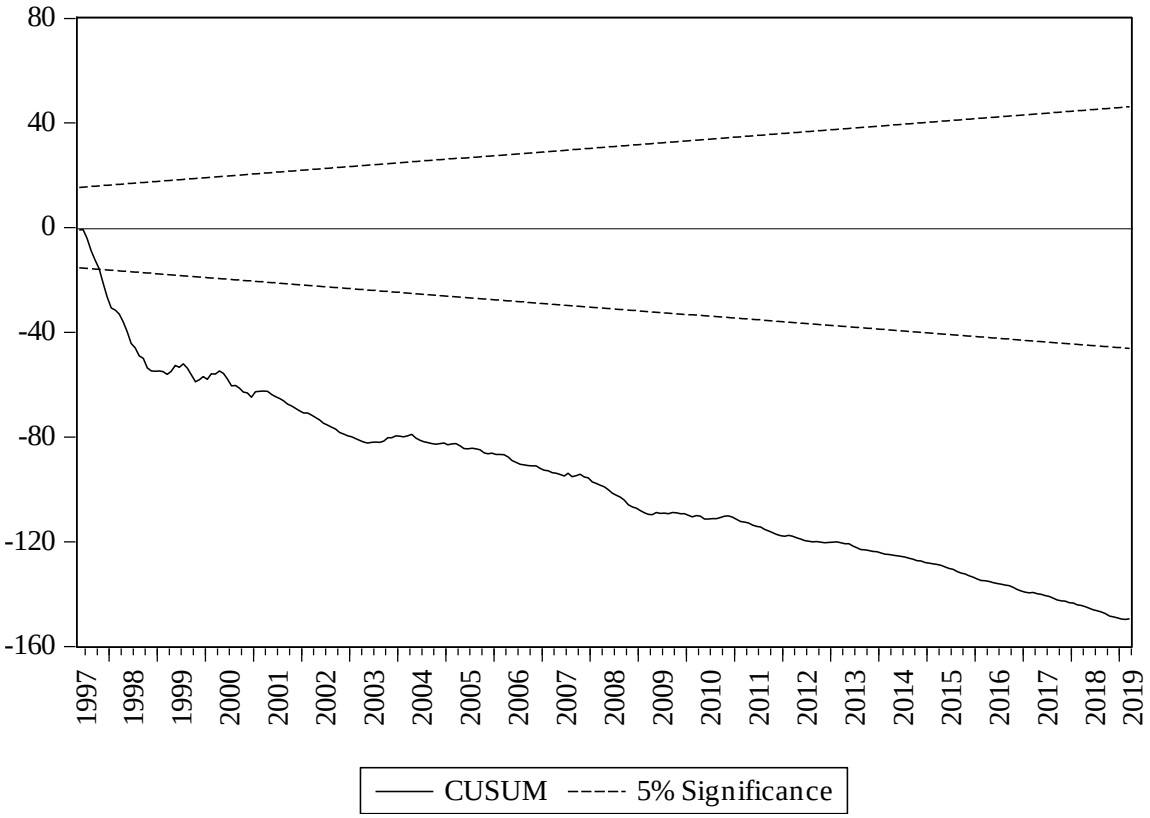


Figure 4.12. CUSUM test for D_LN_CUM_FIIs_EQ

From both of the above figure, Figure 4.11 and Figure 4.12, it can be said that even after taking the first difference of log transformation the coefficient of the model could not be stabilized. As the line of the CUSUM is crossing two lines of 5% level of significance, the null hypothesis of the coefficient of the model are stable can not be accepted. Hence in conclusion coefficient of the model is changing systematically. After conducting the CUSUM test it is needed to apply the CUSUM of Square test to check the stability of variance of residuals.

The following figure shows the result of the CUSUM of Square test on original data series i.e. CUM_FIIs_EQ.

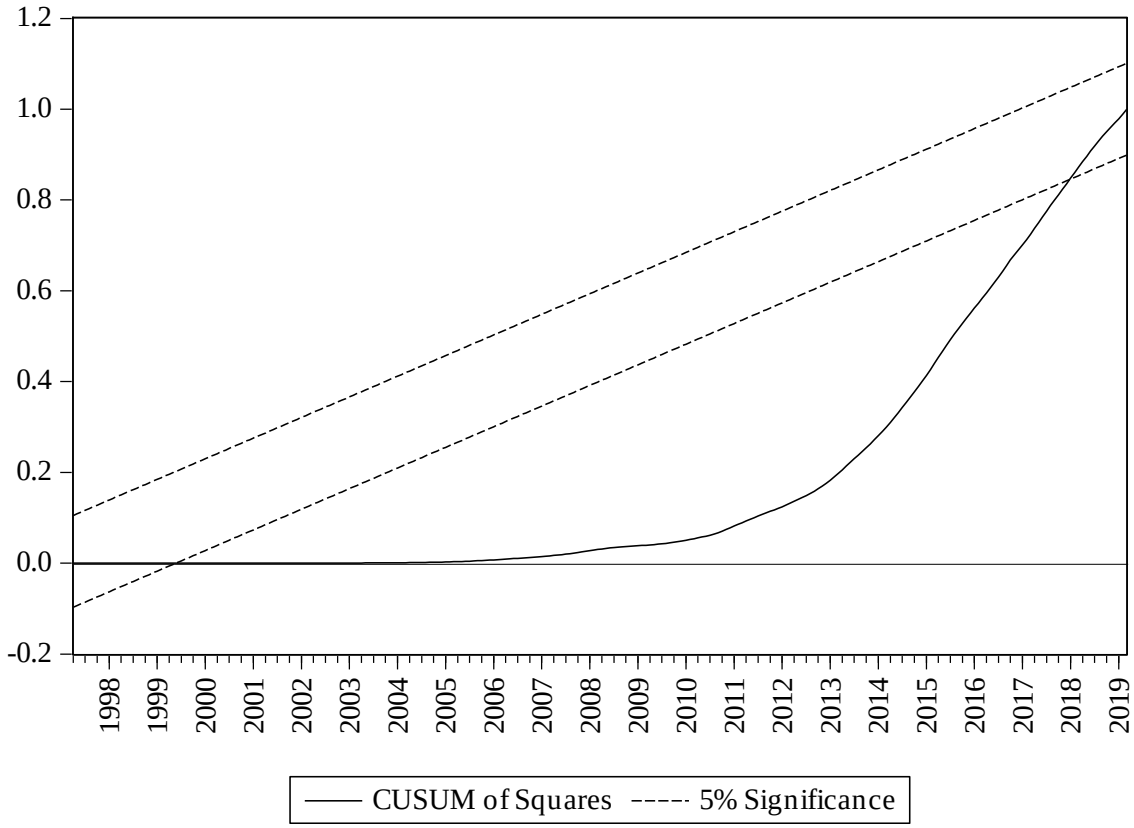


Figure 4.13. CUSUM of Square test for CUM_FIIs_EQ

From the Figure 4.13, it can be observed that line of the CUSUM of Square crosses the area of two lines of 5% significance. Hence, it can be said that the null hypothesis of a stable coefficient of time-series CUM_FIIs_EQ can not be accepted. To test further stability of coefficient the CUSUM of squares test is applied on transformed data series D_LN_FIIs_EQ to check the stability of variance of residuals.

Following the CUSUM of squares show the test of the first difference of log-transformed time-series i.e. D_LN_FIIs_EQ.

From the Figure 4.14, it can be observed that even after taking the first difference of log transformation of cumulative FII investment in the Indian equity market, line of the CUSUM of Square crosses two lines of 5% level of significance. It leads me to fail in accepting the null hypothesis of stability in the coefficient of transformed time-series data of D_LN_FIIs_EQ.

Hence from the CUSUM Test and the CUSUM of Squares Test, it can be said that coefficients of the time-series model are not stable, they are changing systematically as well as suddenly, so the null hypothesis of coefficients of the model are stable can not be accepted.

It implies that structural breaks are existing in time-series data of FIIs flow in the Indian equity market.

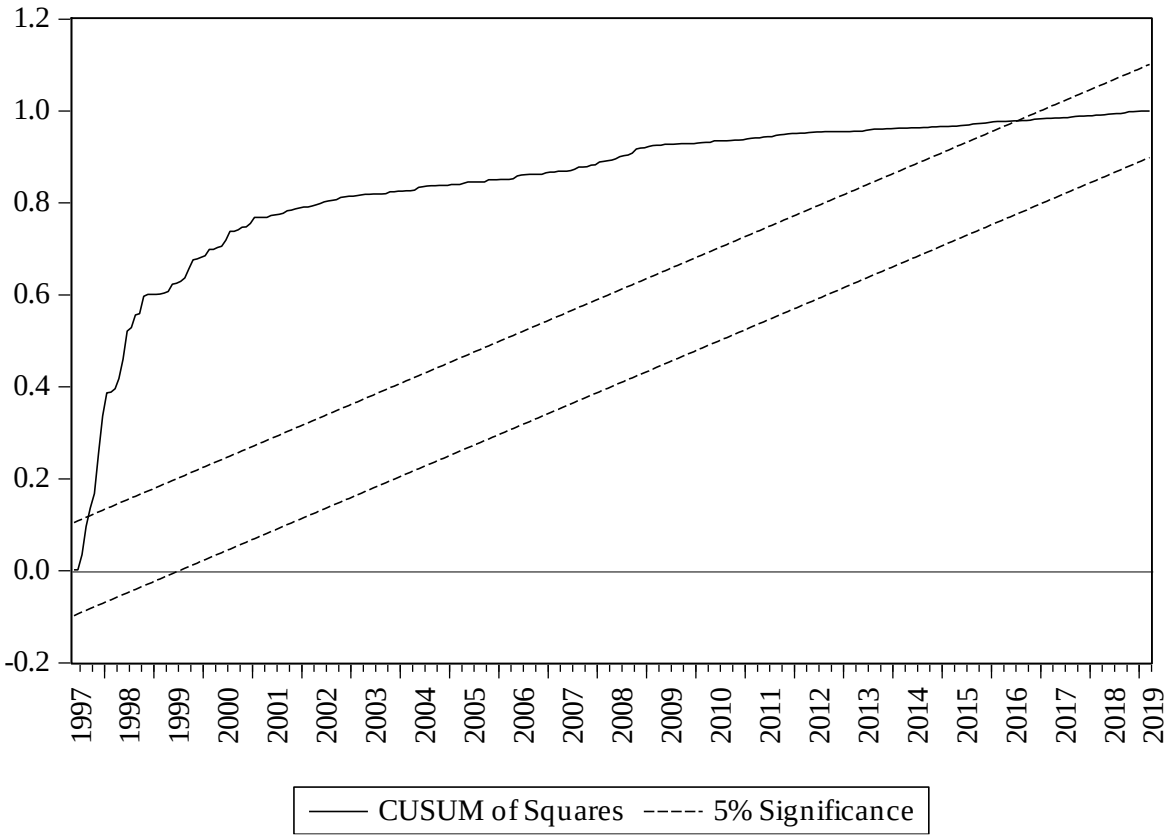


Figure 4.14. CUSUM of Square test for D_LN_CUM_FIIs_EQ

4.3.2.2. Augmented Dicky-Fuller (ADF) test

A structural break can be confirmed with Unit root test, applying the Augmented Dicky-Fuller test to check whether the stationarity related issue is due to a structural break or not. The following result shows the outcome of this test.

H0 4.4. Time-series (CUM_FIIs_EQ) has a unit root

H1 4.4: Time-series (CUM_FIIs_EQ) has no unit root

Following is the output of the ADF test conducted with trend specification and structural break specification with intercept only under Least Square method. Break type is an innovational outlier. Selection of break is based on minimizing Dicky-Fuller t-statistics. Lag length is based on automatic selection of Schwarz Information Criterion with a maximum lag of 12.

Table 4.14. ADF test statistics with adjusted Sample: 1997M05 2019M03

		t-stat.	Prob.*
Test statistic of ADF		-2.639949	0.8544206
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Augmented Dickey-Fuller Test Equation				
Variable	**Coeff.**	**Sd.Er**	**t-stat.**	**Prob.**
CUM_FIIs_EQ(-1)	0.991556	0.003199	310.0008	0.0000
D(CUM_FIIs_EQ(-1))	0.275067	0.060935	4.514091	0.0000
C	1695.628	715.595	2.369536	0.0185
INCPTBREAK	7585.04	2010.983	3.771808	0.0002
BREAKDUM	-6409.63	7964.768	-0.80475	0.4217
R-sqred	0.999371	Mean dependent var		330274.2
Adjusted R-sqred	0.999361	S.D. dependent var		308200.4
S.E. of regression	7791.477	Akaike Inf. Cr.		20.77828
Sum sqred residl	1.57E+10	SIC		20.84619
Log-likelihood	-2727.34	Hannan-Quinn criteria.		20.80557
F-stat.	102422.3	DW Statistic		1.964125
Prob(F-stat.)	0			

From the Table 4.14, it can be observed that the P-value of the ADF test is 0.85 which is not less than 0.05, so null hypothesis is accepted. Coefficient of the first difference and second difference are significant as the P-value are less than 0.05, so there is a probability of autocorrelation, which could be a cause for unit root. Coefficient of incepting break is also significant as its value is 0.0002 which less than 0.05, it suggests the existence of structural break in time-series model. Dickey-fuller t-statistics figure and Dickey-fuller autoregressive coefficients figure also suggested the existence of structural break during March 2009. Existence of structural break also disturbs the stationarity of series.

Figure 4.15. Dickey-Fuller t-statistics (Break Date: 2009M03**)**

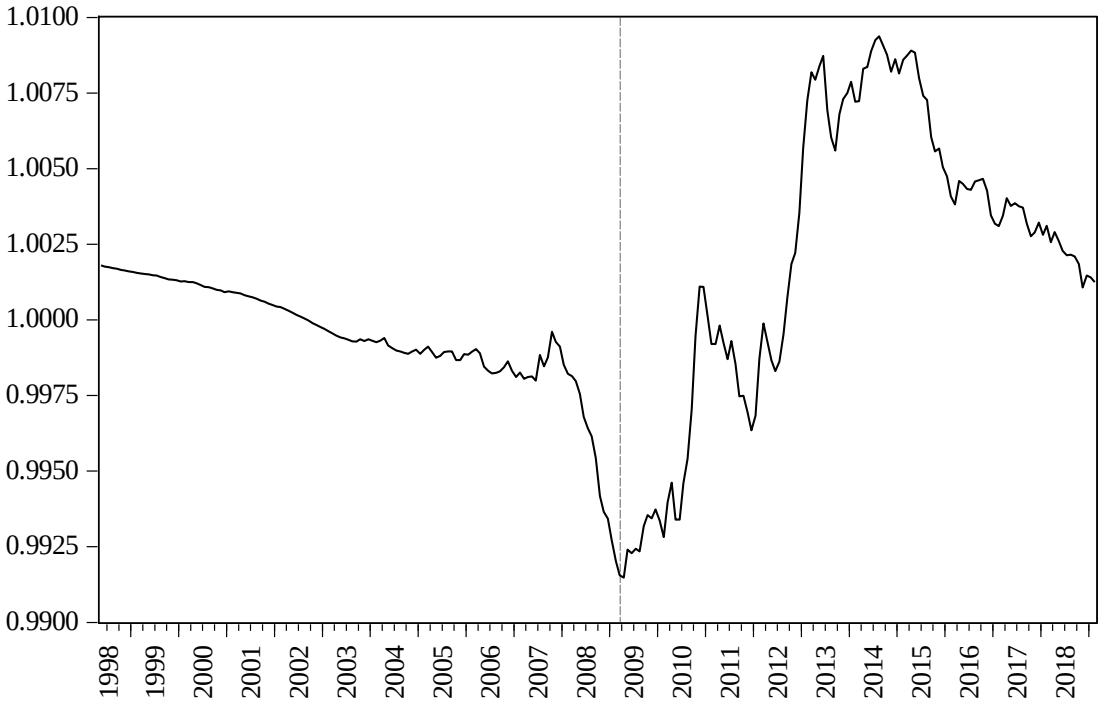


Figure 4.16. Dickey-Fuller autoregressive coefficients (Break Date: 2009M03**)**

Thus, the CUSUM test, the CUSUM of square test and ADF test suggested the existing structural breaks. For further investigation about the structural breaks, various tests need to applied to identify structural breaks in time-series data.

Structural breaks can be studied by applying two alternative approaches. In one of the approaches, it can be done initially by identify a significant change in time-series data through the appropriate test and then find the cause for the same. In an alternative approach, when after being aware of the events, its significant effect on the trend of time-series data can be confirmed. Both of the approaches were applied to identify major reasons for changes in FII investment in the Indian equity market. In the first approach, the Bai-Perron (1996, 2003) test is applied to identify multiple structural breaks without being aware of causing the events. In the alternative approach, the Chow (1960) test is applied to confirm the significance of time period for the identified events, causing structural breaks in the time-series data of FII investment in the Indian equity market.

The following discussion of the chapter discusses the first of all about the major events which are the probable causes of structural breaks in time-series data of FII investment in the Indian equity market. Then in the later part, the Bai-Perron test and the Chow test is discussed for the study of the structural breaks.

4.3.3. Structural Breaks in FIIs Investment in India: Identification and Causes

Before applying appropriate test for the structural breaks discussion about various events which may cause the structural break in time-series data of FII investment in the Indian equity market helps me in better understanding of the behaviour of time-series data of FII investment.

Since the opening of the Indian economy, there has been a continuous flow of Foreign Institutional Investors investment in the Indian equity market. As discussed earlier in the year 2016-17 FIIs turnover in cash segment of equity market was 21% of total turnover of NSE and BSE and 13.7% of equity-based derivative market, in recent time FIIs have emerged as the most dominant groups of investors with ownership of significant component of the total trade volume in the Indian equity market. As the influence of FII investment significantly affects the Indian stock market, it is important to study causes affecting FII investment in the Indian equity market. These causes lead to change in FII investment flow can be grouped together on the basis of major factors related to the internal and external environment of the country. Internal factors can be further group together as i) FIIs related Regulatory measures by the Indian government, ii) Lok Sabha election, and iii) Problems of

the Indian equity market (scams). Factors related to the external environment are due to internal exposure which includes viz. The global crisis, Remedial action to such crisis, Change in value of the foreign currency, Trade war, Petroleum issue etc.

On the basis of a literature review of various research papers as well as newspaper articles, a few such events were identified, which are potential to affect the FII investment in India. Following is the list of such national and international events which are potentially significant for FII investment in the Indian equity market.

- ✓ Harshad Mehta Scam (1992)
- ✓ Mexican Peso Crisis (1994)
- ✓ Asian Financial Crisis (1998)
- ✓ Ketan Parekh Scam (2001)
- ✓ P-Notes Issues (2003)
- ✓ FIIs limit related announcement in Budget (2006)
- ✓ Eurozone Crisis (2007)
- ✓ Subprime Crisis (2008)
- ✓ Bail-out program of Europe, Satyam Scam, End of Subprime in the US (2009)
- ✓ Announcement of GAAR (2012)
- ✓ Petroleum Issue (2014)
- ✓ Declaration of MAT, Greece Crisis, Chinese Yuan devaluation (2015)

After the exploration of this significant national and international events to FII investment in the Indian equity market following discussion is done about the check of structural breaks applying two different approaches discussed earlier. In the next section of the chapter initial discussion is done about application of the Bai-Perron test and in the latter part of the section discussion about the application of the chow, a test is done.

4.3.3.1. Bai-Perron test for Structural Break

Bai and Perron (1998) had considered issues related to multiple structural changes, occurring at unknown dates, in the linear regression model estimated by least squares. The main aspects were the properties of the estimators, including the estimates of the break dates, and the construction of tests that allow inference to be made about the presence of structural change and the number of breaks. They considered the general case of a partial structural change model where not all parameters were subject to shifts. They studied both fixed and shrinking

magnitudes of shifts and obtain the rates of convergence for the estimated break fractions. Bai and Perron (2003) supplemented the set of critical values to check multiple structural breaks.

In the study, to find a number of structural breaks in time-series data of FII investment in the Indian equity market, the Bai-Perron test is applied. The first condition to apply this test is that there should be at least 100 observations. In the study, 264 observations available. So the Bai-Perron test can be applied to find a structural break in FIIs flow in the Indian equity market.

E-views software is used to apply the Bai-Perron test. In this application the first of all, the equation is estimated using specification using the least square (LS) method. In the regression equation, the first difference of cumulative FII investment is considered in the Indian equity market (D_FIIs_EQ) as the dependent variable and single regressor i.e. C. To perform the Bai-Perron tests Global L break vs. none method and *l* globally optimized breaks along with the corresponding UD_{max} and WD_{max} tests are considered. Following is the null hypothesis to apply Bai-Perron test.

H0 4.5. There are no structural breaks
H1 4.5: There are structural breaks

In multiple breakpoint tests, during the period from March 1997 to March 2019 having 264 observations, 5 maximum structural breaks are selected. The test also permits to determining trimming percentage i.e. 100(h/T). Here h determines the minimum segment permitted length. Trimming is done at 0.15, which default setting in Eviews software considering the optimality of the result. The significant level is also set as per default setting of 0.05 in the software. The following table shows the statistics of multiple structural break test.

Table 4.15. Multiple Structural Breaks

		Scaled	Weighted	Critical
Breaks	**F-stat.**	**F-stat.**	**F-stat.**	**Value**
1 *	16.6296	16.6296	16.6296	8.58
2 *	20.9114	20.9114	24.8504	7.22
3 *	14.649	14.649	21.0887	5.96
4 *	11.1062	11.1062	19.0965	4.99

5 *	8.40723	8.40723	18.4486	3.91
UDMax statistic* 20.91142039013124 UDMax critical value** 8.880000114440918				
WDMax statistic* 24.85041420578056 WDMax critical value** 9.90999984741211				

* Significant at the 0.05 level. ** Bai-Perron (Econometric Journal, 2003) critical values.

In the application of the multiple structural break test with five Sequential F-stat. determined breaks, all five F-stat were found. largest breaks are significant at 5% level of significance. But UDmax statistics and WDmax statistics determined 2 breaks, which are significant at 5% level of confidence as well as significant as per Bai-Perron (2003) critical values.

F-stat., Scaled F-stat. and Weighted F-stat. provides individual values for each break. Here all these statistics found exceeding their respective critical value, hence the null hypothesis of no structural break is rejected.

The UDmax and WDmax results show the number of breakpoints as determined by the application of the unweighted and weighted maximized statistics. As both of the maximized statistics values exceed critical values and they are significant, both indicate the presence of multiple breaks. They suggest optimum structural breaks dates out of all following estimated structural break dates found in 5 sequential estimated breaks.

Estimated break dates:

1: 2009M04
2: 2009M04, 2015M05
3: 2003M06, 2009M04, 2015M05
4: 2002M10, 2006M01, 2009M04, 2015M05
5: 2000M07, 2003M10, 2008M11, 2012M02, 2015M05

Above result of Bai-Perron test produced major 9 event periods during which potential structural break occurred. An effort is made to find the major events happened during those 9 time period as follow.

1. 2000M07: FIIs developed confidence in the Indian equity market as Derivative market initiated,

2. 2002M10: October is best for FIIs flow(Mudgill, 2016a),
3. 2003M06: Uptrend started. Using P-Notes FIIs could pump a huge amount of funds in the Indian stock market)
4. 2003M10: October is best for FIIs flow (Mudgill, 2016a),
5. 2006M01: The FIIs net investment was highest during the month of December 2005, when they made a net purchase for a peak of Rs. 83, 610 million. ("Indian Securities Market A Review," 2006)
6. 2008M11: October 2008 While going over the External Commercial Borrowing policy, the Government raised the cumulative debt investment limits from the USD 3 billion to the USD 6 billion for FIIs investments in Corporate Debt. Elimination of regulation for FIIs relating to limit of 70:30 ratio of investment in equity and debt respectively. Elimination of Restrictions on Overseas Derivatives Instruments (ODIs) ("Indian Securities Market A Review," 2009).
7. 2009M04: End of Subprime in US and Bailout program of Europe,
8. 2012M02: In January 2012, the Government expanded this scheme to allow Qualified Foreign Investors to directly invest in the Indian equity markets ("Indian Securities Market A Review," 2014)) and
9. 2015M05: India's taxmen sent a number of notices to FPIs on minimum alternate tax (MAT) (Dave & Pandey, 2015; Patel, Chowdhry, & Associates, 2015). Downtrend started. the Indian equity market was perceived overpriced and FIIs found other better opportunities in the world (Sriram, 2015).

All the estimated breaks are significant at 5% level of significance according to Bai-Perron (2003) critical values. The UDmax statistic, as well as WDmax, is also significant at 5% level of significance which suggest major two estimated breaks of 2009M04 and 2015M05. Hence the null hypothesis of no structural break is rejected.

After identification of structural break, an effort is made to prepare a line chart of the first difference of cumulative FII investment in the Indian equity market (D_FIIs_EQ), cumulative FII investment in the Indian equity market (CUM_FIIs_EQ) and Structural Breaks. The following figure shows those two major estimated structural breaks of 2009M04 & 2015M05 suggested by Bai-Perron testing the trend line of FIIs cumulative investment in the Indian equity market.

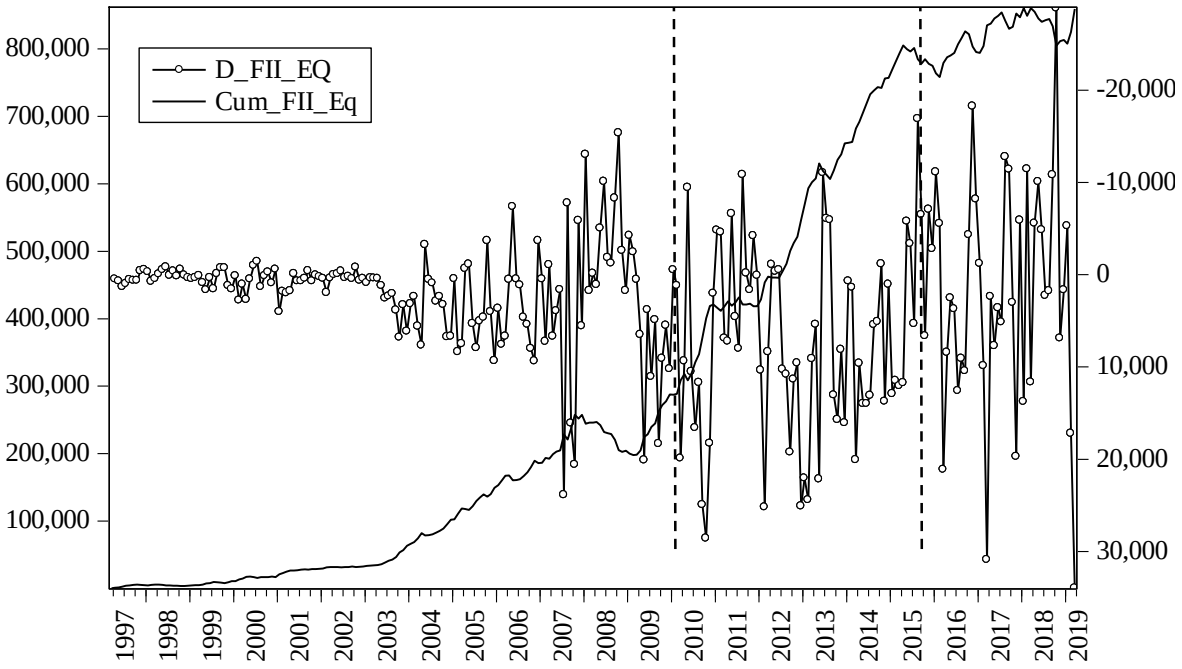


Figure 4.17. Line chart of D_FIIs_EQ, CUM_FIIs_EQ and Structural Breaks

Considering these major two structural breaks in the time-series model, two dummy variables are introduced i.e. SB_2009M04 (structural break of April 2009) and SB_2015M05 (structural break of May 2015).

4.3.3.1.1. Time-series model introducing Structural Breaks suggested by Bai-Perron (2003)

Following estimated time-series model suggests the value of Net Monthly FIIs flow in the Indian equity market (D_FIIs_EQ) in relation to structural breaks suggested by Bai-Perron (2003) test.

D_FIIs_EQ = 1421.246 + 6816.735*SB_2009M04 - 6975.938*SB_2015M05

The estimated equation for the dependent Variable D_FIIs_EQ using least squares method considering the adjusted sample of 1997M04 2019M03 having 264 observations after adjustments produced following results.

Table 4.16. Statistics of the estimated regression equation

Variable	Coeff.	Sd.Er	t-stat.	Prob.

C	1421.247	656.1044	2.166190	0.0312**
SB_2009M04	6816.736	1121.102	6.080389	0.0000*
SB_2015M05	-6975.939	1447.336	-4.819846	0.0000*

R-sqred	0.136538	Mean dependent var	3251.410
Adjusted R-sqred	0.129921	S.D. dependent var	8439.641
S.E. of regression	7872.329	Akaike Inf. Cr.	20.79139
Sum sqred residl	1.62E+10	SIC	20.83203
Log-likelihood	-2741.464	Hannan-Quinn criteria.	20.80772
F-stat.	20.63576	DW Statistic	1.494419
Prob(F-stat.)	0.000000		

* Significant at 1%, ** Significant at 5%

From the above test statistics, it can be observed that the P-value of F-stat. is less than 0. 05, so the suggested time-series model is significant. the P-value of both of the structural breaks are also less than 0.05, so they are also significant. Hence it can be concluded that both of the dummy variables are significant to estimate time-series model. But still, the stability of these significant coefficients of the time-series model need to be checked.

In order to check the stability of the coefficient of the time-series model, again CUSIM and the CUSUM of Square test are applied after introducing dummy variables of structural breaks. Following figures present the result of these test.

From the Figure 4.18, it can be observed that the line of the CUSUM is passing through two lines of 5% significance. From this, it can be infered that coefficients of the time-series model after introducing dummy variables are stable.

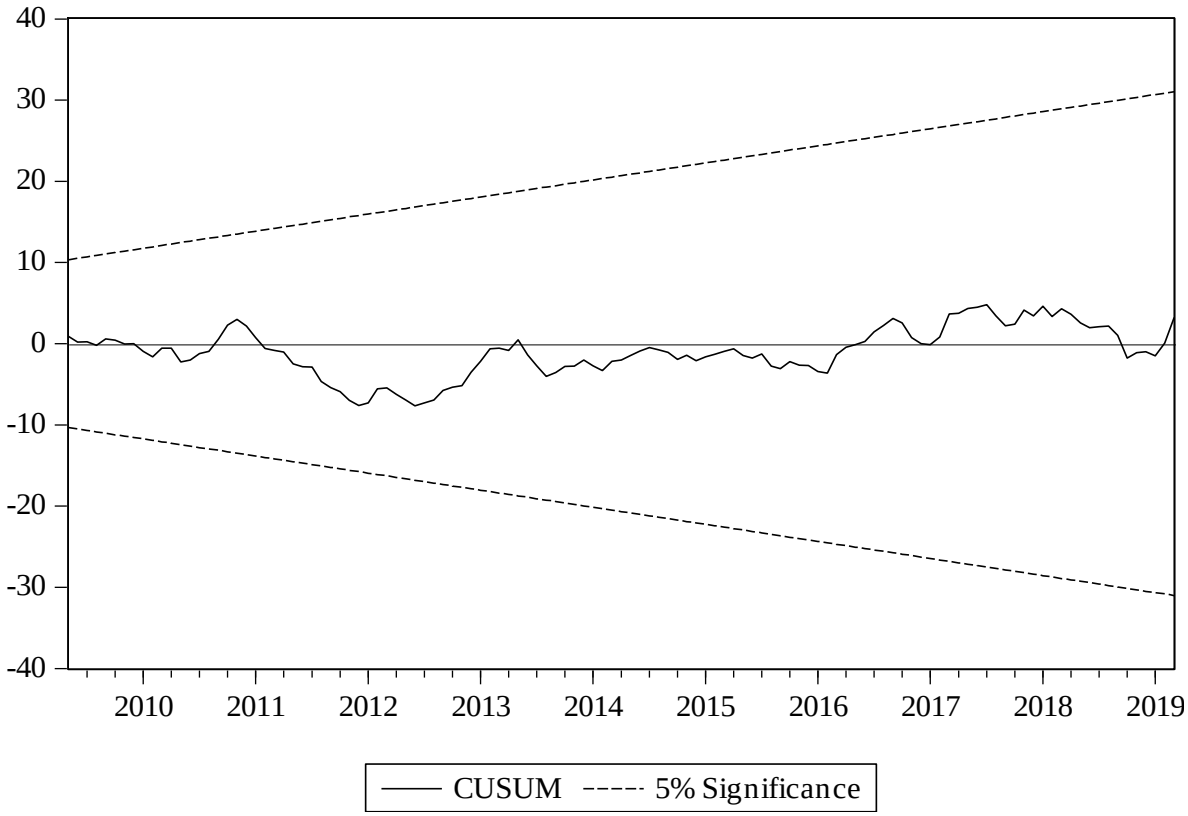


Figure 4.18. CUSUM test for D_ FIIs_EQ with structural breaks

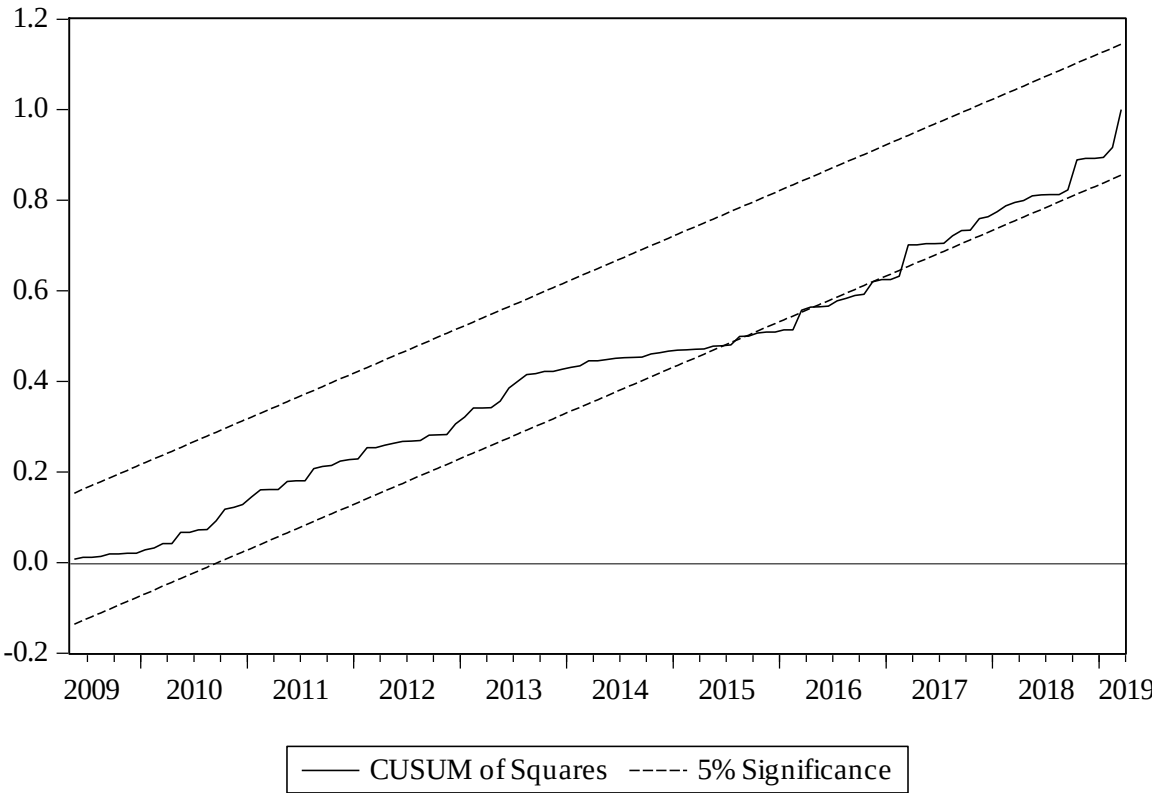


Figure 4.19. CUSUM of Square test for D_ FIIs_EQ with structural breaks

From the Figure 4.19, it can be observed that the line of the CUSUM of Squares passes through two lines of 5% significance. From this it can be inferred that variance of residual of time-series after introducing dummy variables for structural breaks are also stable. Thus, from the CUSUM and the CUSUM of Squares test it can be concluded that after the introduction of two new dummy variables of two major structural breaks (April 2009 and May 2015) suggested by Bai-Perron, the model is almost stable, though exactly not at 5% significant level as line of residual variance still crosses line of 5% significance in the case of the CUSUM of Squares test.

From the above analysis, it could be found that Bai-Parron (2003) test is useful to identify structural breaks, especially when the time period for these structural breaks are not identified. In a study of the time-series model of FII investment in the Indian equity market through the CUSUM and the CUSUM of Square test, it is found that the time-series model was not stable in terms of their coefficients. Without a stable coefficient, time-series model cannot be used for forecasting and for further statistical analysis as well. Bai-Perron test provided assistance to find major two structural breaks during the periods of April 2009 and May 2015. Introduction of the dummy variable for these time period structural breaks made the coefficient of the time-series model stable. But structural breaks are not always unknown or with unidentified. As discussed earlier some events are potential to affect time-series model significantly. Whether such events are significant or not it can be checked through applying Chow test.

4.3.3.2. Chow test for Structural Break

The Chow (1960) test is mainly used to test the presence of structural breaks in the time-series model. The Chow test is a statistical test to check whether the coefficients in two linear regressions on different data sets are equal. It is commonly used in the time-series analysis to test the presence of structural break's presence. The chow test estimates two regression models – one using the data set of all observation and the other using a long subperiod sample. When the results are different for the models, the stability of the estimated relation over the sample period is doubtful.

To identify a structural break in time-series data of FII investment in the Indian equity market using the chow test, the first of all, major events have to be identified and their respective time periods. Following is the list of events to be checked for their significance.

Table 4.17. Events and their respective time period

Events	**Time Period**
13th Lok Sabha Election	Oct-99
The boom in IT and Telecom companies in the US	Dec-99
Ketan Parekh Scam	Feb-01
Increased in Investment through P-Notes	May-03
14th Lok Sabha Election	May-04
P-Note Crisis, Subprime Crises and Financial Crisis of 2007-08	Oct & Dec-07
Satyam Scam, Lok Sabha Election	Jan-09
Bailout Program of Europe and End of Subprime Crisis of US	Jun-09
FIIs infused a record Rs 24,978.40 crore in Indian Equity Market	Sep-10
15th Lok Sabha Election	Oct – Nov 2011
Facilitation of inflation, relaxing on restrictions of foreign investors and the RBI's monetary policy	Feb-12
Announcement of General anti-avoidance rules of taxation (GAAR)	Mar-12
QFIs were allowed to invest in the schemes of Indian mutual funds and Indian equity shares	Jun-12
16th Lok Sabha Election	Apr-May 2014
Declaration of Minimum Alternate Tax (MAT)	May-15
Greece Crisis	Aug-15
Uri attack by militants and Surgical Strike by Indian Army	Sep-16
Demonetization	Nov-16
Uri attack and Surgical Strike by the Indian military	Sep-16
Budget 2018-19 with Long-term Capital Gain Tax and Conflict about SGX Nifty	Feb-18
US-China Trade ware	Jul-18
BJP Government Budgets from July 2014 Feb 2018	2014-2018
GST Council revised tax rates	Dec-18
Militant attack in Pulwama, Airstrikes by IAF at Balakot in Pakistan & Interim Budget 2019-20	Feb-19
Events	Time Period
13th Lok Sabha Election	Oct-99
The boom in IT and Telecom companies in the US	Dec-99

Ketan Parekh Scam	Feb-01
Increased in Investment through P-Notes	May-03
14th Lok Sabha Election	May-04
P-Note Crisis, Subprime Crises and Financial Crisis of 2007-08	Oct & Dec-07
Satyam Scam, Lok Sabha Election	Jan-09
Bailout Program of Europe and End of Subprime Crisis of US	Jun-09
FIIs infused a record Rs 24,978.40 crore in Indian Equity Market	Sep-10
Facilitation of inflation, relaxing on restrictions of foreign investors and the RBI's monetary policy	Feb-12
Announcement of General anti-avoidance rules of taxation (GAAR)	Mar-12
QFIs were allowed to invest in the schemes of Indian mutual funds and Indian equity shares	Jun-12
Declaration of Minimum Alternate Tax (MAT)	May-15
Greece Crisis	Aug-15
Uri attack by militants and Surgical Strike by Indian Army	Sep-16
Demonetization	Nov-16
Uri attack and Surgical Strike by the Indian military	Sep-16
Budget 2018-19 with Long-term Capital Gain Tax and Conflict about SGX Nifty	Feb-18
US-China Trade ware	Jul-18
BJP Government Budgets from July 2014 Feb 2018	2014-2018
GST Council revised tax rates	Dec-18
Militant attack in Pulwama, Airstrikes by IAF at Balakot in Pakistan & Interim Budget 2019-20	Feb-19

To apply the chow test following is the null hypothesis to be checked, followed by details of the events with the result of chow test.

H0 4.6. There are no breaks at specified breakpoints

H1 4.6. There are breaks at specified breakpoints

4.3.3.2.1. October 1999: 13th Lok Sabha Election

On Oct 6, 1999, Vajpayee got a majority in 13th Lok Sabha Election. The stock market was rising before the election results were ready and once it was formally announce, the market

countered with 5% move on the election date and mounting almost 12% before the top was made on 14 Oct (Bramesh, 2014).

Date	High	Low	Diffrence	%	Days	Comment
05-Oct-99	1358	1522	164	12.07658	8	Atal Bihari Vajaypee got Majority
14-Oct-99	1522	1239	283	18.59396	14	Correction started

(Source: http://www.brameshtechanalysis.com/wp-content/uploads/2014/04/19991.png)

Following is the alternative hypothesis to be checked.

H1 4.6.1. There is a break at 1999M10

The following table shows the result of the chow test applied to check the significance of a structural break during October 1999 due to the result of the 13th Lok Sabha Election.

Table 4.14. Chow Breakpoint Test: 1999M10

F-stat.	4.271306	Prob. F(1,262)	0.0397**
Log-likelihood ratio	4.269205	Prob. Chi-Square(1)	0.0388**
Wald Statistic	4.271306	Prob. Chi-Square(1)	0.0388**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, null hypothesis can not be accepted. So it can be said that structural break during the period of Oct 1999 is significant. It leads to infer that the effect of 13th Lok Sabha Election is significant on FII investment in the Indian equity market.

4.3.3.2.2. December 1999: Boom in IT and Telecom sector in the US.

The Dow Jones industrial average moved up by 44.26 points to 11,497.12, crossing the record set on last Wednesday of December 1999. The Nasdaq composite index increased 32.44 to 4,069.31, also highest noticeable on that day, while the S&P 500 index increased 4.78 to 1,469.25, the third straight record close for the indicator. But only dot.com, high-tech or telecom stock of New York Stock Exchange gained, 64 per cent of the socks declined with an average of 28 per cent. On the Nasdaq, 50 per cent of stocks moves back an average of 32 per cent (Bebar, 1999). Following is the alternative hypothesis to be checked.

H1 4.6.2. There is a break at 1999M12

The following table shows the result of the chow test applied to check the significance of a structural break during December 1999 due to the result of Boom in IT and Telecom sector in the US.

Table 4.15. Chow Breakpoint Test: 1999M12

F-stat.	4.606303	Prob. F(1,262)	0.0328*
Log-likelihood ratio	4.601136	Prob. Chi-Square(1)	0.0320*
Wald Statistic	4.606303	Prob. Chi-Square(1)	0.0319*

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of December 1999 is significant. It leads to infer that the effect of Boom in IT and Telecom sector in the US is significant on FII investment in the Indian equity market.

4.3.3.2.3. February 2001: Ketan Parekh Scam

Ketan Parekh scam created a historical impact on the financial status of the Bombay Stock Exchange and also on the trust of the investors in its working. Securities and Exchange Board of India (SEBI) was highly condemned as being reactive rather than proactive. The market regulator was attributed for being careless in supervising the issue of uncommon price movement and terrific volatility in shares over an 18-month period prior to February 2001(T. Singh, 2010). Following is the alternative hypothesis to be checked.

H1 4.6.3. There is a break at 2001M02

The following table shows the result of the chow test applied to check the significance of a structural break during February 2001 due to Ketan Parekh rig the Indian stock market.

Table 4.16. Chow Breakpoint Test: 2001M02

F-stat.	6.267109	Prob. F(1,262)	0.0129**
Log-likelihood ratio	6.240605	Prob. Chi-Square(1)	0.0125**
Wald Statistic	6.267109	Prob. Chi-Square(1)	0.0123**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of February 2001 is significant. It leads to infer that the effect of Ketan Parekh Scam is significant on FII investment in the Indian equity market.

4.3.3.2.4. May 2003: FIIs Initiated to invest through the P-Notes:

FIIs were allowed to invest in the Indian capital market since 1992. As the Know-Your-Investor or Know-Your-Client (KYC) norms were pertinent for these foreign funds, the FIIs initiated to issue P-Notes, which helped the end-user to persist unidentified. P-Notes are, in essence, overseas derivatives instruments (ODIs), which have Indian stocks and derivatives as their underlying securities ("P-Notes require more stringent monitoring," 2015). The investments through P-Notes were permitted by SEBI in 2002 when D. R. Mehta was the Chairman of the capital market regulator. Total FIIs inflow of Rs 10,097 crore in October and November 2003, out of which Rs 5,756 crore came through P-Notes. In 2003 most of the FII investment done through P-Notes, which was initiated in the month of May. ("What are participatory notes?," 2004). Following is the alternative hypothesis to be checked.

H1 4.6.4. There is a break at 2003M05

The following table shows the result of the chow test applied to check the significance of a structural break during May 2003 due to FIIs started investment through P-notes.

Table 4.17. Chow Breakpoint Test: 2003M05

F-stat.	11.3936	Prob. F(1,262)	0.0008*
Log-likelihood ratio	11.23795	Prob. Chi-Square(1)	0.0008*
Wald Statistic	11.3936	Prob. Chi-Square(1)	0.0007*

* Significant at 1%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of May 2003 is significant. It leads to infer that the effect of FIIs initiated investment through P-Notes is significant on FII investment in the Indian equity market.

4.3.3.2.5. May 2004: 14th Lok Sabha Election

The influence of FIIs on the movement of the Sensex became apparent after the 2004 general elections in India when the sudden reversal of FIIs flows resulted in very high volatility in the Indian stock market. During this period, the Sensex experienced the worst single-day decline in its history. In the three months between April and June 2004, the index declined by about 17 per cent (Pal, 2005). Following is the alternative hypothesis to be checked.

H1 4.6.5. There is a break at 2004M05

The following table shows the result of the chow test applied to check the significance of a structural break during May 2005 due to results of 14th Lok Sabha Election.

Table 4.18. Chow Breakpoint Test: 2004M05

F-stat.	9.554989	Prob. F(1,262)	0.0022*
Log-likelihood ratio	9.456521	Prob. Chi-Square(1)	0.0021*
Wald Statistic	9.554989	Prob. Chi-Square(1)	0.0020*

* Significant at 1%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, null hypothesis can not be accepted. So it can be said that structural break during the period of May 2004 is significant. It leads to infer that the effect of 14th Lok Sabha Election is significant on FII investment in the Indian equity market.

4.3.3.2.6. October 2007: P-Note Crisis, Subprime Crises and Financial Crisis of 2007-08

On the 16th of October, 2007, SEBI (Securities & Exchange Board of India) proposed controls on participatory notes which accounted for roughly 50% of FII investment in 2007. SEBI was not happy with P-Notes because it is not possible to know who owns the underlying securities and hedge funds acting through PNs might, therefore, cause volatility in the Indian markets. However, the proposals of SEBI were not clear and this led to an immediate crash when the markets opened on the following day October 17, 2007. Within a minute of opening trade, the Sensex crashed by 1744 points or about 9% of its value - the biggest intra-day fall in Indian stock-markets in absolute terms. ("Participatory note," 2016)

According to the US National Bureau of Economic Research (the official arbiter of US recessions) the recession, as experienced in that country, began in December 2007 and ended on June 2009, thus extending over 19 months. Greece Recession was related to the financial crisis of 2007–08 and U.S. subprime mortgage crisis of 2007–09. Greece Recession has resulted in the scarcity of valuable assets in the market and the collapse of the financial sector in the world economy. Following is the alternative hypothesis to be checked.

H1 4.6.6. There is a break at 2007M10

The following table shows the result of the chow test applied to check the significance of a structural break during October and December 2007 due to the P-Note Crisis, Subprime Crisis and Financial Crisis of 2007-08.

Table 4.19. Chow Breakpoint Test: 2007M10 and 2007M12

	2007M10	2007M12		2007M10	2007M12
F-stat.	6.526945	5.900118	Prob. F(1,262)	0.0112**	0.0158**
Log-likelihood ratio	6.496185	5.879204	Prob. Chi-Square(1)	0.0108**	0.0153**
Wald Statistic	6.526945	5.900118	Prob. Chi-Square(1)	0.0106**	0.0151**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of October and December 2007 is significant. It leads to infer that the effect of P-Note Crisis, Subprime Crises and Financial Crisis of 2007-08 is significant on FII investment in the Indian equity market.

4.3.3.2.7. April – May 2009: 15th Lok Sabha Election

The Election commission of India held 15th Lok Sabha Election between 16th April 2009 and 13th May 2009 in five phases. The result of the election announced on 16th May 2009, in which the United Progressive Alliance (UPA) led by the Indian National Congress won the election by 322 seats out of 543 seats in total. Following is the alternative hypothesis to be checked.

H1 4.6.7. There are breaks at 2009M04 and 2009M05

The following table shows the result of the chow test applied to check the significance of a structural break during April-May 2009 due to 15th Lok Sabha Election.

Table 4.20. Chow Breakpoint Test: 2009M04 and 2007M05

	2009M04	2009M05		2009M04	2009M05
F-stat.	16.62956	16.23188	Prob. F(1,262)	0.0001**	0.0001**
Log-likelihood ratio	16.24621	15.86914	Prob. Chi-Square(1)	0.0001**	0.0001**
Wald Statistic	16.62956	16.23188	Prob. Chi-Square(1)	0.0000**	0.0001**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of April – May 2009 is significant. It leads to infer that the effect of 15th Lok Sabha Election is significant on FII investment in the Indian equity market.

4.3.3.2.8. January & June 2009: Satyam Scam, Bailout Program of Europe and End of Subprime Crisis of US

In the first week of January 2009, B Ramalinga Raju, founder and chairman of SCSL, confesses to fudging of accounts to the extent of about Rs 7,000-crore in a letter to the board (PTI, 2015). Foreign portfolio investor (FPI) inflows into Indian equities increased abruptly after the 2009 Lehman crisis, as the US central bank went on a money-pumping spree to avert a global slowdown (Kant & Modak, 2018).

When, as a negative repercussion of the Greece Recession, the relatively fragile banking sector had suffered large capital losses, most states in Europe had to bail out several of their most affected banks with some supporting recapitalization loans, because of the strong linkage between their survival and the financial stability of the economy. As of January 2009, a group of 10 central and eastern European banks had already asked for a bailout. According to the US National Bureau of Economic Research, the recession ended in June 2009 after 19 months' subprime crisis. Following is the alternative hypothesis to be checked.

H1 4.6.8. There are breaks at 2009M01 and 2009M06

The following table shows the result of the chow test applied to check the significance of a structural break during January and June 2009.

Table 4.21. Chow Breakpoint Test: 2009M01 and 2009M06

	2009M01	2009M06		2009M01	2009M06
F-stat.	14.56947	14.16416	Prob. F(1,262)	0.0002*	0.0002*
Log-likelihood ratio	14.28703	13.89985	Prob. Chi-Square(1)	0.0002*	0.0002*
Wald Statistic	14.56947	14.16416	Prob. Chi-Square(1)	0.0001*	0.0002*

* Significant at 1%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of January & June 2009 is significant. It leads to infer that the effect of Satyam Scam, Lok Sabha Election, Bailout Program of Europe and End of Subprime Crisis of US is significant on FII investment in the Indian equity market.

4.3.3.2.9. September 2010: FIIs found Indian financial market more lucrative compared to other emerging countries.

Pauli Laursen, who was managing Indian equities at SydInvest Asset Management in Copenhagen opine that FIIs found Indian financial market more lucrative compared to other emerging countries. By the 10^{th} day of the month of September 2010, FIIs have net-bought shares worth almost USD 5 billion (Rs. 22,700 crores). Helping make India the best performer within the emerging market pack in this month (M. Shah, 2010). Major FIIs belongs to the USA. Gyntelberg and King (2010) found that up to August 2010 US debt market was at its lowest (Two-year government bonds, Ten-year government bonds) and value of the USD/JPY was also lowest at least from 1996. Return of US investors in Bonds was highest in the segment of return from an emerging market. Compare to China, Brazil, Hungary, Mexico and Russia Equity Market Performance, Interest Expectation and a Real effective exchange rate of India was highest. Mudgill (2016b) noted that September has seen

heavy foreign inflows in 11 out of the past 14 years. FIIs infused a record Rs 24,978.40 crore in Indian Equity. Following is the alternative hypothesis to be checked.

H1 4.6.9. There is a break at 2010M09

The following table shows the result of the chow test applied to check the significance of a structural break during September 2010 due to the result of the perception of FIIs that they found Indian financial market more lucrative compared to other emerging countries.

Table 4.22. Chow Breakpoint Test: 2010M10

F-stat.	5.488592	Prob. F(1,262)	0.0199**
Log-likelihood ratio	5.473357	Prob. Chi-Square(1)	0.0193**
Wald Statistic	5.488592	Prob. Chi-Square(1)	0.0191**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of September 2010 is significant. It leads to infer that the effect of the perception of FIIs that Indian financial market found more lucrative compared to other emerging countries is significant on FII investment in the Indian equity market.

4.3.3.2.10. February 2012: Facilitation of inflation, a relaxing of restrictions on foreign investors and the RBI's monetary policy

Stock market inflows in the first 17 days of February of 2012, at Rs. 13,867 crores (USD 2.81 billion), were greater than that for the entire month of January 2012. Market analysts recognized strong FIIs inflow in the native market to the setback in RBI's monetary policy and the consequent effect of improved liquidity position (PTI, 2012). CNI Research Head Kishor Ostwal opined that in 2012, FIIs infused money into the Indian equity market mainly due to the facilitation of inflation, a relaxing of restrictions on foreign investors and moves in the RBI's policy. Following is the alternative hypothesis to be checked.

H1 4.6.10. There is a break at 2012M02

The following table shows the result of the chow test applied to check the significance of a structural break during February 2012 due to the result of facilitation of inflation, a relaxing of restrictions on foreign investors and the RBI's monetary policy.

Table 4.23. Chow Breakpoint Test: 2012M02

F-stat.	5.585863	Prob. F(1,262)	0.0188**
Log-likelihood ratio	5.569343	Prob. Chi-Square(1)	0.0183**
Wald Statistic	5.585863	Prob. Chi-Square(1)	0.0181**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of February 2012 is significant. It leads to infer that the effect of Facilitation of inflation, a relaxing of restrictions on foreign investors and the RBI's monetary policy is significant on FII investment in the Indian equity market.

4.3.3.2.11. March 2012: Announcement of GAAR

General anti-avoidance rules of taxation (GAAR) was introduced by the finance minister Pranab Mukherjee in his budget speech in March 2012. On 16th March 2012 Finance Minister, Pranab Mukherjee takes a tough stand and announces that the government will take action on tax avoidance effective from the fiscal year 2012–13 ("General anti-avoidance rule (India)," 2016). Following is the alternative hypothesis to be checked.

H1 4.6.11. There is a break at 2012M03

The following table shows the result of the chow test applied to check the significance of a structural break during March 2012 due to the result of the Announcement of GAAR.

Table 4.24. Chow Breakpoint Test: 2012M03

F-stat.	4.077189	Prob. F(1,262)	0.0445**
Log-likelihood ratio	4.076674	Prob. Chi-Square(1)	0.0435**
Wald Statistic	4.077189	Prob. Chi-Square(1)	0.0435**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of March 2012 is significant. It leads to infer that the effect of Announcement of GAAR is significant on FII investment in the Indian equity market.

4.3.3.2.12. June 2012: Effect of Policy Announcement related FIIs

Revision in framework for qualified foreign investor(QFI)s' investment in equity shares and mutual fund schemes (SEBI Circular dated June 7, 2012): Vide the SEBI circulars dated August 09, 2011 and January 13, 2012, QFIs were allowed to invest in the schemes of Indian mutual funds and Indian equity shares, subject to the terms and conditions mentioned therein. Subsequently, vide the SEBI circular dated January 25, 2012, the eligibility criteria for a qualified DP were revised. Following is the alternative hypothesis to be checked.

H1 4.6.12. There is a break at 2012M06

Following table shows the result of the test of chow test applied to check the significance of a structural break during June 2012 due to the circular of SEBI regarding QFIs allowed to invest in mutual funds.

Table 4.25. Chow Breakpoint Test: 2012M06

F-stat.	4.345959	Prob. F(1,262)	0.0381**
Log-likelihood ratio	4.343211	Prob. Chi-Square(1)	0.0372**
Wald Statistic	4.345959	Prob. Chi-Square(1)	0.0371**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of June 2012 is significant. It leads to infer that the effect of Policy Announcement related FIIs is significant on FII investment in the Indian equity market.

4.3.3.2.13. April – May 2014: 16th Lok Sabha Election

Election commission of India held 16th Lok Sabha Election during the period of 7th April 2014 to 12th May 2014 in different 9 phases. On 16th May 2014 result of the election was

declared in which the Bharatiya Janata Party won the election with a clear majority with 282 seats out of 543. Following is the alternative hypothesis to be checked.

H1 4.6.13. There are breaks at 2014M04 and 2014M05

The following table shows the result of the chow test applied to check the significance of a structural break during April and May 2014 due to the result of 16th Lok Sabha Election and its result.

Table 4.26. Chow Breakpoint Test: 2014M04 and 2014M05

	2014M04	2014M05		2014M04	2014M05
F-stat.	0.100117	0.184344	Prob. F(1,262)	0.7519	0.6680
Log-likelihood ratio	0.100862	0.185686	Prob. Chi-Square(1)	0.7508	0.6665
Wald Statistic	0.100117	0.184344	Prob. Chi-Square(1)	0.7517	0.6677

As p-value of F-test, log likelihood ratio and wald test for both of the periods 2014M04 and 2014M05 are greater than 0.10, the null hypothesis is accepted. So it can be said that structural breaks during the periods of April & May 2014 are not significant. It leads to infer that the effect of 16th Lok Sabha Election is not significant on FII investment in the Indian equity market.

4.3.3.2.14. May 2015: Declaration of Minimum Alternate Tax (MAT) on interest income of FIIs

On the announcement of MAT on interest income of FIIs leads to net outflows of Rs. 817 crores till April 27. Due to tax notices asking for tax at 20 per cent on the interest income, as conflicting to 5 per cent without MAT, FIIs outflows come in the wake (Reporter, 2015). Following is the alternative hypothesis to be checked.

H1 4.6.14. There is a break at 2015M05

The following table shows the result of the chow test applied to check the significance of a structural break during May 2015 due to the result of the declaration of MAT**.**

Table 4.27. Chow Breakpoint Test: 2015M05

F-stat.	3.596886	Prob. F(1,262)	0.0590***
Log-likelihood ratio	3.599690	Prob. Chi-Square(1)	0.0578***
Wald Statistic	3.596886	Prob. Chi-Square(1)	0.0579***

As p-value of F-test, log likelihood ratio and wald test are less than 0.10, the null hypothesis can not be accepted. So it can be said that structural break during the period of May 205 is significant. It leads to infer that the effect of a declaration of MAT is significant on FII investment in the Indian equity market.

4.3.3.2.15. July & August 2015: Greece Crisis and Yuan Clashes

June 2015: In the first week of June 2015 Greece asks the IMF to postpone the instalment due until the end of the month. In the last week of June 2015 the prime minister, Alexis Tsipras announced that Greek banks will remain closed for a while; he also announced the imposition of capital controls (€60/day withdrawal limit; most foreign transfers banned). At the end of June month, Greece misses a payment on an IMF loan and falls into arrears.

August 2015: In the first week of August 2015 the Greek Stock Exchange reopened after being closed since June 25, 2015, and fell more than 16% with bank stocks losing an average of 30% in a single day's trading. In the last week of June 2015, the Chinese stock market crash affects Greece and the Greek Stock Exchange fell 10.54%. On 11th August China slashes the yuan's fixing by a record 1.9 per cent, sparking the biggest selloff since 1994 ("A Timeline: The Chinese Yuan's Journey to Global Reserve Status - Bloomberg," 2015). Following is the alternative hypothesis to be checked.

H1 4.6.15. There are breaks at 2015M07 and 2015M08

The following table shows the result of the chow test applied to check the significance of a structural break during July and August 2015 due to the Greece Crisis.

Table 4.28. Chow Breakpoint Test: 2015M07 and 2015M08

	2015M07	2015M08		2015M07	2015M08
F-stat.	2.631184	2.8152	Prob. F(1,262)	0.1060	0.0946***
Log-likelihood ratio	2.638045	2.821558	Prob. Chi-Square(1)	0.1043	0.0930***
Wald Statistic	2.631184	2.8152	Prob. Chi-Square(1)	0.1048	0.0934***

*** Significant at 10%

In the case of the period during July 2015, a p-value of F-test, log likelihood ratio and wald test are greater than 0.10, the null hypothesis is accepted. So it can be said that structural break during the period of July 2015 is not significant. It leads to infer that the effect of the Greece Crisis is not significant on FII investment in the Indian equity market.

In the case of the period during August 2015, As p-value of F-test, log likelihood ratio and wald test are less than 0.10, the null hypothesis can not be accepted. So it can be said that structural break during the period of August 2015 is significant. It leads to infer that the effect of the Greece Crisis is significant on FII investment in the Indian equity market.

4.3.3.2.16. September 2016: Uri attack by militants and Surgical strike by the Indian army

On 18th September 2016 four heavily armed militant attack at Uri in which 19 Indian soldiers martyred. Against this attack, the Indian Army did surgical strike on 29th September 2016 against militant's launch pad across LOC in Pakistan administered Kashmir. Following is the alternative hypothesis to be checked.

H1 4.6.16. There is a break at 1999M10

The following table shows the result of the chow test applied to check the significance of a structural break during September 2016 due to Uri attack by militants and Surgical strike by the Indian army.

Table 4.29. Chow Breakpoint Test: 2016M09

F-stat.	1.697612	Prob. F(1,262)	0.1937
Log-likelihood ratio	1.705052	Prob. Chi-Square(1)	0.1916
Wald Statistic	1.697612	Prob. Chi-Square(1)	0.1926

As p-value of F-test, log likelihood ratio and wald test are greater than 0.10, the null hypothesis is accepted. So it can be said that structural break during the period of September 2016 is not significant. It leads to infer that the effect of Uri attack by militants and Surgical strike by the Indian army is not significant on FII investment in the Indian equity market.

November 2016: Demonetization

On 8th November 2016, the government of Indian announced the demonetisation of all Rs. 500 and Rs. 1000 currency notes. Following is the alternative hypothesis to be checked.

H1 4.6.17. There is a break at 2016M011

The following table shows the result of the chow test applied to check the significance of a structural break during November 2016 due to Demonetization.

Table 4.30. Chow Breakpoint Test: 2016M11

F-stat.	1.776934	Prob. F(1,262)	0.1837
Log-likelihood ratio	1.784454	Prob. Chi-Square(1)	0.1816
Wald Statistic	1.776934	Prob. Chi-Square(1)	0.1825

As p-value of F-test, log likelihood ratio and wald test are greater than 0.10, the null hypothesis is accepted. So it can be said that structural break during the period of November 2016 is not significant. It leads to infer that the effect of Demonetisation is not significant on FII investment in the Indian equity market.

February 2018: Budget 2018-19 with Long-term Capital Gain Tax and Conflict about SGX Nifty:

In a move to confine shifting of volumes to abroad markets after the obligation of long-term capital gains tax (LTCG), Indian stock exchanges have decided to cease providing data to bourses in Singapore and Dubai (P. Shah, 2018). Historical data suggests a positive correlation between FIIs inflows in India and the volume of Nifty contracts traded on the Singapore Stock Exchange (SGX) (Kant & Modak, 2018). SGX Nifty futures volumes are down 27 per cent since February 2018, when Indian bourses the first announced their plan to end data sharing and licensing pact with their global counterparts. The move was aimed at curbing overseas trading of Indian securities (Modak, 2019). Following is the alternative hypothesis to be checked.

H1 4.6.18. There is a break at 2018M02

The following table shows the result of the chow test applied to check the significance of a structural break during February 2018 due to Budget 2018-19 with Long-term Capital Gain Tax and Conflict about SGX Nifty.

Table 4.31. Chow Breakpoint Test: 2018M02

F-stat.	2.34303	Prob. F(1,262)	0.1271
Log-likelihood ratio	2.350422	Prob. Chi-Square(1)	0.1252
Wald Statistic	2.343030	Prob. Chi-Square(1)	0.1258

As p-value of F-test, log likelihood ratio and wald test are greater than 0.10, the null hypothesis is accepted. So it can be said that structural break during the period of February 2018 is not significant. It leads to infer that the effect of Budget 2018-19 with Long-term Capital Gain Tax and Conflict about SGX Nifty is not significant on FII investment in the Indian equity market.

4.3.3.2.17. July 2018: US-China Trade War:

The US Customs and Border Protection initiated collecting a 25 % tariff on 818 imported Chinese products i.e List 1 valued at USD 34 billion – giving effect to the first round of tariffs, which were revised and announce on June 15, 201, and implemented on July 6, 2018. Following is the alternative hypothesis to be checked.

H1 4.6.19. There is a break at 2018M07

The following table shows the result of the chow test applied to check the significance of a structural break during July 2018 due to US-China Trade War.

Table 4.32. Chow Breakpoint Test: 2018M07

F-stat.	0.175769	Prob. F(1,262)	0.6754
Log-likelihood ratio	0.177052	Prob. Chi-Square(1)	0.6739
Wald Statistic	0.175769	Prob. Chi-Square(1)	0.6750

As p-value of F-test, log likelihood ratio and wald test are greater than 0.10, the null hypothesis is accepted. So it can be said that structural break during the period of July 2018 is not significant. It leads to infer that the effect of the US-China Trade War is not significant on FII investment in the Indian equity market.

4.3.3.2.18. July 2014, February 2015 February 2016, February 2017, February 2018: Last Five Years' Union Budgets of BJP Govt.

The first budget of BJP government presented by Finance Minister Mr Arun Jaitley on 10th July 2014; In 2015 he presented Budget 2015-16 on 28th February 2015; In 2016 he presented Budget 2016-17 on February 29, 2016. From the year 2017, Budget started declaring on 1st February in place of 28th Feb. The same Finance Minister, Mr Arun Jaitely announced Budget 2017-18 on 1st February 2017 and Budget 2018-19 on 1st February 2018. There was an important announcement of Long term Capital Gain Tax in budget 2018. Following is the alternative hypothesis to be checked.

H1 4.6.20. There are breaks at 2014M07, 2015M02, 2016M02, 2017M02 and 2018M02

The following table shows the result of the chow test applied to check the significance of a structural break during July 2014, February 2015 February 2016, February 2017 and February 2018 due to Last Five Years' Union Budget of BJP Govt.

Table 4.33. Chow Breakpoint Test: Respective Months of Budget

	2014M07	2015M03	2016M03	2017M02	201802
F-stat.	0.665561	2.360674	0.166445	0.232349	2.343030
Log-likelihood ratio	0.669791	2.368042	0.167662	0.234018	2.350422
Wald Statistic	0.665561	2.360674	0.166445	0.232349	2.343030

	2014M07	2015M03	2016M03	2017M02	2018M2
Prob. F(1,262)	0.4153	0.1256	0.6836	0.6302	0.1271
Prob. Chi-Square(1)	0.4131	0.1238	0.6822	0.6286	0.1252
Prob. Chi-Square(1)	0.4146	0.1244	0.6833	0.6298	0.1258

As in all the above cases, a p-value of F-test, log likelihood ratio and wald test are greater than 0.10, the null hypothesis is accepted. So it can be said that structural break during the

period of July 2014, February 2015 February 2016, February 2017, February 2018 are not significant. It leads to infer that the effect of the Last Five Years' Union Budgets of BJP Govt. is not significant on FII investment in the Indian equity market.

4.3.3.2.19. December 2018: GST Council revised tax rates

31st GST Council Meeting held on December 22, 2018, in New Delhi reduced rates on a host of commonly used products, handing assistance to the common man. The new tax rates were planned to take into effect from 1st January 1, 2019 (Das, 2018). Following is the alternative hypothesis to be checked.

H1 4.6.21. There is a break at 2018M12

The following table shows the result of the chow test applied to check the significance of a structural break during December 2018 due to GST council revised tax rates.

Table 4.34. Chow Breakpoint Test: 2018M12

F-stat.	4.320604	Prob. F(1,262)	0.0386**
Log-likelihood ratio	4.318078	Prob. Chi-Square(1)	0.0377**
Wald Statistic	4.320604	Prob. Chi-Square(1)	0.0377**

** Significant at 5%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of December 2018 is significant. It leads to infer that the effect of the GST Council revised tax rates is significant on FII investment in the Indian equity market.

4.3.3.2.20. February 2019: Militant attack in Pulwama, Airstrike by Indian Air Force at Balakot in Pakistan and Interim Budget 2019:

Shri Piyush Goyal, acting the Finance Minister presented the interim budget for 2019-20 on 1st February 2019. The foreign investors took the announcement of results of Lok Sabha Election 2019 very positively particularly when domestic investors were waiting for improvement even before the elections. The week from May 24, 2019, till June 13, 2019, Nifty saw a return of 1.4 per cent that was reinforced by inflows in FIIs via ETFs largely ("'FII inflows for 6 months after election results could be around Rs 60,000-70,000 crore',").

But at the same time looking at the last five years' data Budget speech is not significant to affect FIIs flow in the Indian equity market.

On February 14, 2019 convoy of vehicles of Indian arm to on the Jammu-Srinagar national highway attached by a militant with a vehicle collision in Pulwama. Against which the Indian Air Force (IAF) conducted airstrikes at Balakot in Pakistan on February 26, 2019. Following is the alternative hypothesis to be checked.

H1 4.6.22. There is a break at 2019M02

The following table shows the result of the chow test applied to check the significance of a structural break during February 2019 due to Militant attack in Pulwama, Airstrike by Indian Air Force at Balakot in Pakistan and Interim Budget 2019.

Table 4.35. Chow Breakpoint Test: 2019M02

F-stat.	13.96360	Prob. F(1,262)	0.0002*
Log-likelihood ratio	13.70806	Prob. Chi-Square(1)	0.0002*
Wald Statistic	13.96360	Prob. Chi-Square(1)	0.0002*

* Significant at 1%

As p-value of F-test, log likelihood ratio and wald test are less than 0.05, the null hypothesis can not be accepted. So it can be said that structural break during the period of February 2019 is significant. It leads to infer that the effect of Militant attack in Pulwama, Airstrike by Indian Air Force at Balakot in Pakistan and Interim Budget 2019 is significant on FII investment in the Indian equity market.

At the end of the chapter, the following table provides a summary of major finds of the major events studied for they are significant to affect the trend of FIIs Investment in the Indian equity market using the chow test.

4.3.3.2.21. Summary of all events and their effect on FIIs net flow in the Indian equity market

Following table provides the crux of all the events tested through the chow test for a structural break in the Indian equity market.

Table 4.36. Summary of application Chow Breakpoint Test

Events (Null Hypothesis: No break at the specified time period of the event)	**Time Period**	**Significant or not**	**Null Hypothesis**
13th Lok Sabha Election	Oct-99	**Significant****	Rejected
The boom in IT and Telecom companies in the US	Dec-99	**Significant****	Rejected
Ketan Parekh Scam	Feb-01	**Significant****	Rejected
Increased in Investment through P-Notes	May-03	**Significant***	Rejected
14th Lok Sabha Election	May-04	**Significant***	Rejected
P-Note Crisis, Subprime Crises and Financial Crisis of 2007-08	Oct & Dec-07	**Significant****	Rejected
Satyam Scam, Lok Sabha Election	Jan-09	**Significant***	Rejected
15th Lok Sabha Election	Apr - May-09	**Significant***	Rejected
Bailout Program of Europe and End of Subprime Crisis of US	Jun-09	**Significant***	Rejected
FIIs infused a record Rs 24,978.40 crore in Indian Equity Market	Sep-10	**Significant****	Rejected
Facilitation of inflation, relaxing on restrictions of foreign investors and the RBI's monetary policy	Feb-12	**Significant****	Rejected
Announcement of General anti-avoidance rules of taxation (GAAR)	Mar-12	**Significant****	Rejected
QFIs were allowed to invest in the schemes of Indian mutual funds and Indian equity shares	Jun-12	**Significant****	Rejected
16th Lok Sabha Election	Apr-May 14	Not Significant	Accepted
Declaration of Minimum Alternate Tax (MAT)	May-15	**Significant*****	Rejected
Greece Crisis	Aug-15	**Significant*****	Accepted
Uri attack by militants and Surgical Strike by Indian Army	Sep-16	Not Significant	Accepted
Demonetization	Nov-16	Not Significant	Accepted
Uri attack and Surgical Strike by the Indian military	Sep-16	Not Significant	Accepted

Budget 2018-19 with Long-term Capital Gain Tax and Conflict about SGX Nifty	Feb-18	Not Significant	Accepted
US-China Trade ware	Jul-18	Not Significant	Accepted
BJP Government Budgets from July 2014 Feb 2018	2014-2018	Not Significant	Accepted
GST Council revised tax rates	Dec-18	**Significant****	Accepted
Militant attack in Pulwama, Airstrikes by IAF at Balakot in Pakistan & Interim Budget 2019-20	Feb-19	**Significant***	Accepted

* Significant 1%, ** Significant at 5%, ***Significant at 10%

4.4. Summary

In this chapter, it is found that structural breaks disturb the stationarity of time-series. For better estimation of time-series model introduction of a structural break in essential. Through the application of the CUSUM and the CUSUM of Square tests, it is found that coefficients of time-series of FII investment in Indian equity market were not stable, but after introducing dummy variables of structural breaks they become stable. To identify structural breaks to be introduced in time-series of FII investment the Bai-Perron (2003) test is applied. In the application of Bai-Perron (2003) test it is found that optimally there are two structural breaks in time-series data from March 1997 to March 2019. These two major structural breaks are for the period of April 2009 and May 2015. it can be observed that in April 2009 subprime crises of the US ended and it was the period of Bailout program of Europe leads to change the trend from down to upward. In May 2015 MAT introduced by India's taxmen which adversely affected FIIs flow and it turns to the negative trend. Bai-Perron (2003) test helped to identify major break periods. The chow (1960) suggested the test to check the breakpoint for a specific event in the time-series model. In the last part of this chapter, the chow test is applied on various national and international potential events, which is identified in the literature review. In this part of the study, it is found that Loc Sabha Election, Major changes in the International economy (especially related the US), Various scams in Indian stock market and Indian government announcement about various regulatory-related issues are the major events cause the structural break in FII investment in the Indian equity market.

CHAPTER: 5. DETERMINANTS OF FIIs INVESTMENT IN INDIA

5.1. Introduction

In order to study the FII investment in the Indian equity market, it is essential to study which major national and international factors affect FII investment in the Indian equity market. Out study towards the factors affecting FII investment in the Indian equity market, is majorly divided into two parts. The first part discusses the analysis of primary data collected from sub-brokers, and their employees as representative of individual investors in the Indian equity market. In this section on the basis of a perception of respondents, major factors affecting FII investment decision in Indian stock market were identified. To analyse these factors, first of all, a reliability test is done to check the reliability of the instrument (questionnaire) used in primary data collection. After the reliability check, factor analysis is applied to reduce these factors and group them into fewer factors. In the second part of the chapter, causality study is done between FII investment and various factors identified through primary data and literature review. Factors considered for these causal studies are Domestic Institutional Investor (DIIs) net investment, DIIs purchase, DIIs sale, Gross Domestic Product (GDP), Index of Industrial Production (IIP), US Dollar, Call money Rate and Foreign Exchange Reserve. Data related to all these factors were collected (or converted) into monthly data except GDP. As GDP data is available quarterly, FIIs net investment, Purchase and Sale are converted into quarterly data for the study. In the time-series analysis, it assumed that the series is stationary. As it is prerequisite of causality study stationarity-check is done. After stationarity-check, the causality between FIIs net investment, FIIs purchase and FIIs sell and all those factors are studied. At the end of the chapter, a summary is depicted.

5.2. Perception about the factors affecting FIIs Investment decision in India

In the span of 22 years (1997-98 to 2018-19) FIIs has emerged to be a dominant market player, who can influence stock prices significantly in India. In an earlier chapter, it is also described that recently 21% of the Indian equity market is led by FIIs turnover which is increasing year by year. FIIs is perceived to be very large and sophisticated investors with very high impact on stock market returns in the Indian equity market. As FIIs are professional and leading investors, it is identified through the literature that they are very cautious in investing in the Indian capital market and even in selecting companies for their investment. Many investors and market players tend to make their stock market strategy based on investment pattern of FIIs and based on their perception about factors considered by FIIs in their investment decision in India. Hence the perception of investors about FII investment decision in the Indian equity market is studied. To conduct the study, the primary data related to these factors are collected through the structured questionnaire.

To analysed the primary data, first of all, the reliability of the instrument (questionnaire) is checked as a new structured questionnaire is prepared. To check the reliability, Cronbach's Alpha is used. The following sub-section of the chapter throws light on the reliability test.

5.2.1. Reliability Test

Cronbach (1951) suggested the value of Cronbach's Alpha, the level of acceptance to check the instrument reliability. To do further analysis of perception about the factors affecting FII investment decision, it is important to check its reliability. To check the reliability, Cronbach's Alpha is calculated using SPSS software. Table 5.1 shows the value of the Cronbach's Alpha and a number of variables taken into consideration for the reliability test.

Table 5.1. Reliability Statistics

Cronbach's Alpha	N of Items
.720	19

Cronbach's Alpha suggests that if the value of Cronbach's Alpha is greater than 0.7, then it can be said that the instrument used for the data collection is reliable. In the study the value of Cronbach's Alpha is 0.720, which is more than the accepted level of 0.70, hence it can be

said that the instrument is reliable and the data collected through this instrument can be used for further analysis.

5.2.2. Perception of the relationship between FII investment and Indices of Indian stock market

Before the study of perception about the factors affecting FII investment decision in India the relationship between FII investment and Indian stock market indices study was done. Table 5.1 presents the perception of investors about how strongly movement in Sensex and Nifty are positively or negatively related to FIIs flow in India

Table 5.2. Perception of the relationship between FII investment and Indices of Indian stock market

	Frequency	Per cent	Cumulative Percent
Highly Negative	0	0	0
Negative	11	5.5	5.5
No relation	43	21.5	27.0
Positive	84	42.0	69.0
Highly positive	62	31.0	100.0
Total	200	100.0	

The result of Table 5.1 shows that 21.5% of respondents perceive that there is no relation between FIIs flow and Indian stock market fluctuations (Sensex and Nifty being major representatives). While 78.5% of respondents believe that there is a relation between FIIs flow and Indian stock markets. Out of this 73%, respondents believe that there is positive (31% highly positive) relation between FIIs flow and the Indian stock market. Joshi and Desai (2015) have also found that the correlations between FII investment and the Indian equity market are varying in different phases. They emphasised that FIIs Investment and Sensex are having strong positive correlation during bullish trend than correlation during the bearish trend. Thus, it is essential to study the behaviour of FIIs to understand the movement and reasons for the movement in the Indian stock market. Following results show various factors affecting FII investment behaviour.

5.2.3. Perception about the factors affecting FII investment decision for selecting Companies in the Indian stock market:

Towards the study of various factors affecting FII investment decision for selecting companies in the Indian stock market, perceptions on the bases of the rating responded is bifurcated. The factors are the most important if the average rating on 5 points scale is more 4.25 and having standard deviation very less that is less than 1. To identify the second level of importance, other important factors are bifurcated into an average rating less than 4.25 but more than 3.5 and a standard deviation of less than 1. In the last category of the least important factors average rating is less than 3.75 with the standard deviation of more than 1.

On the bases of above categorisations, the following factors were found the most important factors perceived by the investors that FIIs considers in selecting companies for investing in the Indian stock market.

Table 5.3. Most Important Factors

	Mean	**S.D.**
Companies belong to Financial Services Sector	4.37	.791
Large Cap Stocks	4.36	.890
Companies belong to Oil & Gas Sector	4.32	1.005
Companies belong to IT Sector	4.31	.829
Companies belong to Banking Sectors	4.29	.835
Earnings Per Share (EPS) of the company	4.29	.915
Dividend Per Share (DPS) of the company	4.27	.872

Out cum of Table 5.3 advocates that FIIs have preferences over certain sector-specific companies while selecting the stock in India. The result of Table 5.3 suggests that the most preferred sectors for FIIs are Financial Services, Oil & Gas, IT and Banking. With sector-specific stocks, FIIs also prefer to select large-cap stocks. FIIs take into note the EPS and DPS of companies while selecting them for investment. Other researchers have also acknowledged similar results. Chen et al. (2008) have also found QFlls (Qualified Financial Institutional investors) select the stocks, they herd on securities classified in specific industries and they also prefer the stocks with high past returns and large firm size. K. P. Prasanna (2008) has also studied that among the financial performance variables earnings per share is a significant factor influencing their investment decision. Other factors which

are considered by FIIs, which has mean value up to 3.7 and standard deviation around 1 or lesser, are listed in Table 5.4.

Table 5.4. Other Important Factors

	Mean	**S.D.**
Companies with a long history	4.10	.954
Companies belong to Pharmaceuticals Sector	4.01	1.035
Companies belong to Telecom Services Sector	3.92	1.097
Liquid Firms	3.73	.981
Companies with Low Stake of DIIs	3.71	.980
Young Companies	3.70	.898

Factors listed in Table 5.4 are again advocating preference of FIIs towards certain sectors-specific stocks. Other important factors also include a long history of companies, liquidity of the company, low DIIs stake and comparatively newly established companies.

Factors which have mean values less than 3.7 and their standard deviations around one are perceived by the investors less important for FIIs to select companies while investing in the Indian stock market. Such factors are as shown in Table 5.5.

Table 5.5. Other Factors

	Mean	**S.D.**
Corporate Governance of the company	3.66	1.054
High Volatile Stocks	3.65	1.060
Mid Cap Stocks	3.63	1.004
Companies belong to Manufacturing Sectors	3.61	.976
Highly Levered Firms	3.61	.907
Small-Cap Stocks	3.56	1.030
Companies with High Stake of DIIs	3.47	1.056
Low Volatile Stock.	3.38	1.000
Companies belong to Aviation	3.35	1.079
Companies belong to Real Estate.	3.17	1.272
Companies belong to Tourism & Hospitality.	3.04	1.181

5.2.4. Perception of Economic and Global Factors

FIIs takes investment decisions not only on the basis of microeconomic factors which are stock-specific but also macroeconomic factors as well as international factors. In the study, factors viz. Purchasing power parity (Amita, 2014), GDP growth rate, inflation-related indices as suggested by Rai and Bhanumurthy (2004) and Amita (2014) are studied. Consumer price index, Wholesale price index, Index of industrial production, Fiscal deficit, Interest rate in FII's domestic country, Problems in domestic country of FIIs, fundamentals of economy suggested by S Kumar (2001) like Growth opportunity in domestic country of FIIs, Growth rate in other developed nations, Growth potentials and Problems in other emerging economies, factors related to new government depicted by Anand (2015a), Anand (2015b) and Anand (2015c) like Make in India campaign, Increase in Investment limit in various sectors for FIIs, Approach of Prime Minister MODI towards relations with other nations, Ease in tax structure for FIIs, GST bill, FIIs limit and Bureaucracy.

As a number of factors affecting FII investment decision in India are considered, they are grouped them into few factors for better understanding. Factor analysis helped to reduce these 19 factors into fewer meaningful groups of factors. Following discussion throws light on the results of factors analysis.

5.2.5. Factor Analysis

Factor analysis is useful to reduce the number of factors into fewer factors. To conduct factor analysis, certain steps are followed. First of all, to check the adequacy of the sample Kaiser-Meyer-Olkin (KMO) and Bartlett test are used. After adequacy check to reduce factors up to a particular number, a scree plot is used. Finally, in the factor analysis component matrix is used to find similar factors together and grouping them to reduce the number of factors into fewer factors.

5.2.6. KMO and Bartlett's Test

To conduct the factor analysis Kaiser-Meyer-Olkin (KMO) is a measure of sampling adequacy and its value should be greater than 0.6 for the sample to be adequate for undertaking factor analysis. At the same time, the p-value of Bartlett (1950) test of sphericity should be less than 0.05. Following table shows the result of KMO and Bartlett's Test.

Table 5.6. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.696
Bartlett's Test of Sphericity	Approx. Chi-Square	1465.666
	Df	171
	Sig.	.000

Above table displays, KMO and Bartlett's Test's the results for the adequacy of data for factor analysis. Since the value of KMO test is 0.696 which is higher than 0.6 and the p-value of Bartlett's test is significant, as it is less than 0.05, it is confirmed that factor analysis can be undertaken considering these data.

After confirming the adequacy, it is needed to identify a number of factors up to which can be reduced the factors. Scree plot is one of the technique to identify a possible number of factors to be reduced. Following discussion provides details about it.

5.2.7. Scree Plot

The Scree Plot is used to determine the optimal number of components. The component beyond the point at which the curve changes its direction and becomes horizontal contributes

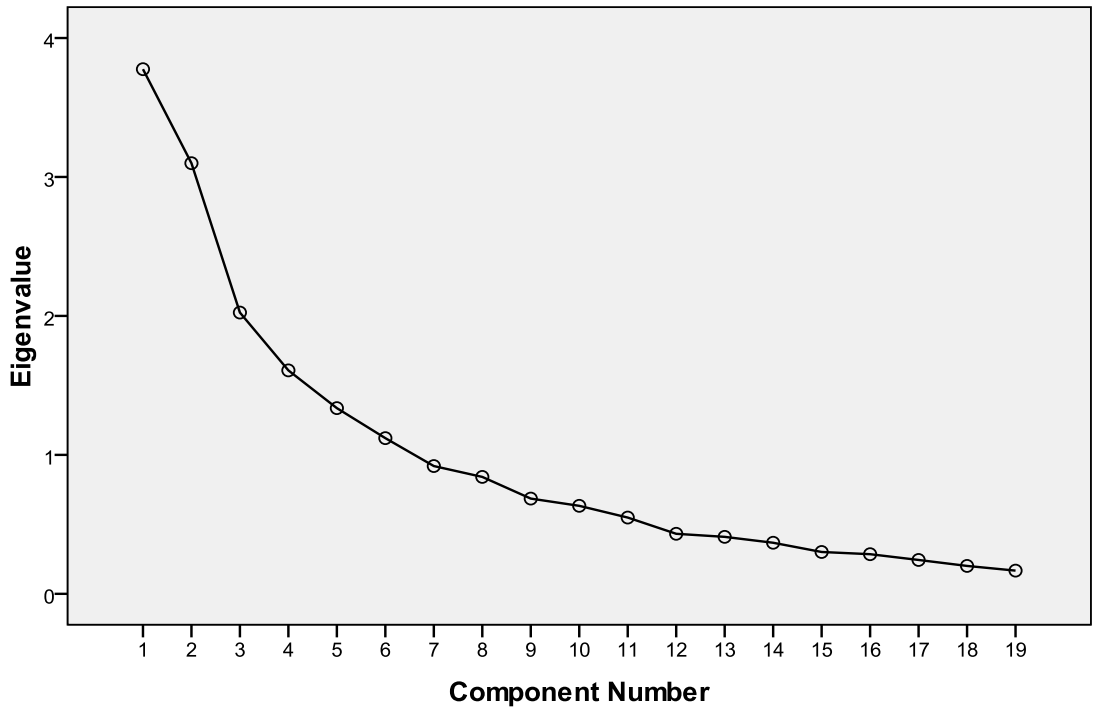


Figure 5.1. Scree plot

very little to variation and therefore they can be eliminated.

From Figure 5.1, it is found that only six components lie on the steeper side of the curve and all other lies on the flat portion of the curve. Therefore, the scree plot suggests that in the study an optimal number of components are six.

After identifying an optimal number, to group together similar kind of factors component matrix is used.

5.2.8. Rotated component matrix

Rotated component matrix is the key output of principal components analysis. It contains estimates of the correlations between each of the factors and the estimated reduced number of components.

Table 5.7. Rotated Component Matrix

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 7 iterations.						
	Component					
	1	2	3	4	5	6
1 Purchasing power parity [currency value]			.392			
2 Economic growths. [GDP]						.648
3 Consumer price index [inflation]			.849			
4 Wholesale price index [inflation]			.801			
5 Index of industrial production [IIP]			.776			.315
6 Fiscal deficits	.324					.617
7 Interest rate in FII's domestic country.				.739		
8 Problems in the domestic country of FIIs.				.875		
9 Growth opportunity in the domestic country of FIIs.				.699		
10 Growth rate in other nations.		.868				
11 Growth in the economy of other developing countries.		.889				

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
12 Problems in other developing countries.		.842				
13 Make in India campaign.					.793	
14 Increase in limit of Investment limit in various sectors for FIIs.					.418	.611
15 Approach of Prime Minister MODI towards relations with other nations.					.808	
16 Ease in tax structure for FIIs. [MAT]					.329	.630
17 Unable to pass goods and service tax [GST] bill.	.800					
18 Revision in the FII investment limit in Government sector. [G sec.]	.892					
19 Highly bureaucratic system.	.885					

From the above table of the rotated component matrix using principal component analysis, the number of factors could minimized from 19 to 6 factors. Those 6 factors derived out of 19 factors are as follow 1. Ineffective implementation of economic policy. 2. The challenges posed by the international environment. 3. The purchasing power of Indian rupee i.e. Inflation related Issues (Rai & Bhanumurthy, 2004), (Amita, 2014), (Anand, 2015c), 4. Opportunities and challenges in the domestic country of FIIs (Rai & Bhanumurthy, 2004) 5. The attractiveness of economic policy (Bose & Coondoo, 2004) and 6. The financial ease initiated by the government.

5.2.9. Summary of Perception about FII investment

Considering FIIs as professional investors it is found that they are very cautious in investing in the Indian equity market and even in selecting companies for their investment. It is observed that FIIs prefers large-cap companies considering their EPS and DPS. They also prefer to invest in Oil & Gas, Information Technology and Banking related scrip than other sectors in the Indian equity market. It is summarized that major six factors with which FIIs are the more concern while investing in India are i) Bureaucracy related issues in Economy / Slow decision making, ii) Issues related to other developing (competitor) countries, iii)

Inflation related Issues, iv) Issues related to origin country of FIIs and v) Initiatives of new government and Current burnings issues related to Indian Economy.

In the first part of this chapter analysis of factors affecting FII investment in India is done through the primary data, in the latter part of this chapter certain factors affecting FII investment in the Indian equity market are confirmed using secondary data. For this analysis of the factors affecting FII investment in the Indian equity market, such factors are identified from the earlier study of primary data as well as through further literature review. In literature, it is also found that there could be bidirectional causality between these factors and FII investment. Thus, following discussion of the chapter is about the causality between FII investment and various factors affecting.

5.3. Causality between FIIs' Investment and Various Factors

In order to confirm the influence of factors identified in the previous section, first of all the correlation of these factors is checked and then to understand types of relation causality of these factors with FII investment is checked.

In order to identify various factors affecting the Indian equity market, primary data is collected and summarized through factors analysis. Various factors are identified throughout the literature. In this section to confirm the relationship between those factors and FII investment in the Indian equity market, secondary data are collected from websites of RBI, moneycontrol.com (provided by SEBI). All those factors for which secondary data are collected as follow.

1. Net investment is done by DIIs in the Indian equity market
2. Purchase of by DIIs in the Indian equity market
3. Sale of by DIIs in the Indian equity market
4. Index of Industrial Production (Base year 2011-12)
5. Wholes Price Index (Base year 2011-12) as a proxy of inflation
6. Exchange rate of US dollar
7. Gross Domestic Product (Base year 2011-12)
8. Call rate
9. Average foreign exchange reserve of US dollar

Before the study of causality between FII investment and various factors, **stationarity-check** is done through the unit root test. To check the stationarity of the time-series data, the Augmented Dickey-Fuller test is applied as a unit root test. Unit root test provides

information about the condition in which errors in time-series data are correlated called a stochastic trend. If there is an existence of unit root in time series, it does not allow for further study of time series as it may adversely affect the result of the analysis.

Causality study between FII investment and individual factors is discussed in further sub-sections of this section. In the process of checking causality, the first, there is a need to find lag at which causality is possible. To check lag order, **VAR lag order selection** criteria are used. For checking causality each identified factor with FII investment, values of different selection criteria (SqLR: sequential modified LR test statistic (each test at 5% level), FPEr.: Final prediction error, AIC: Akaike information criterion, SIC: Schwarz information criterion and HQn: Hannan-Quinn information criterion) are generated based on which lag order is selected to check the causality. This process is done and represented in this chapter for each of the factors selected for checking causality with FII investment.

5.3.1. Causality between FIIs and Domestic Institutional Investors (DIIs)

Causality between FII investment and DIIs investment in the Indian equity market can be studied by bifurcating them into the net purchase, sale and net investment. Following variables stands for various time series data for their causality study between FIIs and DIIs.

FIIs_NET_EQ: FIIs Net Investment in Indian Equity Market
FIIs_PUR_EQ: FIIs Purchase in Indian Equity Market
FIIs_SAL_EQ: FIIs Sell in Indian Equity Market
DIIs_NET_EQ: DIIs Net Investment in Indian Equity Market
DIIs_PUR_EQ: DIIs Purchase in Indian Equity Market
DIIs_SAL_EQ: DIIs Sale in Indian Equity Market

These segregated data of FIIs and DIIs for their Net Investment, Purchase and Sale were collected from moneycontrol.com (collected from SEBI) for the period of January 2006 to March 2019. Data related to DIIs investment is provided in terms of Mutual Fund (MF) Investment in the Indian equity market. Here Net investment means Purchase minus sales. As an elementary check of the relationship between FII investment and DIIs investment in the Indian equity market, the correlation is used. The following table shows the correlation matrix for FIIs and DIIs investment.

Table 5.8. Correlation Matrix of FIIs and DIIs flow

	DIIs_NET_EQ	DIIs_PUR_EQ	DIIs_SAL_EQ
FIIs_NET_EQ	-0.567543	-0.180845	-0.006611
FIIs_PUR_EQ	0.485924	0.761990	0.765410
FIIs_SAL_EQ	0.693302	0.827514	0.767131

From Table 5.8, it can be observed that there is a negative relationship between the net investment of FIIs and the net investment of DIIs. It means when there is a net purchase of FIIs in the Indian equity market DIIs goes for net sale and vice versa. But at the same time, there is a strong positive correlation among all purchase and sale of FIIs and DIIs related data. Which is difficult to interpret, but from the negative correlation between the net investment of FIIs and DIIs it can be said that FIIs purchase lead DIIs sale and DIIs sale leads to FIIs purchase and vice versa. To understand the direction of FII investment and DIIs investment, Figure 5.2 could be useful. It shows the line chart of FIIs net flow and DIIs net flow in the Indian equity market during the period of January 2006 to March 2019.

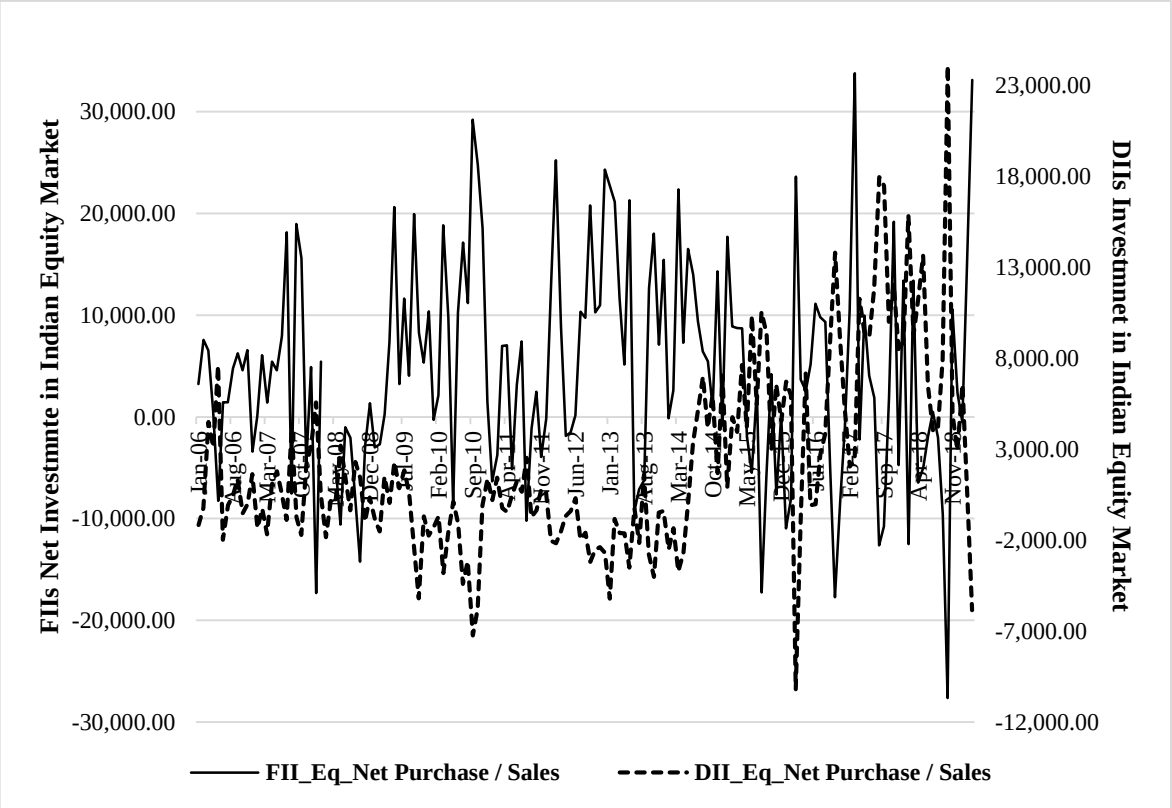


Figure 5.2. FIIs & DIIs Investment in Indian Equity Market

As it can be observed from Figure 5.2 that FIIs and DIIs have a negative relationship among them. Even the coefficient of calculation of -0.56754 also suggests the same. But correlation does not show the direction of causality between the FIIs flow and the DIIs flow.

In order to identify whether FII investment causes to DIIs investment or vice versa causality study can be applied. To know these causalities Granger causality is used. To apply the Granger causality all times series data must be stationary. To check the stationarity of all time-series data viz. FIIs_Net_Eq, FIIs_Pur_Eq and FIIs_Sal_Eq and DIIs_Net_Eq, DIIs_Pur_Eq and DIIs_Sal_Eq, unit root test is applied.

5.3.1.1. Unit Root Test

To check the stationarity of the time-series data, the Augmented Dickey-Fuller test is applied. To check the stationarity of FIIs and DIIs time-series data, the following is the null hypothesis.

H0 5.2.1 All time-series data (FIIs_Net_Eq, FIIs_Pur_Eq, FIIs_Sal_Eq, DIIs_Net_Eq, DIIs_Pur_Eq, DIIs_Sal_Eq) have a unit root.

Table 5.9. Test statistic of ADF for FIIs_Net_Eq

Variable	Exogenous	t-statistics	Prob.
FIIs_Net_Eq	None	-7.734634	0.0000*
	Constant	-8.857318	0.0000*
	Constant, Linear Trend	-8.82856	0.0000*
FIIs_Pur_Eq	None	0.143032	0.7261
	Constant	-2.003266	0.2853
	Constant, Linear Trend	-4.459023	0.0024
FIIs_Sal_Eq	None	0.185520	0.7388
	Constant	-1.706539	0.4259
	Constant, Linear Trend	-2.710153	0.2341
D(FIIs_Pur_Eq) (First Difference)	None	-12.83464	0.0000*
	Constant	-12.85102	0.0000*
	Constant, Linear Trend	-8.002393	0.0000*
D(FIIs_Sal_Eq) (First Difference)	None	-15.11177	0.0000*
	Constant	-15.12111	0.0000*

	Constant, Linear Trend	-15.07016	0.0000*
DIIs_Net_Eq	None	-2.740218	0.0063*
	Constant	-2.971464	0.0399**
	Constant, Linear Trend	-6.142986	0.0000*
DIIs_Pur_Eq	None	0.455923	0.8118
	Constant	-0.645113	0.8559
	Constant, Linear Trend	-1.712318	0.7414
DIIs_Sal_Eq	None	1.159539	0.9363
	Constant	0.066433	0.9622
	Constant, Linear Trend	-1.223925	0.9016
D(DIIs_Pur_Eq) (First Difference)	None	-21.11594	0.0000*
	Constant	-21.14993	0.0000*
	Constant, Linear Trend	-21.13318	0.0000*
D(DIIs_Sal_Eq) (First Difference)	None	-21.35386	0.0000*
	Constant	-21.44917	0.0000*
	Constant, Linear Trend	-21.54373	0.0000*

* Significant at 1% and ** Significant at 5% level of Significance

From the above test, it can be said that the null is rejected in the cases of FIIs_Net_Eq and DIIs_Net_Eq. Thus both of the series are stationary. While in case of FIIs_Pur_Eq, FIIs_Sal_Eq, DIIs_Pur_Eq and DIIs_Sale_Eq null is accepted and they are having unit root i.e. these time series data are not stationary. While taking the first difference of them, the result shows rejecting the null and all series are stationary at the first difference.

To study the causality between FIIs and DIIs a total of 9 causalities among Net investment, Purchase and Sales of FIIs and DIIs must be studied as follow.

1. Causality between Net Investment of FIIs in the Indian Equity Market (FIIs_Net_Eq) and Net Investment of DIIs in Indian Equity Market (DIIs_Net_Eq)
2. Causality between Purchase of FIIs in Indian Equity Market (FIIs_Pur_Eq) and Net investment of DIIs in Indian Equity Market (DIIs_Net_Eq)
3. Causality between Sale of FIIs in Indian Equity Market (FIIs_Sal_Eq) and Net investment of DIIs in Indian Equity Market (DIIs_Net_Eq)

4. Causality between Net Investment of FIIs in Indian Equity Market (FIIs_Net_Eq) and Purchase of DIIs in Indian Equity Market (DIIs_Pur_Eq)
5. Causality between Purchase of FIIs in Indian Equity Market (FIIs_Pur_Eq) and Purchase of DIIs in Indian Equity Market (DIIs_Pur_Eq)
6. Causality between Sale of FIIs in Indian Equity Market (FIIs_Sal_Eq) and Purchase of DIIs in Indian Equity Market (DIIs_Pur_Eq)
7. Causality between Net Investment of FIIs in Indian Equity Market (FIIs_Net_Eq) and Sale of DIIs in Indian Equity Market (DIIs_Sal_Eq)
8. Causality between Purchase of FIIs in Indian Equity Market (FIIs_Pur_Eq) and Sale of DIIs in Indian Equity Market (DIIs_Sal_Eq)
9. Causality between Sale of FIIs in Indian Equity Market (FIIs_Sal_Eq) and Sale of DIIs in Indian Equity Market (DIIs_Sal_Eq)

Following the discussion in this chapter describes all the above potential causality. Before applying causality test optimal lag length needed to be identified under the VAR model. Hence in the following section of the chapter, optimal lag length order is identified under the VAR model which is followed by Granger Causality test.

5.3.1.2. Causality between Net Investment of FIIs in the Indian Equity Market (FIIs_Net_Eq) and Net Investment of DIIs in Indian Equity Market (DIIs_Net_Eq)

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in Indian Equity Market (FIIs_Net_Eq) and Net Investment of DIIs in Indian Equity Market (DIIs_Net_Eq).

Table 5.10. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2726.654	NA	2.27e+15	41.0324	41.0758	41.0500
1	-2669.833	111.0795	1.02e+15	40.2380	40.3684*	40.2910
2	-2660.647	17.68129	9.47e+14	40.1601	40.3774	40.2484*
3	-2655.717	9.342048	9.34e+14*	40.1461*	40.4503	40.2697
4	-2653.921	3.347208	9.66e+14	40.1792	40.5704	40.3382
5	-2653.009	1.673310	1.01e+15	40.2257	40.7038	40.4199

6	-2651.450	2.813812	1.05e+15	40.2624	40.8274	40.4920
7	-2649.984	2.600640	1.09e+15	40.3005	40.9524	40.5654
8	-2644.805	9.033980	1.07e+15	40.2827	41.0216	40.5830
9	-2639.197	9.615004*	1.05e+15	40.2586	41.0844	40.5941
10	-2637.327	3.149104	1.08e+15	40.2906	41.2033	40.6615
11	-2632.474	8.026817	1.07e+15	40.2778	41.2774	40.6840
12	-2630.792	2.732265	1.11e+15	40.3126	41.3992	40.7541

* indicates lag order selected by the respective criterion in their column

SqLR: sequential modified LR test statistic (each test at 5% level)

FPEr.: Final prediction error

AIC: Akaike information criterion

SIC: Schwarz information criterion

HQn: Hannan-Quinn information criterion

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 3. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 3.

Table 5.11. Pairwise Granger Causality Tests at Lag length of 3

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.2.2	DIIs_NET_EQ does not Granger Cause FIIs_NET_EQ	151	1.15983	0.3273
H0 5.2.3	FIIs_NET_EQ does not Granger Cause DIIs_NET_EQ		4.92095	0.0028

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs net investment and DIIs net investment in the Indian equity market. DIIs net flow in the Indian equity market does not cause the FIIs net flow in the Indian equity market. But at a 95% level of confidence, it can be said that the FIIs net flow in the Indian equity market causes the DIIs net flow in the Indian equity market.

7.2.1. Causality between Purchase of FIIs in Indian Equity Market (D(FIIs_Pur_Eq)) and Net investment of DIIs in Indian Equity Market (DIIs_Net_Eq)

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in Indian Equity Market (D(FIIs_Pur_Eq)) and Net investment of DIIs in Indian Equity Market (DIIs_Net_Eq).

Table 5.12. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2799.38	NA	1.29e+16	42.7692	42.8131	42.7870
1	-2738.04	119.869	5.36e+15	41.8938	42.0255*	41.9473
2	-2731.64	12.3090	5.17e+15	41.8572	42.0767	41.9464
3	-2721.28	19.6173	4.69e+15	41.7600	42.0673	41.8849*
4	-2718.89	4.46038	4.81e+15	41.7846	42.1796	41.9451
5	-2710.55	15.2648	4.50e+15	41.7184	42.2013	41.9146
6	-2706.79	6.77670	4.52e+15	41.7221	42.2927	41.9539
7	-2703.00	6.72057	4.54e+15	41.7252	42.3836	41.9927
8	-2697.86	8.93774	4.47e+15	41.7079	42.4541	42.0111
9	-2689.74	13.8898*	4.20e+15*	41.6449*	42.4789	41.9838
10	-2689.18	0.93579	4.43e+15	41.6975	42.6193	42.0720
11	-2687.63	2.55666	4.61e+15	41.7349	42.7445	42.1451
12	-2684.42	5.19304	4.67e+15	41.7469	42.8443	42.1929

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 9. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 9.

Table 5.13. Pairwise Granger Causality Tests at Lag length of 9

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.2.4	D(FIIs_PUR_EQ) does not Granger Cause DIIs_NET_EQ	137	2.47211	0.0128
H0 5.2.5	DIIs_NET_EQ does not Granger Cause D(FIIs_PUR_EQ)		1.78953	0.0772

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs purchase in the Indian equity market and DIIs net investment. At a 95% level of confidence, it can be said that FIIs purchase in the Indian equity market cause DIIs net investment in the Indian equity market. But DIIs net investment does not cause FIIs purchase in the Indian equity market.

5.3.1.3. Causality between Sale of FIIs in Indian Equity Market (D(FIIs_Sal_Eq)) and Net investment of DIIs in Indian Equity Market (DIIs_Net_Eq)

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in Indian Equity Market (D(FIIs_Sal_Eq)) and Net investment of DIIs in Indian Equity Market (DIIs_Net_Eq).

Table 5.14. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2784.16	NA	1.02e+16	42.5368	42.5807	42.5546
1	-2720.38	124.629	4.09e+15	41.6242	41.7559	41.6777
2	-2703.74	32.0223	3.38e+15	41.4311	41.6506*	41.5203
3	-2696.73	13.2673	3.22e+15	41.3852	41.6925	41.5101*
4	-2694.32	4.48049	3.31e+15	41.4095	41.8046	41.5701
5	-2685.21	16.7036	3.06e+15	41.3314	41.8143	41.5276
6	-2680.31	8.81196	3.02e+15	41.3178	41.8885	41.5497
7	-2678.28	3.59561	3.11e+15	41.3479	42.0063	41.6154
8	-2669.83	14.7064*	2.91e+15	41.2799	42.0262	41.5832
9	-2665.20	7.92502	2.89e+15*	41.2703*	42.1043	41.6092
10	-2664.81	0.65497	3.05e+15	41.3254	42.2472	41.6999
11	-2663.27	2.54554	3.18e+15	41.3629	42.3725	41.7731
12	-2660.94	3.76104	3.27e+15	41.3885	42.4859	41.8344

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 9. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 9.

Table 5.15. Pairwise Granger Causality Tests at Lag length of 9

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.2.6	D(FIIs_SAL_EQ) does not Granger Cause DIIs_NET_EQ	137	2.83754	0.0047
H0 5.2.7	DIIs_NET_EQ does not Granger Cause D(FIIs_SAL_EQ)		1.17947	0.3144

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs sell in the Indian equity market and DIIs net investment in the Indian equity market. At a 95% level of confidence**,** it can be said that FIIs sell in the Indian equity market cause DIIs net investment in the Indian equity market. But DIIs net investment do**es** not cause FIIs sell in the Indian equity market.

5.3.1.4. Causality between Net Investment of FIIs in Indian Equity Market (FIIs_Net_Eq) and Purchase of DIIs in Indian Equity Market (D(DIIs_Pur_Eq))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in Indian Equity Market (FIIs_Net_Eq) and Purchase of DIIs in Indian Equity Market (D(DIIs_Pur_Eq)).

Table 5.16. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2739.74	NA	3.77e+15	41.5415	41.5852	41.5593
1	-2712.40	53.4325	2.65e+15	41.1879	41.3189*	41.2412
2	-2705.23	13.7981	2.52e+15	41.1399	41.3583	41.2286*
3	-2700.43	9.08183	2.49e+15*	41.1278*	41.4336	41.2521
4	-2699.05	2.57863	2.59e+15	41.1675	41.5606	41.3272
5	-2695.30	6.86994	2.61e+15	41.17133	41.6518	41.3665
6	-2689.81	9.89718	2.55e+15	41.1487	41.7165	41.3795
7	-2689.67	0.25437	2.70e+15	41.2072	41.8623	41.4734
8	-2687.96	2.97830	2.80e+15	41.2419	41.9844	41.5436
9	-2681.62	10.8555	2.71e+15	41.2064	42.0363	41.5436
10	-2678.99	4.42568	2.77e+15	41.2271	42.1444	41.5999

11	-2671.89	11.7317*	2.65e+15	41.1801	42.1847	41.5883
12	-2668.69	5.17439	2.68e+15	41.1924	42.2843	41.6361

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 3. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 3.

Table 5.17. Pairwise Granger Causality Tests at Lag length of 3

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.2.8	D(DIIs_PUR_EQ) does not Granger Cause FIIs_NET_EQ	150	4.07229	0.0082
H0 5.2.9	FIIs_NET_EQ does not Granger Cause D(DIIs_PUR_EQ)		4.14680	0.0075

From the above result of Granger Causality Tests, it can be said that there is a bidirectional relationship between DIIs purchase in the Indian equity market and FIIs net investment in the Indian equity market. At a 95% level of confidence, it can be said that DIIs purchased in the Indian equity market cause FIIs net investment in the Indian equity market, as well as FIIs net investment cause DIIs, Purchase in the Indian equity market.

5.3.1.5. Causality between Purchase of FIIs in Indian Equity Market (D(FIIs_Pur_Eq)) and Purchase of DIIs in Indian Equity Market (D(DIIs_Pur_Eq))

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in Indian Equity Market (D(FIIs_Pur_Eq)) and Purchase of DIIs in Indian Equity Market (D(DIIs_Pur_Eq)).

Table 5.18. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2786.00	NA	1.05e+16	42.5650	42.6089	42.5828
1	-2752.86	64.7775	6.72e+15	42.1200	42.2516	42.1735
2	-2742.75	19.4322	6.13e+15	42.0268	42.2463*	42.1160

3	-2736.09	12.6250	5.88e+15	41.9861	42.2933	42.1109*
4	-2734.96	2.08966	6.15e+15	42.0300	42.4251	42.1905
5	-2729.78	9.48996	6.04e+15	42.0120	42.4948	42.2082
6	-2723.93	10.5475	5.87e+15	41.9837	42.5543	42.2155
7	-2721.70	3.94615	6.04e+15	42.0107	42.6692	42.2783
8	-2718.83	4.98902	6.15e+15	42.0280	42.7743	42.3312
9	-2710.14	14.8725*	5.73e+15*	41.9563*	42.7903	42.2952
10	-2708.13	3.36459	5.92e+15	41.9868	42.9086	42.3614
11	-2705.16	4.90442	6.02e+15	42.0024	43.0120	42.4127
12	-2702.51	4.29341	6.16e+15	42.0230	43.1204	42.4689

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 9. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 9.

Table 5.19. Pairwise Granger Causality Tests at Lag length of 9

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.2.10	D(FIIs_PUR_EQ) does not Granger Cause D(DIIs_PUR_EQ)	137	0.85729	0.5654
H0 5.2.11	D(DIIs_PUR_EQ) does not Granger Cause D(FIIs_PUR_EQ)		0.85159	0.5705

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs Purchase in the Indian equity market and DIIs Purchase in the Indian equity market.

5.3.1.6. Causality between Sale of FIIs in Indian Equity Market (D(FIIs_Sal_Eq)) and Purchase of DIIs in Indian Equity Market (D(DIIs_Pur_Eq))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in Indian Equity Market (D(FIIs_Sal_Eq)) and Purchase of DIIs in Indian Equity Market (D(DIIs_Pur_Eq)).

Table 5.20. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2752.23	NA	6.26e+15	42.0493	42.0932	42.0671
1	-2718.31	66.2809	3.97e+15	41.5926	41.7242	41.6461
2	-2700.78	33.7287	3.23e+15*	41.3859*	41.6054*	41.4751*
3	-2697.50	6.20240	3.26e+15	41.3970	41.7043	41.5218
4	-2697.01	0.91094	3.44e+15	41.4506	41.8457	41.6111
5	-2693.93	5.65464	3.49e+15	41.4645	41.9474	41.6607
6	-2685.86	14.5311*	3.28e+15	41.4025	41.9731	41.6343
7	-2683.84	3.57662	3.39e+15	41.4327	42.0911	41.7003
8	-2680.92	5.07572	3.45e+15	41.4492	42.1955	41.7525
9	-2676.00	8.41891	3.40e+15	41.4351	42.2692	41.7740
10	-2675.16	1.40469	3.58e+15	41.4834	42.4053	41.8580
11	-2674.58	0.96703	3.78e+15	41.5356	42.5452	41.9458
12	-2668.79	9.36299	3.68e+15	41.5083	42.6057	41.9542

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 2. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 2.

Table 5.21. Pairwise Granger Causality Tests at Lag length of 2

Null Hypothesis:	Obs	F-Statistic	Prob.
H0 5.2.12 D(FIIs_SAL_EQ) does not Granger Cause D(DIIs_PUR_EQ)	151	0.03620	0.9645
H0 5.2.13 D(DIIs_PUR_EQ) does not Granger Cause D(FIIs_SAL_EQ)		0.05875	0.9430

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs sell in the Indian equity market and DIIs Purchase in the Indian equity market.

5.3.1.7. Causality between Net Investment of FIIs in Indian Equity Market (FIIs_Net_Eq) and Sale of DIIs in Indian Equity Market (D(DIIs_Sal_Eq))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in Indian Equity Market (FIIs_Net_Eq) and Sale of DIIs in Indian Equity Market (D(DIIs_Sal_Eq)).

Table 5.22. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2718.50	NA	2.73e+15	41.2198	41.2635	41.2375
1	-2689.71	56.2738	1.88e+15	40.8442	40.9752*	40.8974
2	-2682.67	13.5606	1.79e+15	40.7980	41.0164	40.8867*
3	-2677.64	9.52122	1.76e+15	40.7824	41.0882	40.9067
4	-2674.97	4.97667	1.80e+15	40.8026	41.1957	40.9623
5	-2668.20	12.4048	1.73e+15*	40.7607*	41.2411	40.9559
6	-2664.96	5.85137	1.75e+15	40.7721	41.3399	41.0028
7	-2662.06	5.13978	1.78e+15	40.7888	41.4439	41.0550
8	-2661.25	1.41257	1.87e+15	40.8371	41.5796	41.1388
9	-2658.30	5.03845	1.90e+15	40.8531	41.6830	41.1903
10	-2656.28	3.39759	1.96e+15	40.8831	41.8004	41.2558
11	-2650.12	10.1850*	1.90e+15	40.8503	41.8549	41.2585
12	-2644.43	9.21341	1.86e+15	40.8248	41.9167	41.2685

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 5. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 5.

Table 5.23. Pairwise Granger Causality Tests at Lag length of 5

Null Hypothesis:	Obs	F-Statistic	Prob.
H0 5.2.14 FIIs_NET_EQ does not Granger Cause D(DIIs_SAL_EQ)	146	1.55772	0.1763
H0 5.2.15 D(DIIs_SAL_EQ) does not Granger Cause FIIs_NET_EQ		3.44888	0.0058

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs net investment in the Indian equity market and DIIs sale in the Indian equity market. At a 95% level of confidence, it can be said that DIIs sale in the Indian equity market cause FIIs net investment in the Indian equity market. But FIIs net investment does not cause DIIs sale in the Indian equity market.

5.3.1.8. Causality between Purchase of FIIs in Indian Equity Market (D(FIIs_Pur_Eq)) and Sale of DIIs in Indian Equity Market (D(DIIs_Sal_Eq))

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in Indian Equity Market (D(FIIs_Pur_Eq)) and Sale of DIIs in Indian Equity Market (D(DIIs_Sal_Eq)).

Table 5.24. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2748.47	NA	5.91e+15	41.9919	42.0358	42.0097
1	-2717.08	61.3248	3.89e+15	41.5738	41.7055*	41.6273
2	-2707.56	18.3191	3.58e+15	41.4895	41.7090	41.5787*
3	-2706.55	1.91709	3.75e+15	41.5351	41.8424	41.6600
4	-2702.56	7.42921	3.75e+15	41.5353	41.9304	41.6958
5	-2695.05	13.7556*	3.55e+15*	41.4817*	41.9646	41.6779
6	-2694.50	0.99136	3.75e+15	41.5344	42.1050	41.7663
7	-2690.85	6.46531	3.77e+15	41.5397	42.1982	41.8073
8	-2690.66	0.33215	4.00e+15	41.5979	42.3441	41.9011
9	-2689.62	1.77163	4.19e+15	41.6431	42.4772	41.9820
10	-2686.76	4.81785	4.27e+15	41.6604	42.5822	42.0350
11	-2682.47	7.06701	4.26e+15	41.6560	42.6657	42.0663
12	-2681.20	2.05661	4.45e+15	41.6977	42.7951	42.1436

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 5. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 5.

Table 5.25. Pairwise Granger Causality Tests at Lag length of 5

Null Hypothesis:	Obs	F-Statistic	Prob.
H0 5.2.16 D(FIIs_PUR_EQ) does not Granger Cause D(DIIs_SAL_EQ)	145	1.98181	0.0853
H0 5.2.17 D(DIIs_SAL_EQ) does not Granger Cause D(FIIs_PUR_EQ)		0.38491	0.8585

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs purchase in the Indian equity market and DIIs sale in the Indian equity market.

5.3.1.9. Causality between Sale of FIIs in Indian Equity Market (D(FIIs_Sal_Eq)) and Sale of DIIs in Indian Equity Market (D(DIIs_Sal_Eq))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in Indian Equity Market (D(FIIs_Sal_Eq)) and Sale of DIIs in Indian Equity Market (D(DIIs_Sal_Eq)).

Table 5.26. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2754.85	NA	6.52e+15	42.0893	42.1332	42.1071
1	-2722.50	63.2074	4.23e+15	41.6566	41.7883	41.7101
2	-2706.94	29.9450	3.55e+15*	41.4800*	41.6995*	41.5692*
3	-2703.27	6.95129	3.56e+15	41.4850	41.7923	41.6098
4	-2700.74	4.70212	3.65e+15	41.5075	41.9026	41.6680
5	-2695.01	10.4948*	3.55e+15	41.4811	41.9640	41.6773
6	-2693.27	3.13317	3.68e+15	41.5156	42.0863	41.7475
7	-2690.66	4.62443	3.76e+15	41.5368	42.1953	41.8044
8	-2688.58	3.61686	3.88e+15	41.5662	42.3124	41.8694
9	-2688.02	0.96689	4.09e+15	41.6186	42.4526	41.9575
10	-2685.29	4.58373	4.17e+15	41.6380	42.5598	42.0126
11	-2684.97	0.53262	4.42e+15	41.6942	42.7038	42.1044
12	-2681.13	6.21106	4.44e+15	41.6966	42.7940	42.1426

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 2. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 2.

Table 5.27. Pairwise Granger Causality Tests at Lag length of 2

Null Hypothesis:	Obs	F-Statistic	Prob.
H0 5.2.18 D(FIIs_SAL_EQ) does not Granger Cause D(DIIs_SAL_EQ)	151	3.24638	0.0417
H0 5.2.19 D(DIIs_SAL_EQ) does not Granger Cause D(FIIs_SAL_EQ)		1.14697	0.3204

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs sell in the Indian equity market and DIIs Sale in the Indian equity market. At a 95% level of confidence, it can be said that FIIs sell in the Indian equity market cause DIIs sale in the Indian equity market. But DIIs sale does not cause FIIs sell in the Indian equity market.

From the above discussion, it is summarized that DIIs investment of DIIs is one of the significant factor affecting FII investment. In the next section, other factors are studied for their causality with FII investment in the Indian equity market.

5.3.2. Causality between FIIs and Gross Domestic Product of India (GDP)

Gross Domestic Product (GDP) shows the development of the economy. GDP data are available with two variants i.e. at current price and at a constant price. GDP at a constant price are more reliable as they are adjusted with inflation. As GDP data are made available quarterly in the study FIIs data were also converted on quarterly. To calculate quarterly data FIIs purchase, FIIs sell and FIIs net investment in the Indian equity market are summed for each quarter to study their causality with GDP.

In the case of GDP data, they are having different bases as government changes its base from time to time. Currently, the base year for GDP calculation is 2011-12, before that base year was the year 2004-05. As GDP data before a year, March 2012 is having the base year of 2004-05, so earlier data is required to be adjusted considering a new base year 2011-12, to

have a common base year. Hence the earlier data i.e. from January 2006 to March 2013 (the base year 2004-05) are extrapolated considering new base year 2011-12.

Once the GDP data extrapolated taking a new base year to check the causality between FII investment in the Indian equity market and GDP of the Indian economy, stationarity is required to be checked of both of the time-series data. For FIIs stationarity is already checked earlier, following test shows the results of the unit root test of GDP data.

5.3.2.1. Unit Root Test:

To check the stationarity of the time-series data, the Augmented Dickey-Fuller test is applied. To check the stationarity of GDP time-series, the following is the null hypothesis.

H0 5.3.1 : GDP has a unit root

Table 5.28. Test statistic of Augmented Dickey-Fuller (ADF)

Variable	Exogenous	t-statistics	Prob.
GDP	None	4.241222	1.0000
	Constant	3.081526	1.0000
	Constant, Linear Trend	-0.911768	0.9462
D(GDP_BASE201112)	None	0.324150	0.7750
	Constant	-2.600122	0.1000***
	Constant, Linear Trend	-4.433912	0.0048*
D(GDP_BASE201112,2)	None	-6.933422	0.0000*
	Constant	-6.957851	0.0000*
	Constant, Linear Trend	-6.892620	0.0000*

* Significant at 1%, ** Significant at 5%, *** Significant at 10% level of Significance

From the above table, it can be said that GDP time series data are stationary at their second difference. Now the causality is required be checked between GDP data and FIIs purchase, FIIs sell and FIIs net investment in the Indian equity market.

5.3.2.2. Causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and GDP (D(GDP_BASE201112,2))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and GDP (D(GDP_BASE201112,2)).

Table 5.29. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-965.309	NA	1.20e+19	49.6056	49.6909	49.6362
1	-957.196	14.9775	9.71e+18	49.3946	49.6506	49.4865
2	-952.782	7.69566	9.53e+18	49.3734	49.8000	49.5265
3	-909.445	71.1173*	1.27e+18	47.3561	47.9533*	47.5704*
4	-904.720	7.26921	1.24e+18*	47.3190	48.0868	47.5944
5	-900.536	6.00876	1.24e+18	47.3095*	48.2479	47.6462
6	-899.559	1.30262	1.48e+18	47.4645	48.5736	47.8624
7	-896.780	3.41945	1.63e+18	47.5272	48.8068	47.9863
8	-893.120	4.12980	1.73e+18	47.5446	48.9949	48.0649
9	-888.340	4.90268	1.76e+18	47.5046	49.1255	48.0861
10	-884.630	3.42403	1.92e+18	47.5195	49.3110	48.1623
11	-880.833	3.11556	2.13e+18	47.5299	49.4920	48.2339
12	-878.519	1.66169	2.64e+18	47.6163	49.7491	48.3815

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 3. But GDP data is quarterly data and one of the criteria also suggests a lag length of 4 and one criteria suggests 5. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 5, 4 and 3 respectively.

Table 5.30. Pairwise Granger Causality Tests at Lag length of 5, 4 & 3

Lags: 5

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.3.2	D(GDP_BASE201112,2) does not Granger Cause FIIs_NET_EQ	46	2.83333	0.0299
H0 5.3.3	FIIs_NET_EQ does not Granger Cause D(GDP_BASE201112,2)		1.42393	0.2399

Lags: 4

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.3.4	D(GDP_BASE201112,2) does not Granger Cause FIIs_NET_EQ	47	3.43715	0.0171
H0 5.3.5	FIIs_NET_EQ does not Granger Cause D(GDP_BASE201112,2)		1.19702	0.3279

Lags: 3

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.3.6	D(GDP_BASE201112,2) does not Granger Cause FIIs_NET_EQ	48	2.14510	0.1093
H0 5.3.7	FIIs_NET_EQ does not Granger Cause D(GDP_BASE201112,2)		1.74570	0.1727

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between GDP and FIIs net investment in the Indian equity market. At a 95% level of confidence, it can be said that GDP cause FIIs net investment in the Indian equity market. But FIIs net investment does not cause GDP.

5.3.2.3. Causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and GDP (D(GDP_BASE201112,2))

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and GDP (D(GDP_BASE201112,2)).

Table 5.31. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-990.091	NA	4.27e+19	50.8765	50.9618	50.9071
1	-982.901	13.2737	3.63e+19	50.7129	50.9688	50.8047
2	-976.336	11.4467	3.19e+19	50.5813	51.0079	50.7344
3	-931.204	74.0630*	3.89e+18*	48.4720	49.0692*	48.6862*
4	-927.771	5.28240	4.04e+18	48.5010	49.2688	48.7765
5	-923.360	6.33338	4.01e+18	48.4800	49.4184	48.8167
6	-923.351	0.01175	5.03e+18	48.6846	49.7937	49.0826
7	-917.947	6.65072	4.83e+18	48.6127	49.8923	49.0718
8	-915.716	2.51697	5.51e+18	48.7034	50.1537	49.2237
9	-909.768	6.10092	5.27e+18	48.6035	50.2244	49.1850
10	-903.866	5.44761	5.14e+18	48.5059	50.2975	49.1487
11	-900.749	2.55761	5.92e+18	48.5512	50.5134	49.2552
12	-893.351	5.31185	5.64e+18	48.3769*	50.5097	49.1421

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 3. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 3.

Table 5.32. Pairwise Granger Causality Tests at Lag length of 3

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.3.8	D(FIIs_PUR_EQ) does not Granger Cause D(GDP_BASE201112,2)	48	0.66613	0.5777
H0 5.3.9	D(GDP_BASE201112,2) does not Granger Cause D(FIIs_PUR_EQ)		0.37428	0.7720

From the above result of Granger Causality Tests, it can be said that there is no causality between GDP and FIIs purchase in the Indian equity market.

5.3.2.4. Causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and GDP (D(GDP_BASE201112,2))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and GDP (D(GDP_BASE201112,2)).

Table 5.33. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-976.963	NA	2.18e+19	50.2032	50.2885	50.2338
1	-972.195	8.803517	2.10e+19	50.1638	50.4197	50.2556
2	-965.569	11.55312	1.84e+19	50.0291	50.4557	50.1822
3	-922.356	70.91364*	2.47e+18*	48.0182	48.6154*	48.2325*
4	-919.419	4.518077	2.63e+18	48.0727	48.84058	48.3482
5	-915.389	5.786333	2.67e+18	48.0712	49.0096	48.4079
6	-915.136	0.337312	3.30e+18	48.2634	49.3724	48.6613
7	-908.852	7.733933	3.03e+18	48.1462	49.4259	48.6054
8	-902.234	7.467045	2.76e+18	48.0120	49.4623	48.5323
9	-898.245	4.090725	2.92e+18	48.0126	49.6335	48.5941
10	-893.407	4.466496	3.01e+18	47.9695*	49.7611	48.6123
11	-891.877	1.255151	3.76e+18	48.0962	50.0584	48.8002
12	-886.849	3.609964	4.04e+18	48.0435	50.1763	48.8087

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 3. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 3.

Table 5.34. Pairwise Granger Causality Tests at Lag length of 3

Null Hypothesis:	Obs	F-Statistic	Prob.
H0 5.3.10 D(FIIs_SAL_EQ) does not Granger Cause D(GDP_BASE201112,2)	48	0.05916	0.9809
H0 5.3.11 D(GDP_BASE201112,2) does not Granger Cause D(FIIs_SAL_EQ)		0.54813	0.6522

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs sell in the Indian equity market and GDP.

5.3.3. Causality between FIIs and Index of Industrial Production (IIP)

Like GDP data, IIP data are also having different bases for their calculation from time to time. The government changes the base year for the calculation of IIP from time to time. Currently, the base year for IIP calculation is 2011-12, before that base year was the year 2004-05. IIP data before year March 2012 are calculated considering the base year of 2004-05, so earlier data is required to be adjusted considering the new base of 2011-12 to have a common base year. Hence earlier data i.e. from January 2006 to March 2013 (the base year 2004-05) are extrapolated considering new base year 2011-12.

Once IIP data are extrapolated with new base year to check the causality between FIIs and IIP data it requires to check the stationarity of data. For FIIs the unit root test is already conducted for IIP following test shows the results of the unit root test.

5.3.3.1. Unit Root Test:

To check the stationarity of the time-series data, the Augmented Dickey-Fuller test is applied. To check the stationarity of IIP time-series, the following is the null hypothesis.

H0 7.4.1 : IIP_Base201112 has a unit root

Table 5.35. Test statistic of ADF

Variable	**Exogenous**	**t-statistics**	**Prob.**
IIP_Base201112	None	2.245594	0.9942
	Constant	-1.100805	0.7147
	Constant, Linear Trend	-2.785773	0.2050

D(IIP_Base201112)	None	-2.930770	0.0036**
	Constant	-3.862188	0.0030*
	Constant, Linear Trend	-3.871689	0.0156**

* Significant at 1% and ** Significant at 5% level of Significance

From the above table, it can be said that all IIP time series data are also stationary at their first difference. Now the causality is required be checked between IIP data and FIIs purchase, FIIs sell and FIIs net investment in the Indian equity market.

5.3.3.2. Causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and IIP (D(IIP_BASE201112))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and IIP (D(IIP_BASE201112)).

Table 5.36. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1847.05	NA	5.04e+09	28.0159	28.0596	28.0337
1	-1805.93	80.3615	2.87e+09	27.4536	27.5846	27.5068
2	-1794.54	21.9258	2.57e+09	27.3415	27.5599*	27.4303
3	-1792.09	4.63087	2.63e+09	27.3651	27.6708	27.4893
4	-1788.87	6.00085	2.66e+09	27.3769	27.7700	27.5366
5	-1783.09	10.6040	2.59e+09	27.3499	27.8303	27.5451
6	-1772.03	19.9469	2.33e+09	27.2429	27.8107	27.4736
7	-1770.34	2.99608	2.41e+09	27.2779	27.9330	27.5441
8	-1758.60	20.4477	2.15e+09	27.1607	27.9032	27.4624
9	-1747.23	19.4637	1.92e+09	27.0490	27.8789	27.3862
10	-1743.25	6.69418	1.93e+09	27.0493	27.9666	27.4220
11	-1724.77	30.5206	1.55e+09	26.8299	27.8345	27.2381
12	-1704.44	32.9573*	1.21e+09*	26.5825*	27.6745	27.0262*

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 12. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 12.

Table 5.37. Pairwise Granger Causality Tests at Lag length of 12

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 7.4.2	D(IIP_BASE201112) does not Granger Cause FIIs_NET_EQ	132	2.50103	0.0062
H0 7.4.3	FIIs_NET_EQ does not Granger Cause D(IIP_BASE201112)		0.94570	0.5050

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between IIP and FIIs net investment in the Indian equity market. At a 95% level of confidence, it can be said that IIP cause FIIs net investment in the Indian equity market. But FIIs net investment does not cause FIIs sell in the Indian equity market.

5.3.3.3. Causality between Purchase of FIIs in the Indian equity market (FIIs_Pur_Eq) and IIP (D(IIP_BASE201112))

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in the Indian equity market (FIIs_Pur_Eq) and IIP (D(IIP_BASE201112)).

Table 5.38. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1913.25	NA	1.71e+10	29.2404	29.2843	29.2583
1	-1865.31	93.6693	8.76e+09	28.5697	28.7014	28.6232
2	-1847.47	34.3316	7.10e+09	28.3583	28.5778*	28.4475
3	-1841.00	12.2416	6.83e+09	28.3207	28.6279	28.4455
4	-1840.20	1.48607	7.18e+09	28.3695	28.7646	28.5301
5	-1832.98	13.2362	6.84e+09	28.3203	28.8032	28.5165
6	-1821.77	20.1953	6.13e+09	28.2102	28.7809	28.4421
7	-1817.87	6.90762	6.14e+09	28.2118	28.8702	28.4793

8	-1807.92	17.31834	5.61e+09	28.1209	28.8671	28.4241
	-1797.60	17.6507	5.10e+09	28.0244	28.8584	28.3633
10	-1792.52	8.52259	5.03e+09	28.0080	28.9298	28.3825
11	-1781.17	18.7112	4.50e+09	27.8958	28.9054	28.3060
12	-1762.07	30.9138*	3.58e+09*	27.6652*	28.7626	28.1111*

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 12. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 12.

Table 5.39. Pairwise Granger Causality Tests at Lag length of 12

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 7.4.4	D(FIIs_PUR_EQ) does not Granger Cause D(IIP_BASE201112)	131	1.13952	0.3368
H0 7.4.5	D(IIP_BASE201112) does not Granger Cause D(FIIs_PUR_EQ)		0.93085	0.5194

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs purchase in the Indian equity market and IIP.

5.3.3.4. Causality between Sale of FIIs in the Indian equity market (FIIs_Sal_Eq) and IIP (D(IIP_BASE201112))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in the Indian equity market (FIIs_Sal_Eq) and IIP (D(IIP_BASE201112)).

Table 5.40. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1901.70	NA	1.44e+10	29.0642	29.10809	29.0820
1	-1855.29	90.6914	7.52e+09	28.4167	28.54843	28.4702
2	-1829.52	49.5843	5.39e+09	28.0842	28.30376*	28.1734
3	-1823.30	11.7648	5.22e+09	28.0504	28.35774	28.1753

4	-1821.48	3.39361	5.39e+09	28.0837	28.4787	28.2442
5	-1816.27	9.54703	5.30e+09	28.0652	28.5480	28.2614
6	-1806.70	17.2452	4.87e+09	27.9801	28.5508	28.2120
7	-1801.36	9.44199	4.77e+09	27.9598	28.6182	28.2273
8	-1795.44	10.3155	4.64e+09	27.9304	28.6766	28.2336
9	-1781.04	24.6177	3.96e+09	27.7716	28.6057	28.1105
10	-1773.10	13.3357	3.74e+09	27.7115	28.6333	28.0860
11	-1760.35	21.0295	3.27e+09	27.5778	28.5874	27.9881
12	-1741.82	29.9822*	2.63e+09*	27.3560*	28.4534	27.8020*

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 12. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 12.

Table 5.41. Pairwise Granger Causality Tests at Lag length of 12

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 7.4.6	D(FIIs_SAL_EQ) does not Granger Cause D(IIP_BASE201112)	131	1.41546	0.1702
H0 7.4.7	D(IIP_BASE201112) does not Granger Cause D(FIIs_SAL_EQ)		1.09914	0.3686

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs sell in the Indian equity market and IIP.

5.3.4. Causality between FIIs and Inflation (WPI)

Inflation can be measured using the Wholesale Price Index (WPI) as well as the Consumer Price Index (CPI). WPI is better to consider inflation level at industry and its calculation is stable compared to CPI. CPI more focuses on inflation at the end consumer. Thus for investment and financial markets, WPI is appropriate indicators of inflation than CPI.

Like GDP and IIP, WPI data are also calculated using different bases. The government changes it's the base year for the calculation of WPI from time to time. Currently, the base year for WPI calculation is 2011-12, earlier it was the year 2004-05. WPI data before the year March 2012 are calculated considering the base year 2004-05, so earlier data is required to be adjusted considering the new base of 2011-12 to have a common base year. Hence the earlier data i.e. from January 2006 to March 2013 (the base year 2004-05) are extrapoled considering the new base year 2011-12.

To check the causality between FIIs and WIP data it requires to check the stationarity of data. Following test shows the results of the unit root test.

5.3.4.1. Unit Root Test:

To check the stationarity of the time-series data, the Augmented Dickey-Fuller test is applied. To check the stationarity of WPI time-series, the following is the null hypothesis.

H0 5.5.1 Null Hypothesis: WPI_Base201112 has a unit root

Table 5.42. Test statistic of ADF

Variable	Exogenous	t-statistics	Prob.
WPI_Base201112	None	3.025564	0.9994
	Constant	-1.193670	0.6766
	Constant, Linear Trend	-1.557428	0.8052
D(WPI_Base201112)	None	-8.940203	0.000*
	Constant	-9.755804	0.000*
	Constant, Linear Trend	-9.774569	0.0000*

* Significant at 1% level of Significance

From the above table, it can be said that all FIIs and WPI time series data are stationary at their first difference. Now the causality is required be checked between WPI data and FIIs purchase, FIIs sell and FIIs net investment in the Indian equity market.

5.3.4.2. Causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and WPI (D(WPI_BASE201112))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and WPI (D(WPI_BASE201112)).

Table 5.43. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1573.407	NA	79721843	23.86981	23.91349*	23.88756
1	-1565.729	15.00795	75401268*	23.81407*	23.94511	23.86732*
2	-1563.999	3.327825	78044851	23.84848	24.06687	23.93722
3	-1563.748	0.476344	82616187	23.90527	24.21102	24.02951
4	-1561.718	3.783764	85138045	23.93511	24.32822	24.09486
5	-1561.522	0.358475	90221567	23.99276	24.47323	24.18800
6	-1560.146	2.481656	93927817	24.03251	24.60033	24.26325
7	-1559.676	0.831944	99157823	24.08601	24.74119	24.35224
8	-1553.172	11.33367*	95551960	24.04806	24.79060	24.34979
9	-1547.952	8.936507	93910456	24.02958	24.85948	24.36681
10	-1545.089	4.815335	95678321	24.04680	24.96406	24.41954
11	-1541.420	6.060406	96325272	24.05181	25.05642	24.46004
12	-1538.927	4.041133	98755055	24.07465	25.16662	24.51838

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 1. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 1.

Table 5.44. Pairwise Granger Causality Tests at Lag length of 1

	Null Hypothesis:	Obs	F-Statistic	Prob.
H0 5.5.2	FIIs_NET_EQ does not Granger Cause D(WPI_BASE201112)	154	0.03235	0.8575
H0 5.5.3	D(WPI_BASE201112) does not Granger Cause FIIs_NET_EQ		0.23992	0.6250

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs net investment in the Indian equity market and WPI.

5.3.4.3. Causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and WPI (D(WPI_BASE201112))

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and WPI (D(WPI_BASE201112)).

Table 5.45. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1644.78	NA	2.84e+08	25.14180	25.1857	25.1596
1	-1625.15	38.3661	2.24e+08	24.90313	25.0348*	24.9566*
2	-1619.10	11.6429	2.17e+08*	24.87180*	25.09128	24.9609
3	-1617.21	3.57135	2.24e+08	24.90407	25.21134	25.0289
4	-1616.05	2.17217	2.34e+08	24.94733	25.34240	25.1078
5	-1610.13	10.8360	2.28e+08	24.91810	25.40096	25.1143
6	-1609.24	1.60402	2.39e+08	24.96557	25.53622	25.1974
7	-1605.81	6.07817	2.41e+08	24.97424	25.63269	25.2418
8	-1604.39	2.47665	2.51e+08	25.01359	25.75982	25.3168
9	-1597.99	10.9327*	2.42e+08	24.97704	25.81107	25.3159
10	-1596.31	2.81764	2.51e+08	25.01250	25.93432	25.3870
11	-1594.72	2.62598	2.61e+08	25.04925	26.05886	25.4595
12	-1591.56	5.12286	2.65e+08	25.06199	26.15939	25.5079

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 2. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 2.

Table 5.46. Pairwise Granger Causality Tests at Lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.5.4	D(FIIs_PUR_EQ) does not Granger Cause D(WPI_BASE201112)	151	1.65216	0.1952
H0 5.5.5	D(WPI_BASE201112) does not Granger Cause D(FIIs_PUR_EQ)		1.02142	0.3626

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs purchase in the Indian equity market and WPI.

5.3.4.4. Causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and WPI (D(WPI_BASE201112))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and WPI (D(WPI_BASE201112)).

Table 5.47. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1628.26	NA	2.21e+08	24.8895	24.9334	24.9074
1	-1613.04	29.7508	1.86e+08	24.7182	24.8499	24.7717
2	-1597.07	30.7176*	1.55e+08*	24.5355*	24.7549*	24.6247*
3	-1594.73	4.43292	1.59e+08	24.5608	24.8681	24.6856
4	-1593.80	1.730479	1.67e+08	24.6077	25.0027	24.7682
5	-1591.24	4.69278	1.71e+08	24.6296	25.1125	24.8258
6	-1589.14	3.78920	1.76e+08	24.6586	25.2292	24.8905
7	-1585.53	6.38103	1.77e+08	24.6646	25.3231	24.9322
8	-1584.29	2.16454	1.85e+08	24.7067	25.4530	25.0100
9	-1580.28	6.84901	1.85e+08	24.7066	25.5407	25.0455
10	-1578.13	3.62113	1.90e+08	24.7348	25.6566	25.1094
11	-1575.98	3.54490	1.96e+08	24.7630	25.7727	25.1733
12	-1573.13	4.61549	2.00e+08	24.7806	25.8780	25.2265

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria suggest checking causality at lag order of 2. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 2.

Table 5.48. Pairwise Granger Causality Tests at Lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.5.6	D(FIIs_SAL_EQ) does not Granger Cause D(WPI_BASE201112)	151	2.28481	0.1054
H0 5.5.7	D(WPI_BASE201112) does not Granger Cause D(FIIs_SAL_EQ)		0.92224	0.3999

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs sell in the Indian equity market and WPI.

5.3.5. Causality between FIIs and Dollar of the United State of America (USD)

The USD is dominated currency all over the world in foreign trade and the investment of FPI/FIIs also comes in the form of forex is USD. In addition to this, FII investment in the Indian equity market is also dominated by US investors. As per an earlier discussion, on May 2019 in investment done by FPI/FIIs in equity and in total, 35.73% and 33.06% asset under custody (AUD) is invested by the United State of America respectively. Thus, the exchange rate of Indian rupee (INR) to USD is significant to FIIs Investment in India.

To check the causality between FII investment in the Indian equity market and USD exchange rate data, it requires to check the stationarity of the data. For FIIs unit root test is done, for USD following test shows the results of the unit root test.

5.3.5.1. Unit Root Test:

To check the stationarity of the time-series data, the Augmented Dickey-Fuller test is applied. To check the stationarity of USD time-series, the following is the null hypothesis.

H0 5.6.1 Null Hypothesis: USD has a unit root

Table 5.49. Test statistic of ADF

Variable	Exogenous	t-statistics	Prob.
USD	None	1.204631	0.9413
	Constant	-0.680407	0.8474
	Constant, Linear Trend	-2.888040	0.1693
D(USD)	None	-8.910218	0.0000*
	Constant	-9.034050	0.0000*
	Constant, Linear Trend	-9.007773	0.0000*

* Significant at 1% level of Significance

From the above table, it can be said that USD time series data are also stationary at their first difference. Now the causality is required be checked between USD data and FIIs purchase, FIIs sell and FIIs net investment in the Indian equity market.

5.3.5.2. Causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and USD (D(USD))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and USD (D(USD)).

Table 5.50. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1583.872	NA	93418797	24.02836	24.07204*	24.04611
1	-1574.945	17.44702	86701009	23.95371	24.08475	24.00696
2	-1567.725	13.89285	82577391*	23.90493*	24.12332	23.99367*
3	-1567.211	0.973897	87066958	23.95774	24.26349	24.08199
4	-1564.957	4.199888	89421639	23.98420	24.37731	24.14395
5	-1560.906	7.428150	89382966	23.98342	24.46389	24.17866
6	-1555.455	9.827398*	87484294	23.96144	24.52927	24.19218
7	-1554.234	2.164888	91309311	24.00355	24.65873	24.26978
8	-1551.256	5.189012	92818129	24.01903	24.76157	24.32076
9	-1549.378	3.214860	95961548	24.05119	24.88108	24.38842
10	-1546.424	4.968285	97633400	24.06703	24.98429	24.43976

11	-1544.941	2.448861	1.02e+08	24.10517	25.10978	24.51340
12	-1543.107	2.974301	1.05e+08	24.13798	25.22995	24.58171

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 2. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 2.

Table 5.51. Pairwise Granger Causality Tests at Lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.6.2	D(USD) does not Granger Cause FIIs_NET_EQ	152	0.51937	0.5960
H0 5.6.3	FIIs_NET_EQ does not Granger Cause D(USD)		2.92770	0.0566

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs net investment in the Indian equity market and USD exchange rate.

5.3.5.3. Causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and USD (D(USD))

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and USD (D(USD)).

Table 5.52. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1675.681	NA	4.56e+08	25.61345	25.65735	25.63129
1	-1652.504	45.29274	3.40e+08	25.32067	25.45236*	25.37418
2	-1645.065	14.30918	3.23e+08	25.26817	25.48765	25.35736*
3	-1641.502	6.745107	3.25e+08	25.27485	25.58212	25.39970
4	-1639.306	4.090051	3.34e+08	25.30239	25.69745	25.46292
5	-1629.795	17.42546*	3.07e+08*	25.21825*	25.70110	25.41445
6	-1628.622	2.112661	3.21e+08	25.26141	25.83206	25.49329

7	-1623.938	8.295859	3.18e+08	25.25096	25.90940	25.51852
8	-1623.619	0.556154	3.37e+08	25.30715	26.05339	25.61038
9	-1618.148	9.353919	3.29e+08	25.28470	26.11873	25.62361
10	-1616.621	2.564609	3.43e+08	25.32246	26.24428	25.69703
11	-1616.460	0.266224	3.64e+08	25.38106	26.39067	25.79131
12	-1614.548	3.093159	3.77e+08	25.41295	26.51035	25.85887

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 5. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 5.

Table 5.53. Pairwise Granger Causality Tests at Lag length of 5

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.6.4	D(FIIs_PUR_EQ) does not Granger Cause D(USD)	145	1.37990	0.2358
H0 5.6.5	D(USD) does not Granger Cause D(FIIs_PUR_EQ)		2.14452	0.0639

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs purchase in the Indian equity market and USD exchange rate.

5.3.5.4. Causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and USD (D(USD))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and USD (D(USD)).

Table 5.54. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1660.122	NA	3.59e+08	25.37591	25.41980	25.39374
1	-1638.223	42.79563	2.74e+08	25.10263	25.23432	25.15615
2	-1624.595	26.21455	2.36e+08*	24.95565*	25.17513*	25.04484*
3	-1621.933	5.040035	2.41e+08	24.97607	25.28335	25.10093
4	-1620.431	2.797590	2.50e+08	25.01421	25.40928	25.17474

5	-1614.84	10.2277*	2.45e+08	24.9900	25.4729	25.1862
6	-1613.48	2.45486	2.55e+08	25.0303	25.6009	25.2621
7	-1610.09	6.00579	2.57e+08	25.0396	25.6980	25.3071
8	-1607.87	3.86703	2.65e+08	25.0667	25.8129	25.3699
9	-1606.09	3.03892	2.74e+08	25.1006	25.9347	25.4395
10	-1604.35	2.92107	2.84e+08	25.1352	26.0570	25.5097
11	-1603.90	0.74584	3.01e+08	25.1893	26.1989	25.5996
12	-1601.53	3.82776	3.09e+08	25.2143	26.3117	25.6602

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 2. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 2.

Table 5.55. Pairwise Granger Causality Tests at Lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.6.6	D(FIIs_SAL_EQ) does not Granger Cause D(USD)	151	2.16836	0.1180
H0 5.6.7	D(USD) does not Granger Cause D(FIIs_SAL_EQ)		5.09654	0.0073

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs sell in the Indian equity market and USD exchange rate. At a 95% level of confidence, it can be said that the USD exchange rate cause FIIs sell in the Indian equity market. But FIIs sell does not cause USD exchange.

5.3.6. Causality between FIIs and Call Money Rate (CR)

Call Money Rate (CR) is an indicator of borrowing the cost of money in the money market. It provides information about the cost of short-term capital, i.e. opportunity cost. Call Money Rate data are available on a daily basis. For the analysis purpose, monthly average data is calculated and studied their causality with FIIs.

To check the causality between FII investment in the Indian equity market and Call Money Rate in the Indian economy, it requires to check the stationarity of the data. For FIIs unit test

is done, the following test shows the results of the unit root test of Average Call Money Rate (CR) data.

5.3.6.1. Unit Root Test:

To check the stationarity of CR time-series, the following is the null hypothesis.

H0 5.7.1 Null Hypothesis: CR has a unit root

Table 5.56. Test statistic of ADF

Variable	Exogenous	t-statistics	Prob.
CR	None	-9.00056	0.3249
	Constant	-3.614104	0.0065*
	Constant, Linear Trend	-3.617023	0.0315**
D(CR)	None	-8.930805	0.0000*
	Constant	-8.900952	0.0000*
	Constant, Linear Trend	-8.874607	0.0000*

* Significant at 1%, ** Significant at 5% level of Significance

From the above table, it can be said that CR time series data are stationary at their first difference. Now the causality is required be checked between CR data and FIIs purchase, FIIs sell and FIIs net investment in the Indian equity market.

5.3.6.2. Causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and Call Money Rate (D(CR))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and Call Money Rate (D(CR)).

Table 5.57. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1590.17	NA	1.03e+08	24.1238	24.1675*	24.1415*
1	-1584.97	10.1539	1.01e+08*	24.1057*	24.2367	24.1589
2	-1582.40	4.95661	1.03e+08	24.1273	24.3456	24.2160
3	-1581.04	2.57594	1.07e+08	24.1673	24.4730	24.2915

4	-1573.469	14.1132*	1.02e+08	24.1131	24.5062	24.2729
5	-1569.007	8.17923	1.01e+08	24.1061	24.5866	24.3014
6	-1565.756	5.86177	1.02e+08	24.1175	24.6853	24.3482
7	-1563.643	3.74577	1.05e+08	24.1461	24.8012	24.4123
8	-1560.477	5.51636	1.07e+08	24.1587	24.9012	24.4604
9	-1556.147	7.41415	1.06e+08	24.1537	24.9836	24.4909
10	-1550.544	9.42255	1.04e+08	24.1294	25.0467	24.5021
11	-1548.542	3.30617	1.07e+08	24.1597	25.1643	24.5679
12	-1545.821	4.41200	1.10e+08	24.1791	25.2710	24.6228

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 1. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 1.

Table 5.58. Pairwise Granger Causality Tests at Lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.7.2	FIIs_NET_EQ does not Granger Cause D(CR)	154	0.33699	0.5624
H0 5.7.3	D(CR) does not Granger Cause FIIs_NET_EQ		0.82786	0.3643

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs net investment in the Indian equity market and Call money rate.

5.3.6.3. Causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and Call Money Rate (D(CR))

The following table shows the statistics of VAR lag selection criteria Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and Call Money Rate (D(CR)).

Table 5.59. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1661.531	NA	3.67e+08	25.39743	25.44132	25.41526

1	-1644.99	32.3125	3.03e+08	25.2060	25.3377*	25.2595
2	-1637.93	13.5930	2.89e+08	25.1592	25.3787	25.2484
3	-1634.48	6.51636	2.92e+08	25.1677	25.4750	25.2926
4	-1626.89	14.1423	2.76e+08	25.1129	25.5079	25.2734
5	-1617.50	17.1986	2.55e+08*	25.0306*	25.5135	25.2268*
6	-1613.59	7.04564	2.55e+08	25.0320	25.6026	25.2638
7	-1610.15	6.09159	2.58e+08	25.0405	25.6990	25.3081
8	-1609.50	1.13337	2.71e+08	25.0916	25.8379	25.3949
9	-1605.76	6.40175	2.73e+08	25.0956	25.9296	25.4345
10	-1598.79	11.7072*	2.61e+08	25.0502	25.9720	25.4248
11	-1597.28	2.48082	2.72e+08	25.0883	26.0979	25.4985
12	-1595.58	2.75601	2.82e+08	25.1234	26.2208	25.5693

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 5. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 5.

Table 5.60. Pairwise Granger Causality Tests at Lag length of 5

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.7.4	D(FIIs_PUR_EQ) does not Granger Cause D(CR)	145	0.89939	0.4836
H0 5.7.5	D(CR) does not Granger Cause D(FIIs_PUR_EQ)		2.05547	0.0749

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs purchase in the Indian equity market and Call money rate.

5.3.6.4. Causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and Call Money Rate (D(CR))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and Call Money Rate (D(CR)).

Table 5.61. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-1645.528	NA	2.88e+08	25.15310	25.19700	25.17094
1	-1631.390	27.62951	2.46e+08	24.99832	25.13000	25.05183
2	-1616.182	29.25429	2.08e+08	24.82721	25.04669*	24.91639
3	-1613.131	5.775696	2.11e+08	24.84170	25.14897	24.96656
4	-1605.107	14.94651	1.98e+08	24.78025	25.17532	24.94079
5	-1601.804	6.051472	2.00e+08	24.79089	25.27375	24.98710
6	-1589.123	22.84420	1.76e+08	24.65837	25.22902	24.89025*
7	-1586.304	4.992336	1.79e+08	24.67640	25.33484	24.94395
8	-1585.092	2.109937	1.87e+08	24.71896	25.46519	25.02219
9	-1582.709	4.074575	1.92e+08	24.74365	25.57767	25.08255
10	-1569.480	22.21678*	1.67e+08*	24.60275*	25.52456	24.97732
11	-1568.804	1.113879	1.76e+08	24.65350	25.66311	25.06375
12	-1564.629	6.756936	1.76e+08	24.65082	25.74823	25.09675

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 10. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 10.

Table 5.62. Pairwise Granger Causality Tests at Lag length of 10

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 5.7.6	D(FIIs_SAL_EQ) does not Granger Cause D(CR)	135	0.58104	0.8266
H0 5.7.7	D(CR) does not Granger Cause D(FIIs_SAL_EQ)		3.46863	0.0005

From the above result of Granger Causality Tests, it can be said that there is no causality between FIIs net investment in the Indian equity market and Call money rate.

5.3.7. Causality between FIIs and Foreign Exchange Reserve (Avg_FR_USD)

Foreign Exchange Reserve (FR) is essential for various economic activities. It helps in stabilizing payment to foreign investors at the time of their exit. FR also helps in stabilizing the value of INR at the international market. Hence FR is a crucial factor for FPI/FIIs before investing in any country.

To check the causality between FII investment in the Indian equity market and Foreign Exchange Reserve (Avg_FR_USD) in India, it requires to check the stationarity of the data. Following test shows the results of the unit root test of Avg_FR_USD.

5.3.7.1. Unit Root Test:

To check the stationarity of the time-series data, the Augmented Dickey-Fuller test is applied. To check the stationarity of Avg_FR_USD time-series, the following is the null hypothesis.

H0 7.8.1 Null Hypothesis: Avg_FR_USD has a unit root

Table 5.63. Test statistic of ADF

Variable	Exogenous	t-statistics	Prob.
Avg_FR_USD	None	1.351566	0.9554
	Constant	-1.876613	0.3426
	Constant, Linear Trend	-2.881948	0.1713
D(Avg_FR_USD)	None	-5.878325	0.0000*
	Constant	-6.185556	0.0000*
	Constant, Linear Trend	-6.202389	0.0000*

* Significant at 1%, ** Significant at 5% level of Significance

From the above table, it can be said that Avg_FR_USD time series data are stationary at their first difference. Now the causality is required be checked between Avg_FR_USD and FIIs purchase, FIIs sell and FIIs net investment in the Indian equity market.

5.3.7.2. Causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and Foreign Exchange Reserve (D(Avg_FR_USD)))

The following table shows the statistics of VAR lag selection criteria to study the causality between Net Investment of FIIs in the Indian equity market (FIIs_Net_Eq) and Foreign Exchange Reserve (D(Avg_FR_USD))).

Table 5.64. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2711.985	NA	2.48e+15	41.12099	41.16466	41.13873
1	-2680.299	61.93178	1.63e+15	40.70150	40.83254*	40.75475
2	-2672.371	15.25492	1.53e+15*	40.64199*	40.86038	40.73073*
3	-2670.007	4.477564	1.57e+15	40.66677	40.97253	40.79102
4	-2669.183	1.535131	1.65e+15	40.71490	41.10801	40.87464
5	-2665.074	7.533063	1.65e+15	40.71325	41.19372	40.90849
6	-2662.318	4.970604	1.68e+15	40.73208	41.29991	40.96282
7	-2661.610	1.254171	1.77e+15	40.78197	41.43715	41.04821
8	-2655.235	11.10793	1.71e+15	40.74599	41.48853	41.04772
9	-2653.535	2.910150	1.77e+15	40.78084	41.61074	41.11807
10	-2648.968	7.681231	1.76e+15	40.77225	41.68950	41.14498
11	-2647.481	2.456262	1.83e+15	40.81032	41.81493	41.21855
12	-2640.820	10.79944*	1.76e+15	40.76999	41.86196	41.21372

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 2. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 2.

Table 5.65. Pairwise Granger Causality Tests at Lag length of 2

Null Hypothesis:	Obs	F-Statistic	Prob.
FIIs_NET_EQ does not Granger Cause D(AVG_FR_USD)	152	7.63304	0.0007
D(AVG_FR_USD) does not Granger Cause FIIs_NET_EQ		0.21274	0.8086

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs net investment in the Indian equity market and Foreign Exchange Reserve. At a 95% level of confidence, it can be said that FIIs net investment in the Indian equity market cause Foreign Exchange Reserve. But Foreign Exchange Reserve do not cause FIIs net investment in the Indian equity market.

5.3.7.3. Causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and Foreign Exchange Reserve (D(Avg_FR_USD))

The following table shows the statistics of VAR lag selection criteria to study the causality between Purchase of FIIs in the Indian equity market (D(FIIs_Pur_Eq)) and Foreign Exchange Reserve (D(Avg_FR_USD)).

Table 5.66. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2778.137	NA	9.30e+15	42.44484	42.48873	42.46268
1	-2734.811	84.66794	5.10e+15	41.84444	41.97613*	41.89795*
2	-2729.432	10.34645	5.00e+15	41.82339	42.04287	41.91258
3	-2723.662	10.92333	4.86e+15	41.79637	42.10364	41.92123
4	-2720.705	5.508958	4.94e+15	41.81228	42.20735	41.97282
5	-2711.981	15.98213	4.60e+15*	41.74017*	42.22303	41.93637
6	-2710.335	2.965282	4.77e+15	41.77611	42.34676	42.00799
7	-2706.610	6.597002	4.80e+15	41.78030	42.43875	42.04786
8	-2703.710	5.047356	4.88e+15	41.79710	42.54333	42.10033
9	-2702.005	2.915734	5.06e+15	41.83213	42.66616	42.17104
10	-2700.466	2.584664	5.26e+15	41.86971	42.79152	42.24428
11	-2694.327	10.12159*	5.10e+15	41.83706	42.84667	42.24731
12	-2690.956	5.455805	5.16e+15	41.84665	42.94406	42.29258

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 5. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 5.

Table 5.67. Pairwise Granger Causality Tests at Lag length of 5

Null Hypothesis:	Obs	F-Statistic	Prob.
D(FIIs_PUR_EQ) does not Granger Cause D(AVG_FR_USD)	145	1.59117	0.1668
D(AVG_FR_USD) does not Granger Cause D(FIIs_PUR_EQ)		1.60834	0.1620

From the above result of Granger Causality Tests, it can be said that there is no causality between Foreign Exchange Reserve and FIIs net investment in the Indian equity market.

5.3.7.4. Causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and Foreign Exchange Reserve (D(Avg_FR_USD))

The following table shows the statistics of VAR lag selection criteria to study the causality between Sale of FIIs in the Indian equity market (D(FIIs_Sal_Eq)) and Foreign Exchange Reserve (D(Avg_FR_USD)).

Table 5.68. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-2761.028	NA	7.16e+15	42.18363	42.22753	42.20147
1	-2722.682	74.93675	4.24e+15	41.65926	41.79095	41.71277
2	-2708.315	27.63670	3.62e+15	41.50099	41.72047*	41.59017*
3	-2703.676	8.781959	3.59e+15	41.49124	41.79851	41.61609
4	-2700.727	5.492052	3.64e+15	41.50729	41.90235	41.66782
5	-2694.446	11.50808*	3.52e+15*	41.47246*	41.95531	41.66866
6	-2691.906	4.575517	3.60e+15	41.49475	42.06540	41.72663
7	-2688.153	6.647237	3.62e+15	41.49851	42.15696	41.76607
8	-2686.075	3.616051	3.73e+15	41.52786	42.27410	41.83109
9	-2684.831	2.127418	3.89e+15	41.56994	42.40396	41.90884
10	-2681.376	5.802387	3.93e+15	41.57826	42.50008	41.95283
11	-2676.317	8.341943	3.88e+15	41.56209	42.57170	41.97234
12	-2672.541	6.110124	3.90e+15	41.56551	42.66291	42.01144

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 5. Following table shows the result of Pairwise Granger Causality Tests at a lag length of 5.

Table 5.69. Pairwise Granger Causality Tests at Lag length of 5

Null Hypothesis:	Obs	F-Statistic	Prob.
D(FIIs_SAL_EQ) does not Granger Cause D(AVG_FR_USD)	145	1.27724	0.2774
D(AVG_FR_USD) does not Granger Cause D(FIIs_SAL_EQ)		5.27911	0.0002

From the above result of Granger Causality Tests, it can be said that there is a unidirectional relationship between FIIs sell in the Indian equity market and Foreign Exchange Reserve. At a 95% level of confidence, it can be said that the Foreign Exchange Reserve cause FIIs sell in the Indian equity market. But FIIs sell does not cause Foreign Exchange Reserve.

5.4. Summary: Determinants of FII investment India

In this chapter, it is found that certain factors are significant to effect FII investment, but at the same time, it is also found that FII investment is affecting certain determinants in a significant manner. To identify determinant of FII investment in India, using causality study certain determinants were identified as follow.

1. DIIs purchase causes FIIs net investment
2. DIIs sale causes FIIs net investment
3. GDP causes FIIs net investment
4. IIP causes FIIs net investment
5. Exchange Rate of USD causes FIIs sell
6. Call Rate causes FIIs sell
7. Average foreign exchange reserve of USD causes FIIs sell

All of the above factors cause FIIs net investment and FIIs sell at the same time any of the specific factors were not observed which separately influences FIIs purchase. But it is observed through cause towards FIIs net investment. DIIs purchase (at lag 3) and DIIs sale (at lag 5), GDP (at lag 4 & 5) and IIP (at lag 12) cause FIIs net investment. At the same time, US dollar exchange rate (at lag 2), Call Rate (at lag 10) and average foreign exchange

Reserve of US dollar (at lag 5) cause the FIIs sell in the Indian equity market. As FIIs turnover is significant to the total turnover of the Indian equity market (discussed earlier), the sale of FIIs may also affect the performance of the Indian equity market. Hence the movement of FII investment in India, whether it is purchase or sale, is crucial to understand and to forecast the performance of the Indian equity market. Indian government should also form economic policies in such a way that India can maintain its attractiveness for FII investment in the present global competitive financial market. As DIIs is also one of the determinants of FII investment, the government should also take care of DIIs and provide them with ease while they are investing and operating in the Indian equity market. Other various economic indicators viz. IIP, Call Rate, Foreign exchange reserve and GDP are also being vital for FII investment in India, government actions towards economic development can significantly affect FII investment in the Indian equity market.

During the study of the determinant of FII investment, it is also observed that FII investment in the Indian equity market also causes certain factors. Such determinants affected by FII investment listed below.

1. FIIs net investment cause DIIs net investment at lag 3
2. FIIs purchases cause DIIs net investment at lag 9
3. FIIs sell cause DIIs net investment at lag 9
4. FIIs net investment cause DIIs purchase at lag 3
5. FIIs sell cause DIIs sale at lag 2
6. FIIs net investment cause Average Foreign Exchange of USD at lag 2

From above list it can be observed that FIIs net investment (at lag 3), FIIs purchase (at lag 9) and FIIs sales (at lag 9) cause the DIIs net investment in equity market and the same time FIIs net investment (at lag 3) and FIIs sell (at lag 2) cause DIIs purchase and DIIs sale respectively. It implies that DIIs investment caused by FII investment in the Indian equity market. It means if there is a heavy inflow or outflow of FIIs Investment, it also influences the DIIs flow of investment. In such case FII investment can affect the Indian equity market significantly not only in terms of the value of major indices of the Indian equity market (Sensex and Nifty 50) but also overall market capitalisation as well as even the turnover of the Indian equity market can be affected by the FII investment. The proportion of FIIs turnover to the total turnover of the Indian equity market discussed earlier also justifies it. Further detailed analysis of the effect of FII investment in the Indian equity market is

discussed in the next chapter, where the causality between investment and the Indian equity market as well as the effect of FII investment in the Indian equity market will be discussed. It is also observed that FIIs net investment also cause Average Foreign Exchange of USD (at lag 2). As foreign exchange reserve is the vital part of the strength of the economy and it can be observed that it is affected by FII investment, the government should take into consideration FII investment while framing economic policy.

CHAPTER: 6. EFFECT OF FIIs INVESTMENT ON INDIAN EQUITY MARKET

6.1. Introduction

In order to study the FII investment in the Indian equity market, in the previous chapter, focused was on understanding the factors that attract or discourages FII investment in the Indian equity market. In this chapter, an understanding of the impact of FII investment in the Indian equity market is emphasised. In order to study the impact of FII investment an attempt is made to understand the causality between FII investment and the performance of the Indian equity market. To study this causality, various components or elements of the Indian equity market are identified, which represents various aspects of it. Such elements are Market capitalisation of NSE and BSE, a turnover of NSE and BSE, and various sectoral indices representing various sectors in the Indian equity market and the Indian leading stock market indices Sense and Nifty 50.

At the end of this chapter, the relationship between the performance of the Indian stock market and FII investment in the Indian equity market is established through the estimation of the regression model. The inductive method is adopted to check the BLUE properties of the estimated regression model. A t-test, a F-test, adjusted R square, Durbin Watson statistics, ACF and PACF, heteroskedasticity and normality test were used for for significance of Coefficient, the significance of overall model, percentage of change in the dependent variable explained by change in independent variable, autocorrelation, serial-autocorrelation, homoskedasticity of residuals and normally distributed residuals. During this process, structural breaks dummy variables were included, identity through the Bai-Perron test. ARIMA (2,1,1) is estimated for better forecasting, in which finally the problem of autoregressive conditional heteroskedasticity is found. The TARCH model explaining threshold GARCH model is established.

6.2. Causality between FIIs Investment in the Indian Equity Market and Capitalisation of the Indian Equity Market

Before study the causality between FII investment in the Indian equity market (Cum_FIIs_Eq) and Market Capitalisation of NSE (NSE_Cap) and Market Capitalisation of (BSE_Cap), the stationarity of these data series is required to be studied. The following test shows the test of stationarity of Cum_FIIs_Eq, NSE_Cap and BSE_Cap.

6.2.1. Unit root test:

To check the unit root for the stationarity, the following is the null hypothesis.

H0 6.1. : Cum_FIIs_Eq, NSE_Cap and BSE_Cap have a unit root

The following table presents the result of the Augmented Dickey-Fuller test

Table 6.2. Test statistic of ADF

Variable	Exogenous	t-statistics	Prob.
Cum_FIIs_Eq	None	3.767364	1.0000
	Constant	1.268237	0.9985
	Constant, Linear Trend	-2.033701	0.5797
D(Cum_FIIs_Eq)	None	-9.859069	0.0000*
	Constant	-10.97127	0.0000*
	Constant, Linear Trend	-11.19252	0.0000*
NSE_Cap	None	2.725615	0.9985
	Constant	1.117569	0.9976
	Constant, Linear Trend	-1.679838	0.7577
D(NSE_Cap)	None	-15.16712	0.0000*
	Constant	-15.53484	0.0000*
	Constant, Linear Trend	-13.05504	0.0000*
BSE_Cap	None	2.579077	0.9977
	Constant	0.991083	0.9965
	Constant, Linear Trend	-1.825304	0.6898

D(BSE_Cap)	None	-15.24927	0.0000*
	Constant	-15.58948	0.0000*
	Constant, Linear Trend	-15.72918	0.0000*

* Significant at a 1% significance level

Above unit root test suggest that all three series Cum_FIIs_Eq, NSE_Cap and BSE_Cap have unit root and th Null hypothesis cannot be rejected. But at first difference, all series are stationary at a 1% level of significance. Hence causality test can be done on the first difference series data. To check the causality, the optimal lag length needed to be identified.

6.2.2. Causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and NSE market capitalisation (D(NSE_Cap))

The following table shows the statistics of VAR lag selection criteria to study the causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and NSE market capitalisation (D(NSE_Cap)).

Table 6.3. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-5006.984	NA	6.31e+14	39.75384	39.78185	39.76511
1	-4989.154	35.23482	5.65e+14	39.64408	39.72811*	39.67789
2	-4981.989	14.04563	5.51e+14	39.61896	39.75902	39.67532*
3	-4977.779	8.186506	5.50e+14	39.61729	39.81337	39.69619
4	-4974.076	7.140814	5.52e+14	39.61965	39.87175	39.72109
5	-4971.430	5.061883	5.58e+14	39.63039	39.93852	39.75438
6	-4968.365	5.812621	5.62e+14	39.63782	40.00197	39.78434
7	-4967.024	2.521925	5.74e+14	39.65892	40.07909	39.82799
8	-4960.830	11.55251	5.64e+14	39.64151	40.11770	39.83312
9	-4957.430	6.287860	5.67e+14	39.64627	40.17849	39.86042
10	-4952.583	8.886511	5.63e+14	39.63955	40.22778	39.87624
11	-4945.764	12.39271	5.51e+14	39.61718	40.26144	39.87641
12	-4933.406	22.26503*	5.16e+14*	39.55084*	40.25112	39.83262

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 12. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.4. Pairwise Granger Causality Tests at lag order of 12

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.2.	D(NSE_CAP) does not Granger Cause D(CUM_FIIs_EQ)	252	2.83200	0.0012
H0 6.3.	D(CUM_FIIs_EQ) does not Granger Cause D(NSE_CAP)		2.48054	0.0046

From the above Pairwise Granger Causality test, it is infered that there is bidirectional causality between Capitalisation of NSE and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that Capitalisation of NSE causes FII investment as well as FII investment also causes Capitalisation of NSE.

6.2.3. Causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and BSE market capitalisation (D(BSE_Cap))

The following table shows the statistics of VAR lag selection criteria to study the causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and BSE market capitalisation (D(BSE_Cap)).

Table 6.5. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-5018.199	NA	6.90e+14	39.84285	39.87086	39.85412
1	-5000.814	34.35561	6.20e+14	39.73662	39.82065*	39.77043*
2	-4994.344	12.68393	6.08e+14	39.71701	39.85707	39.77337
3	-4991.357	5.808169	6.13e+14	39.72505	39.92113	39.80395
4	-4987.586	7.272486	6.14e+14	39.72687	39.97897	39.82831
5	-4985.011	4.925151	6.21e+14	39.73818	40.04630	39.86216
6	-4981.814	6.063624	6.25e+14	39.74456	40.10870	39.89108
7	-4980.473	2.522653	6.39e+14	39.76566	40.18583	39.93472

8	-4974.199	11.70189	6.27e+14	39.74761	40.22380	39.93922
9	-4970.482	6.873132	6.29e+14	39.74986	40.28207	39.96401
10	-4965.909	8.383455	6.26e+14	39.74531	40.33355	39.98200
11	-4959.254	12.09539	6.13e+14	39.72424	40.36850	39.98347
12	-4946.492	22.99173*	5.72e+14*	39.65470*	40.35498	39.93648

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 12. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.6. Pairwise Granger Causality Tests at a lag length of 12

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.4.	D(BSE_CAP) does not Granger Cause D(CUM_FIIs_EQ)	252	2.89448	0.0010
H0 6.5.	D(CUM_FIIs_EQ) does not Granger Cause D(BSE_CAP)		2.37405	0.0067

From the above Pairwise Granger Causality test, it is infered that there is bidirectional causality between capitalisation of BSE and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that capitalisation of BSE causes FII investment as well as FII investment also causes capitalisation of BSE.

6.3. Causality between FIIs Investment in Indian Equity Market and Turnover of Indian Equity Market

Before study the causality, the stationarity of these data series is required to be studied. For CUM_FIIs_EQ the unit root test is already done, the following test shows the test of stationarity of turnover of NSE (NSE_Tur) and turnover of BSE (BSE_Tur).

6.3.1. Unit root test:

To check the unit root for the stationarity, the following is the null hypothesis.

H0 10.2.1 : NSE_Tur and BSE_Tur have a unit root

The following table presents the result of the Augmented Dickey-Fuller test

Table 6.7. Test statistic of ADF

Variable	Exogenous	t-statistics	Prob.
NSE_Tur	None	1.897147	0.9864
	Constant	0.608987	0.9898
	Constant, Linear Trend	-2.972985	0.1417
D(NSE_Tur)	None	-8.625834	0.0000*
	Constant	-8.892307	0.0000*
	Constant, Linear Trend	-9.009742	0.0000*
BSE_Tur	None	-1.770442	0.0729***
	Constant	-3.621795	0.0059*
	Constant, Linear Trend	-4.336200	0.0031*
D(BSE_Tur)	None	-16.99417	0.0000*
	Constant	-16.97135	0.0000*
	Constant, Linear Trend	-16.94741	0.0000*

* Significant at a 1% *** Significant at a 10%significance level

Above unit root test suggest that both of the series NSE_Tur and BSE_Tur have unit root and the null hypothesis cannot be rejected. But at first difference of both of the series are stationary at a 1% level of significance. Hence causality test can be done on the first difference series data. To check the causality, the optimal lag length needed to be identified.

6.3.2. Causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and Turnover of NSE (D(NSE_Tur))

The following table shows the statistics of VAR lag selection criteria to study the causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and Turnover of NSE (D(NSE_Tur)).

Table 6.8. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4550.853	NA	1.69e+13	36.13376	36.16177	36.14503
1	-4516.159	68.56273	1.32e+13	35.89015	35.97418*	35.92396
2	-4507.276	17.41319	1.27e+13	35.85140	35.99145	35.90775
3	-4500.716	12.75678	1.25e+13	35.83108	36.02715	35.90997
4	-4499.121	3.076095	1.27e+13	35.85016	36.10226	35.95160
5	-4486.121	24.86335	1.18e+13	35.77874	36.08687	35.90272*
6	-4481.264	9.213094	1.18e+13	35.77194	36.13609	35.91846
7	-4476.671	8.639405	1.17e+13	35.76723	36.18740	35.93630
8	-4474.384	4.265041	1.19e+13	35.78083	36.25702	35.97244
9	-4465.182	17.01675	1.14e+13	35.73954	36.27176	35.95369
10	-4460.399	8.769313	1.13e+13	35.73333	36.32156	35.97002
11	-4453.705	12.16544*	1.11e+13	35.71195	36.35621	35.97118
12	-4449.023	8.435808	1.10e+13*	35.70653*	36.40681	35.98831

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 12. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.9. Pairwise Granger Causality Tests

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.6.	D(NSE_TUR) does not Granger Cause D(CUM_FIIs_EQ)	252	3.18994	0.0003
H0 6.7.	D(CUM_FIIs_EQ) does not Granger Cause D(NSE_TUR)		2.63935	0.0025

From the above Pairwise Granger Causality test, it is infered that there is bidirectional causality between turnover of NSE and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that a turnover of NSE causes FII investment as well as FII investment also causes a turnover of NSE.

6.3.3. Causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and Turnover of BSE (D(BSE_Tur))

The following table shows the statistics of VAR lag selection criteria to study the causality between Total FII investment in Indian Equity Market (D(Cum_FIIs_Eq)) and Turnover of BSE (D(BSE_Tur)).

Table 6.10. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4375.515	NA	4.20e+12	34.74218	34.77019	34.75345
1	-4333.014	83.98923	3.10e+12	34.43662	34.52065*	34.47043
2	-4324.018	17.63609	2.97e+12	34.39696	34.53702	34.45332*
3	-4319.824	8.153433	2.97e+12	34.39543	34.59151	34.47433
4	-4315.644	8.061626	2.97e+12*	34.39400*	34.64610	34.49544
5	-4312.162	6.661161	2.98e+12	34.39811	34.70623	34.52209
6	-4310.124	3.864836	3.03e+12	34.41368	34.77783	34.56021
7	-4307.612	4.724430	3.06e+12	34.42550	34.84567	34.59456
8	-4304.080	6.588677	3.07e+12	34.42920	34.90540	34.62081
9	-4300.124	7.315189	3.08e+12	34.42955	34.96177	34.64371
10	-4297.180	5.396878	3.10e+12	34.43794	35.02618	34.67463
11	-4291.665	10.02307*	3.07e+12	34.42591	35.07018	34.68515
12	-4289.619	3.686719	3.11e+12	34.44142	35.14170	34.72320

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 4. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.11. Pairwise Granger Causality Tests at a lag length of 4

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.8.	D(BSE_TUR) does not Granger Cause D(CUM_FIIs_EQ)	260	2.71998	0.0302
H0 6.9.	D(CUM_FIIs_EQ) does not Granger Cause D(BSE_TUR)		3.23307	0.0131

From the above Pairwise Granger Causality test, it is infered that there is bidirectional causality between turnover of BSE and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that a turnover of BSE causes FII investment as well as FII investment also causes a turnover of BSE.

Thus, from the above discussion, it is summerised that market capitalisation and turnover in the market both are crucial to FII investment in India. In the same way, as discussed earlier FIIs is a leading player in the Indian equity market and their investment also causes a change in overall capitalisation and turnover of the Indian equity market. It depicts that FII investment is potentially significant to affect the performance of the Indian equity market.

Thus, in further discussion of this chapter to study the causality between FII investment and the Indian equity market, various indices of the Indian equity market are considered. Indices present the performance of a group of securities belonging to the similar kind of stocks. This analysis consists of a study of causality between FII investment and sectoral indices and study of causality between FII investment and major indices of the Indian equity market (SENSEX and NIFTY).

6.4. Causality between FIIs Investment and Various Sectoral Indices

To identify various sectoral indices, sectoral indices of BSE are used, as BSE is the oldest stock exchange of Asia, as well as its indices, are also more in number compare to indices of NSE. Before the selection of sectoral indices, the amount of investment done by FIIs in various sectors is found. They are arranged in descending order and then strive to identify various sectoral indices related to these sectors. The following list provides details about various indices of BSE and NSE.

Sectoral Indices in BSE

1. S&P BSE Basic Materials
2. S&P BSE Consumer Discretionary Goods & Services
3. S&P BSE Energy
4. S&P BSE Fast Moving Consumer Goods

Sectoral Indices in NSE

1. NIFTY Auto Index
2. NIFTY Bank Index
3. NIFTY Financial Services Index
4. NIFTY FMCG Index
5. NIFTY IT Index
6. NIFTY Media Index

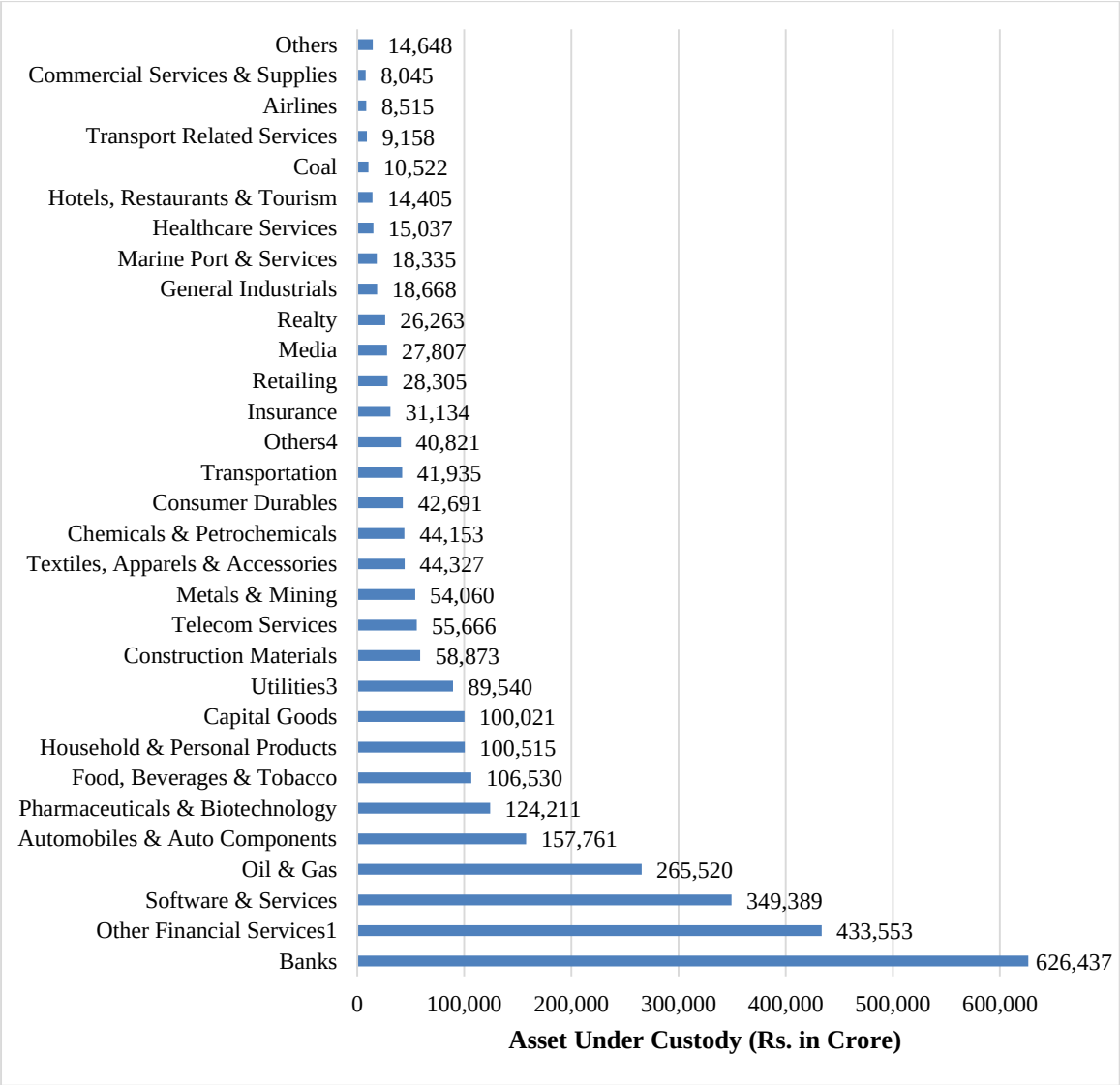
5. S&P BSE Finance
6. S&P BSE Healthcare
7. S&P BSE Industrials
8. S&P BSE Information Technology
9. S&P BSE Telecom
10. S&P BSE Utilities
11. S&P BSE AUTO
12. S&P BSE BANKEX
13. S&P BSE CAPITAL GOODS
14. S&P BSE CONSUMER DURABLES
15. S&P BSE METAL
16. S&P BSE OIL & GAS
17. S&P BSE POWER*
18. S&P BSE REALTY
19. S&P BSE TECK

7. NIFTY Metal Index
8. NIFTY Pharma Index
9. NIFTY Private Bank Index
10. NIFTY PSU Bank Index
11. NIFTY Realty Index

In addition to the above BSE had classified more than 4600 number of issuers into 35 sectors. Currently, NSDL provides data related to FII investment in India. NSDL has decided to rely on the BSE classification. Investment of FPI is categorized on the bases of classification provided by BSE. Any FPI investment outside those 4600 issuers, is classified under 'Others'.

(https://www.fpi.nsdl.co.in/web/StaticReports/Fortnightly_Sector_wise_FIIs_Investment_Data/FIIInvestSector_March312019.html)

To identify major sectors to relate with FII investment in the Indian equity market, Sector-wise asset under custody (AUC) of FIIs as on 31st March 2019 is as follow.



(Source: Data from NSDL website)

Figure 6.1. Sectors-wise FIIs Asset Under Custody as on March 31, 2019

Table 6.12. FII investment in Various sectors and Sectoral Indices

Sectors	AUC on 31st March 2019 (INR Cr.)	Representative S&P BSE Index
Banks	626,437	S&P BSE Bankex
Other Financial Services	433,553	S&P BSE Finance
Software & Services	349,389	S&P BSE Information Technology
Oil & Gas	265,520	S&P BSE Oil & Gas
Automobiles & Auto Components	157,761	S&P BSE Auto
Pharmaceuticals & Biotechnology	124,211	S&P BSE Health Care
Food, Beverages & Tobacco	106,530	S&P BSE Fast Moving Consumer Goods

Household & Personal Products	100,515	S&P BSE Fast Moving Consumer Goods
Capital Goods	100,021	S&P BSE Capital Goods
Utilities	89,540	S&P BSE Utility
Construction Materials	58,873	
Telecom Services	55,666	S&P BSE Telecom
Metals & Mining	54,060	S&P BSE Metal
Textiles, Apparels & Accessories	44,327	
Chemicals & Petrochemicals	44,153	
Consumer Durables	42,691	S&P BSE Consumer Durable Goods
Transportation	41,935	
Others	40,821	
Insurance	31,134	
Retailing	28,305	
Media	27,807	S&P BSE Teck
Realty	26,263	S& P BSE Reality
General Industrials	18,668	S&P BSE Industrial
Marine Port & Services	18,335	S&P BSE India Infrastructure (2)
Healthcare Services	15,037	S&P BSE Health Care (2)
Hotels, Restaurants & Tourism	14,405	
Coal	10,522	S&P BSE Energy, S&P BSE Power
Transport Related Services	9,158	S&P BSE India Infrastructure (3)
Airlines	8,515	
Commercial Services & Supplies	8,045	S&P BSE Basic Material S&P BSE Consumer Discretionary Goods & Services
Others	14,648	

From Figure 6.1, FIIs Asset Under Custody (AUC) in India as on 31st March 2019 can be observed. This data is collected from the website of NSDL. The following table provides information regarding FII's AUC in a specific sector and relevant BSE sectoral index.

As from Table 6.11 it can be observed that proportion of FIIs AUC in Coal and Commercial Services & Supplies are very, S&P BSE Basic Material, S&P BSE Consumer Discretionary Goods & Services, S&P BSE Energy and S&P BSE Power indices are not considered in further analysis. Thus, out of 19 sectoral indices of BSE 15 indices were considered for the further study of causality with FII investment in the Indian equity market.

Before checking the causality between FIIs and various sectoral indices, the stationarity of the series of sectoral indices is checked. For CUM_FIIs_EQ the unit root test, the f test shows the result of the stationarity-check for all sectoral indices is already done. In primary data

analysis also it is found that FIIs prefers stock related to Financial Services, Oil & Gas and IT sector while taking investment decision in India.

In causality, study prerequisite is a stationary check through the unit root test. To check the unit root of different time-series data, the Augmented Dickey-Fuller test is used, as it is done in the earlier part of this section.

6.4.1. Unit Root Test

In the earlier section, the unit root of CUM_FIIs_EQ is already checked. To check the unit root for the stationarity of all sectoral indices, the following is the null hypothesis.

H0 6.10. : Sectoral Indices data have a Unit Root

The following table presents the result of the Augmented Dickey-Fuller test

Table 6.13. Test statistic of ADF for Sectoral Indices

Variable	Exogenous	t-statistics	Prob.	Variable at First Difference	t-statistics	Prob.
AUTO	None	1.1554	0.9314	D(AUTO)	-15.5363	0.0000*
	Constant	-0.2862	0.9237		-15.7033	0.0000*
	Constant, Linear Trend	2.0203	0.5871		-15.6884	0.0000*
BANKEX	None	2.6499	0.9982	D(BANKEX)	-14.8782	0.0000*
	Constant	1.2845	0.9986		-15.1907	0.0000*
	Constant, Linear Trend	-1.4816	0.8337		-12.8449	0.0000*
CG	None	0.4220	0.8039	D(CG)	-13.8721	0.0000*
	Constant	-1.1245	0.7067		-13.9222	0.0000*
	Constant, Linear Trend	-3.1241	0.1029		-13.8970	0.0000*
FINANCE	None	2.3046	0.9952	D(FINANCE)	-12.6568	0.0000*
	Constant	0.9930	0.9965		-14.7997	0.0000*
	Constant, Linear Trend	-1.7890	0.7076		-12.6568	0.0000*
FMCM	None	3.31376	0.9998	D(FMCM)	-16.2355	0.0000*
	Constant	1.4844	0.9993		-13.8418	0.0000*
	Constant, Linear Trend	-1.0419	0.9352		-14.2195	0.0000*

HEALTH	None	1.4877	0.9663	D(HEALTH)	-10.1611	0.0000*
	Constant	-0.1347	0.9431		-18.5241	0.0000*
	Constant, Linear Trend	-1.7931	0.7056		-18.5182	0.0000*
IT	None	1.4877	0.9663	D(IT)	-16.0124	0.0000*
	Constant	-0.1347	0.9431		-16.2428	0.0000*
	Constant, Linear Trend	-1.7931	0.7056		-16.2919	0.0000*
OILGAS	None	0.9539	0.9097	D(OILGAS)	-16.2719	0.0000*
	Constant	-0.6103	0.8647		-16.4080	0.0000*
	Constant, Linear Trend	-2.8457	0.1824		-16.3851	0.0000*
UTILITY	None	-0.1401	0.6345	D(UTILITY)	-16.0164	0.0000*
	Constant	-1.2883	0.6356		-16.0356	0.0000*
	Constant, Linear Trend	-2.1286	0.5270		-16.0054	0.0000*
Telecom	None	-0.5977	0.4578	D(Telecom)	-18.0459	0.0000*
	Constant	-1.5619	0.5007		-18.0343	0.0000*
	Constant, Linear Trend	-1.6502	0.7703		-18.0279	0.0000*
Metal	None	-0.4079	0.5359	D(Metal)	-15.8964	0.0000*
	Constant	-1.7611	0.3994		-15.8969	0.0000*
	Constant, Linear Trend	-2.2434	0.4631		-15.8781	0.0000*
CDG	None	3.6046	0.9999	D(CDG)	-4.7217	0.0000*
	Constant	2.3510	1.0000		-6.4612	0.0000*
	Constant, Linear Trend	0.1740	0.9978		-7.0039	0.0000*
Teck	None	1.0135	0.9182	D(Teck)	-14.9468	0.0000*
	Constant	-0.5275	0.8823		-15.0560	0.0000*
	Constant, Linear Trend	-3.0592	0.1185		-15.0434	0.0000*
Reality	None	-1.3063	0.1768	D(Reality)	-9.5007	0.0000*
	Constant	-1.8654	0.3498		-9.4858	0.0000*
	Constant, Linear Trend	-1.8565	0.6741		-9.4716	0.0000*
Industrial	None	0.3042	0.7730	D(Industrial)	-14.4722	0.0000*
	Constant	-0.8969	0.7883		-14.5185	0.0000*
	Constant, Linear Trend	-2.5630	0.2978		-14.1914	0.0000*

From the above statistics, it can be said that all sectoral data-series are stationary at first level difference. So the causality test at first difference series can be applied. But before that appropriate lag length under VAR is needed to be identified.

6.4.2. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE AUTO Index (AUTO)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE AUTO Index (AUTO).

Table 6.14. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4597.371	NA	2.44e+13	36.50295	36.53096	36.51422
1	-4578.841	36.61977	2.18e+13	36.38763	36.47166*	36.42144*
2	-4572.685	12.06666	2.14e+13*	36.37052*	36.51058	36.42687
3	-4571.095	3.091377	2.18e+13	36.38965	36.58573	36.46855
4	-4565.637	10.52616	2.16e+13	36.37808	36.63018	36.47952
5	-4563.388	4.302073	2.19e+13	36.39197	36.70010	36.51595
6	-4562.299	2.066779	2.24e+13	36.41507	36.77922	36.56159
7	-4561.095	2.264557	2.29e+13	36.43726	36.85743	36.60633
8	-4557.326	7.029836	2.29e+13	36.43909	36.91528	36.63070
9	-4552.918	8.150346	2.29e+13	36.43586	36.96807	36.65001
10	-4547.823	9.341128	2.27e+13	36.42717	37.01540	36.66386
11	-4543.728	7.442515	2.27e+13	36.42641	37.07067	36.68565
12	-4536.699	12.66344*	2.21e+13	36.40237	37.10266	36.68415

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 2. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.15. Pairwise Granger Causality Tests at a lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.11.	D(AUTO) does not Granger Cause D(CUM_FIIs_EQ)	262	6.64119	0.0015
H0 6.12.	D(CUM_FIIs_EQ) does not Granger Cause D(AUTO)		2.63886	0.0734

From the above Pairwise Granger Causality test, it is inferred that there is unidirectional causality between the AUTO index and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that AUTO index causes FII investment but FII investment does not cause AUTO index.

6.4.3. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE BANKEX (BANKEX)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE BANKEX (BANKEX).

Table 6.16. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4669.777	NA	4.34e+13	37.07759	37.10560	37.08886
1	-4648.732	41.58876	3.79e+13	36.94232	37.02635*	36.97613*
2	-4643.226	10.79252	3.75e+13	36.93037	37.07042	36.98672
3	-4636.210	13.64227	3.66e+13	36.90643	37.10251	36.98533
4	-4633.450	5.324041	3.69e+13	36.91627	37.16837	37.01771
5	-4630.480	5.680705	3.73e+13	36.92444	37.23257	37.04843
6	-4628.719	3.338997	3.79e+13	36.94222	37.30637	37.08874
7	-4623.715	9.412472	3.76e+13	36.93425	37.35442	37.10332
8	-4617.998	10.66356	3.71e+13	36.92062	37.39681	37.11223
9	-4615.651	4.340629	3.76e+13	36.93373	37.46595	37.14789
10	-4612.527	5.727412	3.79e+13	36.94069	37.52892	37.17738
11	-4604.615	14.37821	3.67e+13	36.90965	37.55391	37.16888
12	-4595.758	15.95749*	3.54e+13*	36.87109*	37.57138	37.15287

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 12. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.17. Pairwise Granger Causality Tests at a lag length of 12

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.13.	D(BANKEX) does not Granger Cause D(CUM_FIIs_EQ)	252	2.53932	0.0037
H0 6.14.	D(CUM_FIIs_EQ) does not Granger Cause D(BANKEX)		2.53131	0.0038

From the above Pairwise Granger Causality test, it is infered that there is bidirectional causality between BANKEX and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that a BANKEX causes FII investment as well as FII investment also causes a turnover of BANKEX.

6.4.4. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE CAPITAL GOOD (CG)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE CAPITAL GOOD (CG).

Table 6.18. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4685.012	NA	4.90e+13	37.19851	37.22652	37.20978
1	-4667.823	33.96860	4.41e+13*	37.09383*	37.17787*	37.12764*
2	-4664.377	6.754093	4.43e+13	37.09823	37.23829	37.15459
3	-4661.389	5.811165	4.47e+13	37.10626	37.30234	37.18516
4	-4658.142	6.261051	4.49e+13	37.11224	37.36434	37.21368
5	-4657.180	1.840492	4.60e+13	37.13635	37.44447	37.26033
6	-4655.835	2.550523	4.70e+13	37.15742	37.52157	37.30395

7	-4653.812	3.805995	4.78e+13	37.17311	37.59328	37.34218
8	-4647.280	12.18231	4.68e+13	37.15302	37.62921	37.34463
9	-4642.520	8.802576	4.66e+13	37.14698	37.67920	37.36114
10	-4639.142	6.192815	4.68e+13	37.15192	37.74016	37.38862
11	-4635.721	6.216950	4.70e+13	37.15652	37.80078	37.41576
12	-4627.387	15.01446*	4.55e+13	37.12212	37.82241	37.40390

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.19. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.15.	D(CG) does not Granger Cause D(CUM_FIIs_EQ)	263	2.42196	0.1209
H0 6.16.	D(CUM_FIIs_EQ) does not Granger Cause D(CG)		0.32841	0.5671

From the above Pairwise Granger Causality test, it is infered that there is no causality between CG index and FII investment in the Indian equity market.

6.4.5. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Finance (FINANCE)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Finance (FINANCE).

Table 6.20. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4266.252	NA	1.77e+12	33.87502	33.90303	33.88629
1	-4248.088	35.89722	1.58e+12	33.76260	33.84663*	33.79641*
2	-4243.158	9.663747	1.57e+12	33.75522	33.89528	33.81158

3	-4238.886	8.306991	1.56e+12*	33.75306*	33.94914	33.83196
4	-4237.615	2.451389	1.60e+12	33.77472	34.02682	33.87616
5	-4236.056	2.982000	1.63e+12	33.79409	34.10222	33.91807
6	-4234.812	2.359332	1.66e+12	33.81597	34.18011	33.96249
7	-4232.889	3.616408	1.69e+12	33.83245	34.25262	34.00152
8	-4225.413	13.94308	1.65e+12	33.80487	34.28106	33.99648
9	-4223.528	3.485446	1.67e+12	33.82165	34.35387	34.03581
10	-4220.640	5.295367	1.69e+12	33.83048	34.41871	34.06717
11	-4215.782	8.829000	1.68e+12	33.82367	34.46793	34.08290
12	-4208.313	13.45660*	1.63e+12	33.79613	34.49642	34.07791

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 3. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.21. Pairwise Granger Causality Tests at a lag length of 3

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.17.	D(FINANCE) does not Granger Cause D(CUM_FIIs_EQ)	261	2.02582	0.1108
H0 6.18.	D(CUM_FIIs_EQ) does not Granger Cause D(FINANCE)		1.69186	0.1692

From the above Pairwise Granger Causality test, it is infered that there is no causality between FINANCE index and FII investment in the Indian equity market.

6.4.6. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Fast Moving Consumer Goods (FMCG)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Fast Moving Consumer Goods (FMCG).

Table 6.22. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4360.942	NA	3.74e+12	34.62652	34.65453	34.63779
1	-4344.494	32.50414	3.39e+12	34.52773	34.61176*	34.56154*
2	-4338.766	11.22887	3.34e+12*	34.51402*	34.65407	34.57037
3	-4337.220	3.006450	3.41e+12	34.53349	34.72957	34.61239
4	-4336.237	1.894824	3.49e+12	34.55744	34.80954	34.65888
5	-4333.942	4.389258	3.54e+12	34.57097	34.87910	34.69496
6	-4329.654	8.134406	3.53e+12	34.56868	34.93283	34.71521
7	-4328.298	2.551377	3.61e+12	34.58966	35.00983	34.75873
8	-4324.596	6.903918	3.62e+12	34.59203	35.06822	34.78364
9	-4319.612	9.215496	3.59e+12	34.58423	35.11644	34.79838
10	-4312.248	13.50110	3.50e+12	34.55753	35.14576	34.79422
11	-4306.814	9.876775*	3.46e+12	34.54614	35.19040	34.80538
12	-4303.936	5.184903	3.49e+12	34.55505	35.25533	34.83683

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 2. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.23. Pairwise Granger Causality Tests at a lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.19.	D(FMCG) does not Granger Cause D(CUM_FIIs_EQ)	262	1.94718	0.1448
H0 6.20.	D(CUM_FIIs_EQ) does not Granger Cause D(FMCG)		1.03564	0.3565

From the above Pairwise Granger Causality test, it is infered that there is no causality between the FMCG index and FII investment in the Indian equity market.

6.4.7. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Healthcare (HEALTH)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Healthcare (HEALTH).

Table 6.24. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4512.929	NA	1.25e+13	35.83277	35.86078	35.84404
1	-4490.230	44.85852	1.08e+13	35.68436	35.76840*	35.71817*
2	-4484.829	10.58613	1.07e+13	35.67325	35.81331	35.72960
3	-4482.949	3.656540	1.08e+13	35.69007	35.88615	35.76897
4	-4482.506	0.853442	1.12e+13	35.71830	35.97041	35.81974
5	-4480.139	4.527937	1.13e+13	35.73126	36.03939	35.85524
6	-4477.400	5.195121	1.14e+13	35.74127	36.10542	35.88780
7	-4468.714	16.33821	1.10e+13	35.70408	36.12425	35.87315
8	-4463.809	9.148199	1.09e+13	35.69690	36.17309	35.88851
9	-4453.302	19.42886	1.04e+13	35.64526	36.17747	35.85941
10	-4446.992	11.56815*	1.02e+13*	35.62692*	36.21516	35.86362
11	-4443.569	6.222506	1.02e+13	35.63150	36.27576	35.89074
12	-4440.403	5.703375	1.03e+13	35.63812	36.33840	35.91990

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 10. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.25. Pairwise Granger Causality Tests at a lag length of 10

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.21.	D(HEALTH) does not Granger Cause D(CUM_FIIs_EQ)	254	2.30684	0.0133
H0 6.22.	D(CUM_FIIs_EQ) does not Granger Cause D(HEALTH)		3.35993	0.0004

From the above Pairwise Granger Causality test, it is infered that there is bidirectional causality between HEALTH index and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that HEALTH index causes FII investment as well as FII investment also causes HEALTH index.

6.4.8. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Information Technology (IT)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Information Technology (IT).

Table 6.26. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4540.357	NA	1.55e+13	36.05045	36.07846	36.06172
1	-4524.475	31.38607	1.41e+13*	35.95615*	36.04018*	35.98996*
2	-4523.476	1.957966	1.45e+13	35.97997	36.12003	36.03632
3	-4521.064	4.689837	1.47e+13	35.99257	36.18865	36.07147
4	-4518.701	4.556808	1.49e+13	36.00557	36.25767	36.10701
5	-4514.987	7.105389	1.49e+13	36.00783	36.31595	36.13181
6	-4511.510	6.594916	1.50e+13	36.01198	36.37613	36.15851
7	-4510.777	1.377698	1.54e+13	36.03791	36.45809	36.20698
8	-4507.179	6.711704	1.54e+13	36.04110	36.51729	36.23271
9	-4504.820	4.362248	1.56e+13	36.05412	36.58634	36.26828
10	-4503.477	2.460858	1.59e+13	36.07522	36.66346	36.31191
11	-4495.250	14.95296*	1.54e+13	36.04167	36.68593	36.30090
12	-4493.714	2.767466	1.57e+13	36.06122	36.76150	36.34300

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.27. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.23.	D(IT) does not Granger Cause D(CUM_FIIs_EQ)	263	1.26891	0.2610
H0 6.24.	D(CUM_FIIs_EQ) does not Granger Cause D(IT)		0.00371	0.9515

From the above Pairwise Granger Causality test, it is infered that there is no causality between IT index and FII investment in the Indian equity market.

6.4.9. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE OIL & GAS (OILGAS)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE OIL & GAS (OILGAS).

Table 6.28. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4586.599	NA	2.24e+13	36.41745	36.44546	36.42872
1	-4570.068	32.66864	2.03e+13*	36.31800*	36.40203*	36.35181*
2	-4567.232	5.559725	2.05e+13	36.32724	36.46729	36.38359
3	-4564.802	4.724203	2.08e+13	36.33970	36.53578	36.41860
4	-4563.351	2.798495	2.12e+13	36.35993	36.61203	36.46137
5	-4562.903	0.857022	2.18e+13	36.38812	36.69624	36.51210
6	-4562.321	1.103573	2.24e+13	36.41525	36.77939	36.56177
7	-4561.239	2.034842	2.29e+13	36.43841	36.85858	36.60748
8	-4552.940	15.47984	2.22e+13	36.40428	36.88047	36.59589
9	-4547.723	9.646799	2.19e+13	36.39463	36.92684	36.60878
10	-4546.142	2.897627	2.24e+13	36.41383	37.00207	36.65052
11	-4540.819	9.675502	2.21e+13	36.40332	37.04758	36.66256
12	-4530.339	18.88010*	2.10e+13	36.35190	37.05218	36.63368

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.29. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.25.	D(OILGAS) does not Granger Cause D(CUM_FIIs_EQ)	263	0.01252	0.9110
H0 6.26.	D(CUM_FIIs_EQ) does not Granger Cause D(OILGAS)		0.51293	0.4745

From the above Pairwise Granger Causality test, it is infered that there is no causality between the OILGAS index and FII investment in the Indian equity market.

6.4.10. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Utilities (UTILITY)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Utilities (UTILITY).

Table 6.30. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4220.338	NA	1.23e+12	33.51062	33.53863	33.52189
1	-4204.056	32.17561	1.11e+12*	33.41314*	33.49718*	33.44696*
2	-4201.854	4.316131	1.13e+12	33.42741	33.56747	33.48377
3	-4199.405	4.762851	1.14e+12	33.43972	33.63580	33.51862
4	-4196.563	5.480412	1.15e+12	33.44891	33.70102	33.55035
5	-4195.884	1.298763	1.18e+12	33.47527	33.78339	33.59925
6	-4193.375	4.759952	1.20e+12	33.48710	33.85125	33.63363
7	-4192.576	1.501487	1.23e+12	33.51251	33.93268	33.68158
8	-4183.549	16.83670	1.18e+12	33.47261	33.94880	33.66422
9	-4179.961	6.634735	1.18e+12	33.47588	34.00810	33.69003
10	-4174.223	10.51953*	1.17e+12	33.46209	34.05033	33.69878

11	-4170.542	6.689544	1.17e+12	33.46462	34.10888	33.72386
12	-4166.666	6.984239	1.17e+12	33.46560	34.16588	33.74738

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.31. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.27.	D(UTILITY) does not Granger Cause D(CUM_FIIs_EQ)	263	0.11128	0.7390
H0 6.28.	D(CUM_FIIs_EQ) does not Granger Cause D(UTILITY)		0.05245	0.8190

From the above Pairwise Granger Causality test, it is infered that there is no causality between UTILITY index and FII investment in the Indian equity market.

6.4.11. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Telecom (TELECOM)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Telecom (TELECOM).

Table 6.32. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4188.613	NA	9.53e+11	33.25883	33.28684	33.27010
1	-4169.939	36.90284	8.48e+11*	33.14238*	33.22641*	33.17619*
2	-4167.649	4.488999	8.60e+11	33.15595	33.29600	33.21230
3	-4164.877	5.390417	8.68e+11	33.16569	33.36177	33.24459
4	-4164.037	1.619295	8.91e+11	33.19077	33.44288	33.29221

5	-4163.502	1.024540	9.15e+11	33.21827	33.52639	33.34225
6	-4162.016	2.817802	9.34e+11	33.23822	33.60237	33.38475
7	-4159.355	5.005663	9.44e+11	33.24885	33.66902	33.41792
8	-4154.974	8.170732	9.41e+11	33.24583	33.72202	33.43744
9	-4151.219	6.944388	9.43e+11	33.24777	33.77998	33.46192
10	-4150.051	2.140873	9.65e+11	33.27025	33.85848	33.50694
11	-4146.427	6.587455	9.68e+11	33.27323	33.91749	33.53246
12	-4140.460	10.74882*	9.53e+11	33.25762	33.95790	33.53940

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.33. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.29.	D(TELECOM) does not Granger Cause D(CUM_FIIs_EQ)	263	0.00395	0.9499
H0 6.30.	D(CUM_FIIs_EQ) does not Granger Cause D(TELECOM)		0.05315	0.8178

From the above Pairwise Granger Causality test, it is infered that there is no causality between TELECOM index and FII investment in the Indian equity market.

6.4.12. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE METAL (METAL)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE METAL (METAL).

Table 6.34. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4717.006	NA	6.32e+13	37.45243	37.48044	37.46370
1	-4701.444	30.75322	5.76e+13*	37.36067*	37.44470*	37.39448*
2	-4697.529	7.675772	5.77e+13	37.36134	37.50140	37.41769

3	-4696.316	2.358357	5.90e+13	37.38346	37.57954	37.46236
4	-4694.492	3.516940	6.00e+13	37.40073	37.65283	37.50217
5	-4693.073	2.713966	6.12e+13	37.42122	37.72934	37.54520
6	-4691.979	2.076628	6.27e+13	37.44427	37.80842	37.59080
7	-4690.936	1.960680	6.42e+13	37.46775	37.88792	37.63681
8	-4676.114	27.64443	5.89e+13	37.38186	37.85805	37.57347
9	-4673.875	4.140842	5.97e+13	37.39583	37.92805	37.60998
10	-4672.414	2.677722	6.09e+13	37.41599	38.00422	37.65268
11	-4662.759	17.54883*	5.83e+13	37.37110	38.01536	37.63034
12	-4657.834	8.871947	5.79e+13	37.36376	38.06405	37.64554

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.35. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.31.	D(METAL) does not Granger Cause D(CUM_FIIs_EQ)	263	0.00032	0.9857
H0 6.32.	D(CUM_FIIs_EQ) does not Granger Cause D(METAL)		0.71358	0.3990

From the above Pairwise Granger Causality test, it is infered that there is no causality between the METAL index and FII investment in the Indian equity market.

6.4.13. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE CONSUMER DURABLES GOODS (CDG)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE CONSUMER DURABLES GOODS (CDG).

Table 6.36. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4557.060	NA	1.77e+13	36.18302	36.21103	36.19429
1	-4539.472	34.75865	1.59e+13	36.07517	36.15920*	36.10898*

2	-4535.767	7.262540	1.60e+13	36.07751	36.21757	36.13387
3	-4529.562	12.06512	1.57e+13	36.06001	36.25609	36.13891
4	-4522.813	13.01623	1.54e+13	36.03820	36.29030	36.13964
5	-4520.667	4.103390	1.56e+13	36.05292	36.36104	36.17690
6	-4510.546	19.19917	1.48e+13	36.00433	36.36848	36.15086
7	-4508.367	4.097546	1.51e+13	36.01879	36.43896	36.18785
8	-4504.844	6.571090	1.51e+13	36.02257	36.49876	36.21418
9	-4498.676	11.40600	1.49e+13	36.00536	36.53758	36.21952
10	-4493.439	9.601333	1.47e+13	35.99555	36.58378	36.23224
11	-4487.800	10.24911	1.45e+13	35.98254	36.62680	36.24177
12	-4479.711	14.57274*	1.41e+13*	35.95008*	36.65037	36.23186

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 12. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.37. Pairwise Granger Causality Tests at a lag length of 12

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.33.	D(CDG) does not Granger Cause D(CUM_FIIs_EQ)	252	2.48679	0.0044
H0 6.34.	D(CUM_FIIs_EQ) does not Granger Cause D(CDG)		2.51937	0.0039

From the above Pairwise Granger Causality test, it is infered that there is bidirectional causality between CDG index and FII investment in the Indian equity market. At a 95% level of confidence, it can be said that CDG index causes FII investment as well as FII investment also causes CDG index.

6.4.14. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE TECK (TECK)

The following table shows the statistics of VAR lag selection criteria to study the causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE TECK (TECK).

Table 6.38. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4426.342	NA	6.29e+12	35.14557	35.17358	35.15684
1	-4409.832	32.62606*	5.69e+12*	35.04629*	35.13032*	35.08010*
2	-4407.815	3.954034	5.78e+12	35.06202	35.20208	35.11838
3	-4403.641	8.116536	5.78e+12	35.06064	35.25672	35.13954
4	-4402.346	2.497411	5.90e+12	35.08211	35.33421	35.18355
5	-4399.714	5.034789	5.97e+12	35.09297	35.40109	35.21695
6	-4398.131	3.002107	6.08e+12	35.11215	35.47630	35.25868
7	-4396.847	2.414418	6.22e+12	35.13371	35.55388	35.30278
8	-4393.255	6.700738	6.24e+12	35.13694	35.61313	35.32855
9	-4390.813	4.515469	6.32e+12	35.14931	35.68152	35.36346
10	-4389.792	1.871384	6.47e+12	35.17295	35.76119	35.40965
11	-4388.372	2.580002	6.60e+12	35.19343	35.83769	35.45267
12	-4387.052	2.378289	6.75e+12	35.21470	35.91498	35.49648

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.39. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.35.	D(TECK) does not Granger Cause D(CUM_FIIs_EQ)	263	0.08697	0.7683
H0 6.36.	D(CUM_FIIs_EQ) does not Granger Cause D(TECK)		0.12036	0.7289

From the above Pairwise Granger Causality test, it is infered that there is no causality between TECK index and FII investment in the Indian equity market.

6.4.15. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE REALITY (REALITY)

The following VAR lag order selection criteria suggest the optimal lag length FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE REALITY (REALITY).

Table 6.40. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4551.258	NA	1.69e+13	36.13697	36.16498	36.14824
1	-4535.159	31.81512	1.54e+13	36.04094	36.12498*	36.07476*
2	-4531.346	7.475157	1.54e+13	36.04243	36.18248	36.09878
3	-4529.304	3.970219	1.57e+13	36.05797	36.25405	36.13686
4	-4526.399	5.601487	1.58e+13	36.06666	36.31876	36.16810
5	-4524.108	4.383015	1.60e+13	36.08022	36.38834	36.20420
6	-4518.146	11.30856	1.58e+13	36.06465	36.42880	36.21118
7	-4515.318	5.319132	1.59e+13	36.07395	36.49412	36.24302
8	-4508.325	13.04215	1.55e+13	36.05020	36.52639	36.24181
9	-4499.191	16.89065*	1.49e+13*	36.00945	36.54167	36.22361
10	-4496.091	5.683441	1.50e+13	36.01660	36.60483	36.25329
11	-4492.185	7.099926	1.51e+13	36.01734	36.66160	36.27658
12	-4487.178	9.019431	1.49e+13	36.00935*	36.70963	36.29113

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria two criteria suggest checking causality at lag order of 9. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.41. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.37.	D(REALITY) does not Granger Cause D(CUM_FIIs_EQ)	263	0.01935	0.8895
H0 6.38.	D(CUM_FIIs_EQ) does not Granger Cause D(REALITY)		0.02156	0.8834

From the above Pairwise Granger Causality test, it is infered that there is no causality between REALITY index and FII investment in the Indian equity market.

6.4.16. Causality between FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Industrials (INDUSTRIAL)

The following VAR lag order selection criteria suggest the optimal lag length FIIs Investment in the Indian equity market (Cum_FIIs_Eq) and S&P BSE Industrials (INDUSTRIAL).

Table 6.42. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4250.778	NA	1.56e+12	33.75221	33.78022	33.76348
1	-4235.135	30.91344	1.42e+12*	33.65980*	33.74384*	33.69362*
2	-4232.231	5.693056	1.44e+12	33.66850	33.80856	33.72486
3	-4229.483	5.343564	1.45e+12	33.67843	33.87451	33.75733
4	-4226.481	5.788738	1.46e+12	33.68636	33.93846	33.78780
5	-4226.051	0.823281	1.50e+12	33.71469	34.02281	33.83867
6	-4224.904	2.174995	1.54e+12	33.73733	34.10148	33.88386
7	-4222.896	3.777504	1.56e+12	33.75314	34.17331	33.92221
8	-4214.809	15.08224	1.51e+12	33.72071	34.19690	33.91232
9	-4210.614	7.757916	1.51e+12	33.71916	34.25137	33.93331
10	-4207.291	6.091128	1.52e+12	33.72454	34.31277	33.96123
11	-4202.851	8.069927	1.51e+12	33.72104	34.36530	33.98028
12	-4195.007	14.13218*	1.47e+12	33.69053	34.39082	33.97231

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria four criteria suggest checking causality at lag order of 1. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.43. Pairwise Granger Causality Tests at a lag length of 1

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.39.	D(INDUSTRIAL) does not Granger Cause D(CUM_FIIs_EQ)	263	1.57090	0.2112
H0 6.40.	D(CUM_FIIs_EQ) does not Granger Cause D(INDUSTRIAL)		2.13415	0.1453

From the above Pairwise Granger Causality test, it is infered that there is no causality between INDUSTRIAL index and FII investment in the Indian equity market.

6.4.17. Summary: Causality between various sectoral indices and FII investment in the Indian equity market.

Following table shows the direction of causality between sectoral indices and FII investment in the Indian equity market.

Table 6.44. The direction of Causality between Sectoral Indices and FIIs Investment

S&P BSE Sectoral Indices	**Direction of Causality**	
	Index → FII investment	**FIIs Investment → Index**
AUTO	Significant*	Significant***
BANKEX	Significant*	Significant*
CAPITAL GOODS	Not Significant	Not Significant
Finance	Not Significant	Not Significant
Fast Moving Consumer Goods	Not Significant	Not Significant
Healthcare	Significant**	Significant*
Information Technology	Not Significant	Not Significant
OIL & GAS	Not Significant	Not Significant
Utilities	Not Significant	Not Significant
Telecom	Not Significant	Not Significant
METAL	Not Significant	Not Significant
CONSUMER DURABLES GOODS	Significant*	Significant*
TECK	Not Significant	Not Significant
REALITY	Not Significant	Not Significant
Industrial	Not Significant	Not Significant

* Significant at a 1%, ** Significant at a 5%, *** Significant at a 10%

From Table 6.44, it is found that out of 15 sectoral indices only four sectoral indices (AUTO, Bankex, Healthcare and Consumer Durable Goods) have a causal relationship with FII investment in the Indian equity market. After a study of sectoral indices, the next section of the chapter discusses causality between FII investment and Indian leading indices SENSEX (BSE) and NIFTY (NSE).

6.5. Causality between FII investment in the Indian equity market and major the Indian equity market Indices (Sensex and Nifty)

To check the causality between FIIs and major the Indian equity market indices, the stationarity is required to be checked of the series of SENSEX and NIFTY. For CUM_FIIs_EQ the unit root test is already done, the following test shows the result of the stationarity-check for SENSEX and NIFTY.

6.5.1. Unit Root Test

To check the unit root for the stationarity, the following is the null hypothesis.

H0 6.41. Null Hypothesis: SESEX has a Unit Root, NIFTY has a Unit Root

The following table presents the result of the Augmented Dickey-Fuller test

Table 6.45. Test statistic of ADF

Variable	Exogenous	t-statistics	Prob.	Variable at First Difference	t-statistics	Prob.
SENSEX	None	2.2940	0.9950	D(SENSEX)	-12.7228	0.0000*
	Constant	0.7255	0.9925		-13.0297	0.0000*
	Constant, Linear Trend	-2.2498	0.4595		-13.1416	0.0000*
NIFTY	None	2.2635	0.9946	D(NIFTY)	-12.7019	0.0000*
	Constant	0.6682	0.9913		-13.0104	0.0000*
	Constant, Linear Trend	-2.2991	0.4325		-13.1115	0.0000*

*Significant at a 1%

Above unit root test suggest that both of the series SENSEX and NIFTY have unit root and the null hypothesis cannot be rejected. But at first difference of both of the series are stationary at a 1% level of significance. Hence causality test can be done on the first difference series data. To check the causality, the optimal lag length needed to be identified. The following section of the chapter discusses the causality between FII investment in the Indian equity market and SENSEX, followed by causality between FII investment in the Indian equity market and NIFTY.

6.5.2. Causality between FII investment in the Indian equity market (Cum_FIIs_Eq) and BSE index S&P BSE SENSEX (SENSEX)

The following table shows the statistics of VAR lag selection criteria to study the causality between FII investment in the Indian equity market (Cum_FIIs_Eq) and BSE index S&P BSE SENSEX (SENSEX).

Table 6.46. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4603.405	NA	2.56e+13	36.55083	36.57885	36.56211
1	-4581.398	43.48987	2.22e+13	36.40792	36.49196*	36.44174*
2	-4574.790	12.95439	2.18e+13*	36.38722*	36.52728	36.44358
3	-4571.193	6.994654	2.18e+13	36.39042	36.58650	36.46932
4	-4568.703	4.801036	2.21e+13	36.40241	36.65451	36.50385
5	-4567.673	1.970866	2.26e+13	36.42597	36.73410	36.54996
6	-4565.529	4.065862	2.30e+13	36.44071	36.80486	36.58723
7	-4563.026	4.708061	2.32e+13	36.45259	36.87276	36.62166
8	-4558.955	7.593487	2.32e+13	36.45202	36.92822	36.64363
9	-4556.145	5.196301	2.35e+13	36.46147	36.99368	36.67562
10	-4553.958	4.008928	2.38e+13	36.47586	37.06410	36.71255
11	-4547.906	10.99949	2.34e+13	36.45957	37.10383	36.71881
12	-4539.651	14.87257*	2.27e+13	36.42580	37.12608	36.70758

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria toe criteria suggest checking causality at lag order of 2. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.47. Pairwise Granger Causality Tests at a lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.42.	D(SENSEX) does not Granger Cause D(CUM_FIIs_EQ)	262	2.23595	0.1090
H0 6.43.	D(CUM_FIIs_EQ) does not Granger Cause D(SENSEX)		2.32551	0.0998

From the above Pairwise Granger Causality test, it is infered that there is no causality between SENSEX and FII investment in the Indian equity market at a 5% level of significance.

6.5.3. Causality between FII investment in the Indian equity market (Cum_FIIs_Eq) and NSE index Nifty 50 (NIFTY)

The following table shows the statistics of VAR lag selection criteria to study the causality between FII investment in the Indian equity market (Cum_FIIs_Eq) and NSE index Nifty 50 (NIFTY).

Table 6.48. VAR Lag Order Selection Criteria

Lag	LgLk	SqLR	FPEr.	AIC	SIC	HQn
0	-4300.072	NA	2.31e+12	34.14343	34.17144	34.15470
1	-4278.316	42.99509	2.01e+12	34.00251	34.08654*	34.03632
2	-4270.387	15.54371	1.94e+12*	33.97132*	34.11138	34.02768*
3	-4267.462	5.686924	1.96e+12	33.97986	34.17594	34.05875
4	-4264.384	5.934986	1.97e+12	33.98718	34.23928	34.08862
5	-4263.438	1.810844	2.02e+12	34.01141	34.31954	34.13539
6	-4261.472	3.728812	2.06e+12	34.02755	34.39170	34.17408
7	-4258.838	4.953743	2.08e+12	34.03840	34.45857	34.20747
8	-4254.468	8.151183	2.07e+12	34.03546	34.51165	34.22707
9	-4251.641	5.227932	2.09e+12	34.04477	34.57698	34.25892

10	-4249.817	3.343545	2.13e+12	34.06204	34.65028	34.29873
11	-4243.588	11.32027	2.09e+12	34.04435	34.68861	34.30359
12	-4235.204	15.10449*	2.02e+12	34.00956	34.70984	34.29134

* indicates lag order selected by the respective criterion in their column

From the above VAR lag order selection criteria, it can be observed that out of five criteria three criteria suggest checking causality at lag order of 2. The following table shows the statistics of Pairwise Granger Causality Tests.

Table 6.49. Pairwise Granger Causality Tests at a lag length of 2

Null Hypothesis:		Obs	F-Statistic	Prob.
H0 6.44.	D(NIFTY) does not Granger Cause D(CUM_FIIs_EQ)	262	2.30443	0.1019
H0 6.45.	D(CUM_FIIs_EQ) does not Granger Cause D(NIFTY)		2.82734	0.0610

From the above Pairwise Granger Causality test, it is infered that there is no causality between NIFTY and FII investment in the Indian equity market at a 5% level of significance.

But in above both of the cases of causality test, at a 10% of confidence level, it can be said that FII investment in the Indian equity market affects the performance of S&P BSE SENSEX as well as NSE index Nifty 50. But reverse causality is not found at a 10% level of significance i.e. S&P BSE SENSEX and Nifty do not affect FII investment.

As per Asia Index Pvt. Ltd. the S&P BSE SENSEX is India’s most tracked trend indicator index. It is designed to measure the performance of the 30 largest, most liquid and financially sound companies across key sectors of the Indian economy that are listed at BSE Ltd ("S&P BSE SENSEX,"). Whereas the NIFTY 50 is a diversified 50 stock index considering 13 sectors of the economy("Nifty 50 Index,"). Among S&P BSE SENSEX and Nifty 50, Nifty 50 represent the Indian equity market better.

Thus to know the causal relation between FIIs and Indian Equity market, Nifty 50 is a better representative of the Indian equity market than S&P BSE SENSEX. Thus, further causality conducted between FII investment in the Indian equity market and the performance of

Nifty 50. To conduct the VAR Granger causality, followings are the null and the alternative hypothesis.

H0 6.46. Lag 1 and Lag 2 Jointly can not cause the dependent variable

H1 6.46. Lag 1 and Lag 2 Jointly cause the dependent variable

Table 6.50. VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: D(NIFTY)			
Excluded	Chi-sq	df	Prob.
D(CUM_FIIs_EQ)	8.713371	2	0.0128
All	8.713371	2	0.0128
Dependent variable: D(CUM_FIIs_EQ)			
Excluded	Chi-sq	df	Prob.
D(NIFTY)	5.665202	2	0.0589
All	5.665202	2	0.0589

From the above result also it can be confirmed at a 5% level of confidence that FII investment cause Nifty 50 and Nifty 50 do not cause FII investment. Market players are interested in knowing the performance and FII investment is causing stock market performance. Hence here the effect of FII investment on Nifty 50 as proxy of the Indian equity market is studied.

6.6. Effect of FII investment on Nifty 50

To study the relationship between Nifty 50 and FII investment in the Indian equity market regression models is estimated and test statistics is calculated. Following discussion provides information about it.

6.6.1. Model 1: FIIs and Nifty

To study the relationship between Nifty 50 and FII investment in the Indian equity market following is the first estimated equation.

D(NIFTY) = C(1) + C(2)*D(CUM_FIIs_EQ) …….....Estimated Equation (1)

Following table provides test statistics of Estimated Equation (1)

Table 6.51. Test Statistic of Estimated Equation

Variable	Coeff.	Sd.Er	t-stat.	Prob.
C	-15.51409	11.37249	-1.364177	0.1737
D(CUM_FIIs_EQ)	0.016707	0.001260	13.26440	0.0000
R-sqred	0.401750	Mean dependent var		38.80564
Adjusted R-sqred	0.399467	S.D. dependent var		222.4496
S.E. of regression	172.3853	Akaike Inf. Cr.		13.14489
Sum sqred residl	7785770.	SIC		13.17198
Log-likelihood	-1733.125	HQn Cr.		13.15577
F-stat.	175.9442	DW Statistic		1.608222
Prob(F-stat.)	0.000000			

Equation 6.7.1: D(NIFTY) = -15.5140873945 + 0.0167065130943*D(CUM_FIIs_EQ)

Coefficients are significant (t-stat): As the causality is checked, FII investment is significant to determine Nifty 50. P-value of the coefficient of FII investment is less than 0.05, so it can be said that FII investment is significant to affect Nifty 50.

F-Statistics: F-statistics shows whether the overall model is significant to affect the dependent variable. As p-value is less than 0.05, it can be said that the model is significant.

Adjusted R-Squared: It shows that how much percentage change in the dependent variable is explained by the regression model. From the above statistics, it can be said that 40.17% change in Nifty 50 is explained by this model.

Durbin Watson (DW): It shows whether there is autocorrelation is there. DW value should be near to 2.00. Here DW is 1.61 which not satisfactory.

Serial Auto Correlation: It talks about the basic requirement of regression model i.e. residuals should not be related to each other. Correlogram helps in it.

Table 6.52. ACF and PACF

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|* |	.|* |	1	0.206	0.206	11.323	0.001
.|* |	.|* |	2	0.157	0.120	17.930	0.000
.|* |	.|. |	3	0.120	0.071	21.782	0.000
.|* |	.|* |	4	0.197	0.155	32.277	0.000
.|* |	.|. |	5	0.147	0.071	38.129	0.000
.|* |	.|* |	6	0.163	0.090	45.389	0.000
.|* |	.|* |	7	0.198	0.125	56.143	0.000
.|** |	.|** |	8	0.314	0.231	83.193	0.000
.|* |	.|. |	9	0.143	0.008	88.816	0.000
.|. |	*|. |	10	0.051	-0.074	89.548	0.000
.|* |	.|. |	11	0.107	0.020	92.714	0.000
.|* |	.|. |	12	0.107	-0.017	95.893	0.000

From the above diagram, it can be observed that all of the p-values are less than 0.05. It means there is strong serial autocorrelation.

Residuals are Homoscedastic: To check that whether residuals are homoscedastic or not the followings are the null and the alternative hypothesis.

H0 6.47. Residuals are homoscedastic

H1 6.47. Residuals are not homoscedastic

Table 6.53. Breusch-Pagan-Godfrey Heteroscedasticity Test

F-stat.	1.352353	Prob. F(1,262)	0.2459
Obs*R-sqred	1.355679	Prob. Chi-Square(1)	0.2443
Scaled explained SS	2.712222	Prob. Chi-Square(1)	0.0996

From the above test, it is found that p-value corresponding to R-sqred is 0.2443 which is more than 0.05, so the null hypothesis cannot be rejected. Hence residuals are homoscedastic.

Normally Distributed Residuals: Jurque-Bera Test helps to check whether residuals are normally distributed or not. Followings are the null and the alternative hypothesis to check the normality of residuals.

H0 6.48. Residuals are normally distributed.

H1 6.48. Residuals are not normally distributed.

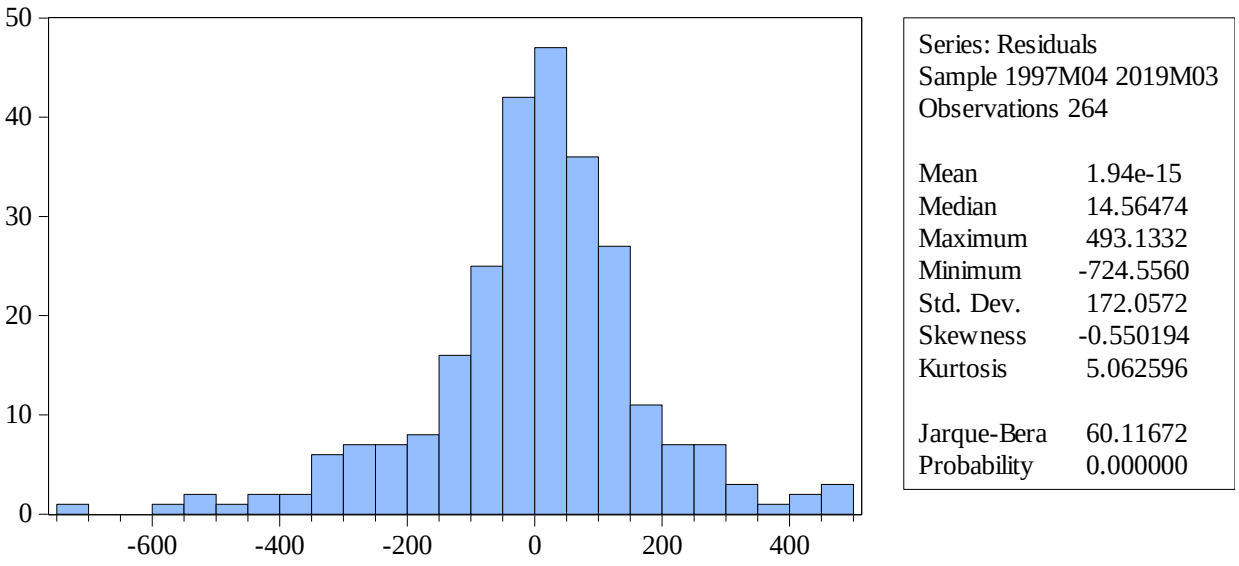


Figure 6.2. Histogram of Residuals

From the above result, it can be said that null is rejected and residuals are not normally distributed.

6.6.2. Model 2: With two dummy variables

Due to frequent sudden changes in the Indian equity market the model is not stable hence dummy variables on the basis of identified structural breaks is required to be considered. The following test shows the result of multiple structural breaks. To apply the Bai-Perron test under the method of L+1 vs. L sequentially determined breaks, with an option of Trimming at 0.15, Max. breaks 5 and Sig. level 0.05. Estimated Equation (1) for the application of Multiple breakpoint tests is used.

Table 6.54. Multiple breakpoint tests

Sequential F-stat. determined breaks:			2
Break Test	F-stat.	Scaled F-stat.	Critical Value**
0 vs. 1 *	7.690207	15.38041	11.47
1 vs. 2 *	8.586002	17.17200	12.95
2 vs. 3	1.275582	2.551164	14.03

* Significant at the 0.05 level.

** Bai-Perron (Econometric Journal, 2003) critical values.

Table 6.55. Break dates:

	Sequential	Repartition
1	2009M07	2009M07
2	2014M03	2014M03

From the above test of multiple structural breaks new models with two dummy variables for 2009M7 and 2014M03 is introduced as follow.

D(NIFTY) = C(1) + C(2)*D(CUM_FIIs_EQ) + C(3)*SB_2009M07 + C(4)*SB_2014M03

…… Estimated Equation (2)

Following table provides the test statistics of Estimated Equation (2)

Table 6.56. Test Statistic of Estimated Equation

Variable	Coeff.	Sd.Er	t-stat.	Prob.
C	-5.239587	13.86343	-0.377943	0.7058
D(CUM_FIIs_EQ)	0.018121	0.001269	14.27592	0.0000
SB_2009M07	-105.2797	27.28146	-3.859018	0.0001
SB_2014M03	137.5631	31.31902	4.392317	0.0000

R-sqred	0.446963	Mean dependent var	38.80564
Adjusted R-sqred	0.440582	S.D. dependent var	222.4496
S.E. of regression	166.3796	Akaike Inf. Cr.	13.08146
Sum sqred residl	7197361.	SIC	13.13564
Log-likelihood	-1722.752	HQn Cr.	13.10323
F-stat.	70.04375	DW Statistic	1.707934
Prob(F-stat.)	0.000000		

Equation 6.7.2: D(NIFTY) = -5.23958730394 + 0.0181207041921*D(CUM_FIIs_EQ) - 105.279652635*SB_2009M07 + 137.563094825*SB_2014M03

Coefficients are significant (t-stat): With FII investment, structural breaks are also significant. P-value of each coefficient is less than 0.05 i.e. significant. Hence all independent variable is significant to affect dependent value.

F-Statistics: F-statistics shows whether the overall model is significant to affect the dependent variable. As p-value is less than 0.05, it can be said that the model is significant.

Adjusted R-Squared: It shows that how much percentage change in the dependent variable is explained by the regression model. From the above statistics, it can be said that 44.7% change in Nifty 50 is explained by this model. This value is greater than an earlier model, it means this model suggest more percentage change in the independent variable than an earlier model.

Durbin Watson (DW): It shows whether there is autocorrelation is there. DW value should be near to 2.00. Here DW is 1.71 which not satisfactory, but improved compared to the earlier model.

Serial Auto Correlation: It talks about the basic requirement of regression model i.e. residuals should not be related to each other. Correlogram helps in it.

Table 6.57. ACF and PACF

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|* |	.|* |	1	0.186	0.186	9.2848	0.002
.|* |	.|* |	2	0.141	0.110	14.643	0.001
.|* |	.|. |	3	0.094	0.053	17.046	0.001
.|** |	.|* |	4	0.217	0.187	29.738	0.000
.|* |	.|* |	5	0.185	0.116	38.972	0.000
.|* |	.|. |	6	0.151	0.069	45.148	0.000
.|* |	.|* |	7	0.200	0.137	56.128	0.000
.|** |	.|** |	8	0.314	0.235	83.118	0.000
.|* |	.|. |	9	0.106	-0.035	86.239	0.000
.|. |	*|. |	10	0.041	-0.073	86.698	0.000
.|* |	.|. |	11	0.125	0.049	91.002	0.000
.|* |	.|. |	12	0.113	-0.038	94.542	0.000

From the above diagram, it can be observed that all of the p-values are less than 0.05. It means there is strong serial autocorrelation. All Q-Stat values are significant and AC and PAC are not equal to zero, it suggests that it is needed to check for ARCH after adjustment of the ARIMA model.

Residuals are Homoscedastic: To check that whether residuals are homoscedastic or not the followings are the null and the alternative hypothesis

H0 6.49. Residuals are homoscedastic

H1 6.49. Residuals are not homoscedastic

Table 6.58. Breusch-Pagan-Godfrey Heteroscedasticity Test

F-stat.	1.713458	Prob. F(3,260)	0.1646
Obs*R-sqred	5.118266	Prob. Chi-Square(3)	0.1633
Scaled explained SS	11.29270	Prob. Chi-Square(3)	0.0102

From the above test, p-value corresponding to R-sqred is 0.1633 is found, which is more than 0.05, so the null hypothesis cannot be rejected. Hence residuals are homoscedastic.

Normally Distributed Residuals: Jurque-Bera Test helps to check whether residuals are normally distributed or not. Followings are the null and the alternative hypothesis to check the normality of residuals.

H0 6.50. Residuals are normally distributed.

H1 6.50. Residuals are not normally distributed.

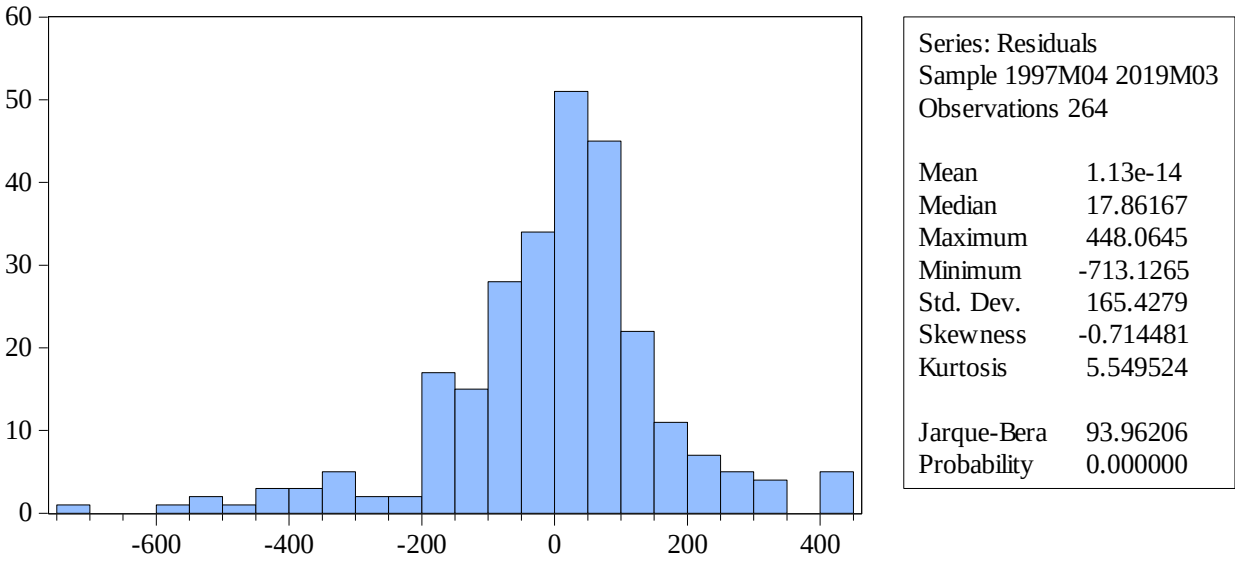


Figure 6.3. Histogram of Residuals

From the above result, it can be said that null is rejected and residuals are not normally distributed.

Addition of dummy variable solves the issue related to the stability of coefficient but still, it is required to check other issues related to residuals i.e. Serial autocorrelation and normal distribution. All these results can be checked after considering the ARIMA model. The following tables show the result of various ARIMA model.

6.6.3. Model 3: ARIMA with a structural break

AutoRegressive Integrated Moving Average (ARIMA) is analysing and forecasting method of time-series data. It assumes that series is stationary, hence a dummy variable of structural breaks is introduced. ARIMA model may have a different structure. Normally a non-

seasonal ARIMA model is used to write as ARIMA(p,d,q). Here p stands for a number of autoregressive terms, d is the number of difference needed for stationarity and q stands for the number of lagged forecast error considers moving average.

To evaluate the ARIMA model of different (p,d,q), various criteria can be applied. The following table provides all possible ARIMA models with a value of different criteria to evaluate them.

Table 6.59. Different ARIMA models with their evaluating criteria

Model with	ACI	SIC	HQn	DW
ARIMA (1,1,1)	13.0577	13.1390	13.0904	2.0340
ARIMA (1,1,2)	13.0503	13.1316	13.0830	1.9952
ARIMA (2,1,1)	13.0466	13.1278	13.0792	1.9932
ARIMA (2,1,2)	13.0431	13.1244	13.0758	1.6621

From the above table, it can be observed that ARIMA (2,1,2) provides the minimum value of ACI, SIC and HQn criteria, but it reduces the value of DW test significant. ARIMA (2,1,1) provides a slightly higher value of ACI, SIC and HQn compare to ARIMA (2,1,2) but gives good result for DW which is very near to the value of 2. Hence the ARIMA (2,1,1) model for further analysis is adopted. Following is the estimate equation considering the ARIMA (2,1,1) model.

D(NIFTY) = C(1) + C(2)*D(CUM_FIIs_EQ) + C(3)*SB_2009M07 + C(4)*SB_2014M03 + C(5) **AR(2)** ***+ C(6)MA(1)…… Estimated Equation (2)***

The following table provides the test statistics of ARIMA (2,1,1) under the method of ARMA Generalized Least Squares (Gauss-Newton). In the following table, convergence is achieved after 4 iterations, Coefficient covariance calculated using an outer product of gradients and degree of freedom adjustment for standard errors & covariance is done.

Table 6.60. Test Statistic of Estimated Equation

Variable	Coeff.	Sd.Er	t-stat.	Prob.
C	-4.337499	13.88062	-0.312486	0.7549
D(CUM_FIIs_EQ)	0.017733	0.001262	14.05008	0.0000
SB_2009M07	-104.1372	27.40220	-3.800322	0.0002

SB_2014M03	137.6867	31.44800	4.378235	0.0000
AR(2)	-0.145793	0.063052	-2.312278	0.0215
MA(1)	0.171450	0.062309	2.751612	0.0064

R-sqred	0.474128	Mean dependent var	38.80564
Adjusted R-sqred	0.463937	S.D. dependent var	222.4496
S.E. of regression	162.8694	Akaike Inf. Cr.	13.04655
Sum sqred residl	6843824.	SIC	13.12782
Log-likelihood	-1716.144	HQn Cr.	13.07921
F-stat.	46.52280	DW Statistic	1.993214
Prob(F-stat.)	0.000000		

Inverted AR Roots	-.00+.38i	-.00-.38i
Inverted MA Roots	-.17	

Equation 6.7.3: *D(*NIFTY*)* = -4.337499 + 0.017733**D(CUM_FIIs_EQ)* + -104.1372**SB_2009M07* + 137.6867**SB_2014M03* + -0.145793AR (2) + 0.171450*MA (1)*

Coefficients are significant (t-stat): With FII investment and structural breaks, AR(2) and MA(1) are also significant. P-value of each coefficient is less than 0.05 i.e. significant. Hence all independent variables are significant to affect dependent value.

F-Statistics: F-statistics shows whether the overall model is significant to affect the dependent variable. As p-value is less than 0.05, it can be said that the model is significant.

Adjusted R-Squared: It shows that how much percentage change in the dependent variable is explained by the regression model. From the above statistics, it can be said that 47.41% change in Nifty 50 is explained by this model. This value is greater than an earlier model, it means this model suggest more percentage change in the independent variable than an earlier model.

Durbin Watson (DW): It shows whether there is autocorrelation is there. DW value should be near to 2.00. Here DW is 1.99 which not satisfactory, but improved compared to the earlier model.

Serial Auto Correlation: It talks about the basic requirement of regression model i.e. residuals should not be related to each other. Correlogram helps in it.

Table 6.61. ACF and PACF

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|* |	.|* |	1	0.175	0.175	8.2106	0.004
.|* |	.|* |	2	0.127	0.099	12.523	0.002
.|. |	.|. |	3	0.041	0.004	12.975	0.005
.|** |	.|** |	4	0.244	0.234	29.096	0.000
.|* |	.|. |	5	0.090	0.013	31.314	0.000
.|* |	.|* |	6	0.153	0.099	37.679	0.000
.|* |	.|* |	7	0.136	0.100	42.764	0.000
.|** |	.|** |	8	0.325	0.246	71.718	0.000
.|. |	.|. |	9	0.064	-0.051	72.831	0.000
.|* |	.|. |	10	0.105	0.026	75.862	0.000
.|* |	.|. |	11	0.088	0.039	77.999	0.000
.|* |	.|. |	12	0.099	-0.063	80.719	0.000

From the above diagram, it can be observed that all of the p-values are less than 0.05. It means there is strong serial autocorrelation. This also suggests that even after the inclusion of ARMA term the Q-stat are significant and AC and PAC are not equal to zero. So it can be said that there is an existence of Autoregressive Conditional Heteroskedasticity (ARCH).

Residuals are Homoscedastic: To check that whether residuals are homoscedastic or not the followings are the null and the alternative hypothesis

H0 6.51. Residuals are homoscedastic

H1 6.51. Residuals are not homoscedastic

Table 6.62. Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-stat.	2.008064	Prob. F(3,260)	0.1132
Obs*R-sqred	5.978354	Prob. Chi-Square(3)	0.1127
Scaled explained SS	11.75889	Prob. Chi-Square(3)	0.0083

Table 6.63. Harvey Heteroskedasticity Test

F-stat.	4.670478	Prob. F(3,260)	0.0034
Obs*R-sqred	13.49950	Prob. Chi-Square(3)	0.0037*
Scaled explained SS	14.75034	Prob. Chi-Square(3)	0.0020

Table 6.64. Glejser Heteroskedasticity Test

F-stat.	5.228131	Prob. F(3,260)	0.0016
Obs*R-sqred	15.01964	Prob. Chi-Square(3)	0.0018*
Scaled explained SS	20.05858	Prob. Chi-Square(3)	0.0002

Table 6.65. ARCH Heteroskedasticity Test

F-stat.	4.219652	Prob. F(12,239)	0.0000
Obs*R-sqred	44.05611	Prob. Chi-Square(12)	0.0000*

Table 6.66. Heteroskedasticity Test: White

F-stat.	2.468449	Prob. F(23,240)	0.0004
Obs*R-sqred	50.50445	Prob. Chi-Square(23)	0.0008*
Scaled explained SS	99.33780	Prob. Chi-Square(23)	0.0000

Out of five tests of heteroscedasticity, only Breusch-Pagan-Godfrey test accept null. All other tests reject the null and support the argument of residuals are heteroscedastic. ARCH test also suggests residuals are heteroscedastic and follow ARCH family heteroscedasticity.

Normally Distributed Residuals: Jurque-Bera Test helps to check whether residuals are normally distributed or not. Followings are the null and the alternative hypothesis to check the normality of residuals.

H0 6.52. Residuals are normally distributed.

H1 6.52. Residuals are not normally distributed.

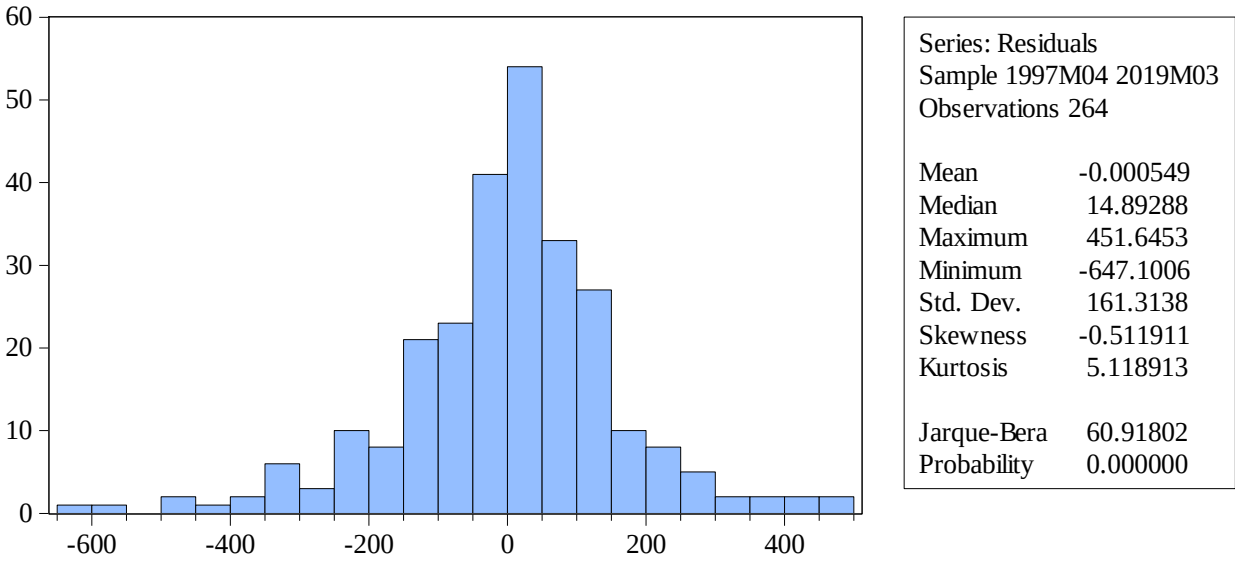


Figure 6.4. Histogram of Residuals

From the above result, it can be said that null is rejected and residuals are not normally distributed.

Considering above all condition it is required to check that which type of heteroscedasticity of ARCH family exist i.e. GARCH, TGARCH or TARCH.

6.6.4. Model 4: TARCH Model

All various combination of GARCH, TGARCH and TARCH were tried and GARCH (2,2) at Threshold order of 2 (TARCH) models is found with minimum AIC value i.e. 12.668.

D(NIFTY) = C(1) + C(2)*D(CUM_FIIs_EQ) + C(3)*SB_2009M07 + C(4)*SB_2014M03 + AR(2)=C(5), MA(1)=C(6) ……. Estimated Equation (3)

GARCH = C(7) + C(8)*RESID(-1)^2 + C(9)*RESID(-1)^2*(RESID(-1)<0) + C(10)*RESID(-2)^2 + C(11)*RESID(-2)^2*(RESID(-2)<0) + C(12)*GARCH(-1) + C(13)*GARCH(-2) ……. Estimated Equation (4)

Following table provides the test statistics of Estimated Equation (3) and Estimated Equation (4) using the Method: ML ARCH - Normal distribution (OPG - BHHH / Marquardt steps). In this method convergence is achieved after 55 iterations, Coefficient covariance is computed using outer product of gradients and Pre-sample variance is back-cast considering parameter = 0.7.

Table 6.67. Test Statistic of Estimated Equation

Variable	Coeff.	Sd.Er	z-Statistic	Prob.
C	2.518690	7.387358	0.340946	0.7331
D(CUM_FIIs_EQ)	0.017162	0.001236	13.88547	0.0000
SB_2009M07	-97.36105	20.41043	-4.770162	0.0000
SB_2014M03	121.3558	23.61301	5.139361	0.0000
AR(2)	-0.046666	0.067523	-0.691111	0.4895
MA(1)	0.164373	0.061879	2.656364	0.0079
	Variance Equation			
C	305.289	213.653	1.429	0.153
RESID(-1)^2	0.116	0.077	1.512	0.131
RESID(-1)^2*(RESID(-1)<0)	-0.033	0.097	-0.342	0.732
RESID(-2)^2	0.539	0.140	3.850	0.000
RESID(-2)^2*(RESID(-2)<0)	-0.618	0.155	-3.984	0.000
GARCH(-1)	0.071	0.079	0.894	0.371
GARCH(-2)	0.699	0.096	7.317	0.000
R-sqred	0.467346	Mean dependent var		38.80564
Adjusted R-sqred	0.457024	S.D. dependent var		222.4496
S.E. of regression	163.9163	Akaike Inf. Cr.		12.66800
Sum sqred residl	6932088.	SIC		12.84409
Log-likelihood	-1659.176	HQn Cr.		12.73876
DW Statistic	1.978329			
Inverted AR Roots	-.00+.22i	-.00-.22i		
Inverted MA Roots	-.16			

Coefficients are significant (t-stat): In both Mean Equation and Variance equation at least 50 per cent coefficients of the independent variable are significant. Their p-values are less than 0.05.

Adjusted R-Squared: From the above statistics it can be said that 46.73% change in Nifty 50 is explained by this model.

Durbin Watson (DW): DW is 1.98 which is near to 2. Hence is also satisfactory.

Serial Auto Correlation: It talks about the basic requirement of regression model i.e. residuals should not be related to each other. Correlogram helps in it.

Table 6.68. ACF and PACF

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	0.035	0.035	0.3215	0.571
.|* |	.|* |	2	0.077	0.076	1.9115	0.385
.|. |	.|. |	3	-0.057	-0.063	2.8007	0.423
.|. |	.|. |	4	-0.035	-0.037	3.1261	0.537
.|. |	.|. |	5	-0.026	-0.015	3.3134	0.652
.|. |	.|. |	6	-0.015	-0.011	3.3712	0.761
.|. |	.|. |	7	-0.038	-0.039	3.7685	0.806
.|. |	.|. |	8	-0.039	-0.039	4.1851	0.840
.|. |	.|. |	9	-0.009	-0.004	4.2094	0.897
.|. |	.|. |	10	-0.037	-0.036	4.5808	0.917
.|. |	.|. |	11	-0.010	-0.014	4.6061	0.949
.|. |	.|. |	12	-0.026	-0.025	4.7902	0.965

From the above diagram, it can be observed that all of the p-values are greater than 0.05. It means there is no serial autocorrelation. This also suggests that the Q-stat are not significant and AC and PAC are very close to zero. So there is no problem of serial autocorrelation with suggested the TARCH model.

Residuals are Homoscedastic: To check that whether residuals are homoscedastic or not the followings are the null and the alternative hypothesis.

H0 6.53. Residuals are homoscedastic

H1 6.53. Residuals are not homoscedastic

Table 6.69. Heteroskedasticity Test: ARCH

F-stat.	0.315130	Prob. F(1,261)	0.5750
Obs*R-sqred	0.317162	Prob. Chi-Square(1)	0.5733

From the above result of ARCH LM Test for the test of heteroscedasticity, a p-value is more than 0.05. So the null hypothesis can not be rejected means residuals are homoscedastic.

Normally Distributed Residuals: Jurque-Bera Test helps to check whether residuals are normally distributed or not. Followings are the null and the alternative hypothesis to check the normality of residuals.

H0 6.54. Residuals are normally distributed.

H1 6.54. Residuals are not normally distributed.

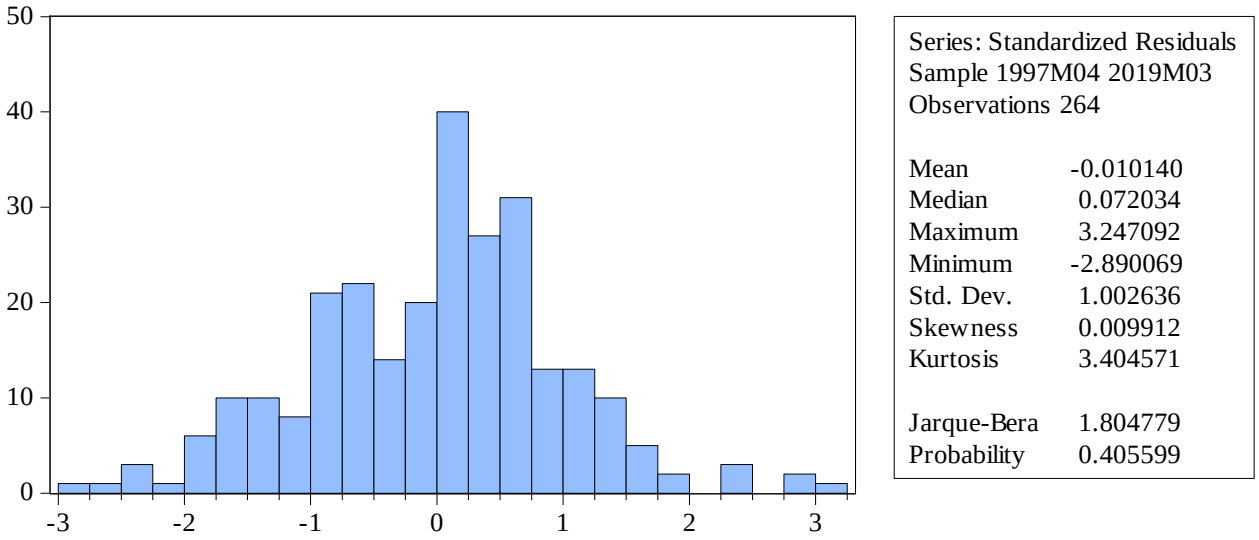


Figure 6.5. Histogram of Residuals

From the above result, it can be said that null is accepted and residuals are normally distributed applying TARCH.

So the followings are the final Mean Model and Variance Model.

Equation 6.7.4: D(NIFTY) = 2.519 + 0.0179(D(CUM_FIIs_EQ)) - 97.361(SB_2009M07) + 121.355(SB_2014M03) - 0.047 (AR(2)) + 0.164(MA(1))

Equation 6.7.5: GARCH = 305.289 + 0.116*RESID(-1)^2 - 0.033*RESID(-1)^2*(RESID(-1)<0) + 0.539*RESID(-2)^2 - 0.618*RESID(-2)^2*(RESID(-2)<0) + 0.071*GARCH(-1) + 0.699*GARCH(-2)

From Table 6.66 it can be observed that coefficenet of mean model (equation 6.7.1) and variance model (eqation 6.7.5) are significant at 1%. Hence form Equation 6.7.4 it can be said that FII investment and structural breals affect Nifty 50 and at the same time from Equation 6.7.5, it can also be confirmed that in this model volatility of one period also affect the volatility of other period. It implies that whenever investors plan to invest in the Indian stock market, they should consider effect of FII investment and Structural breaks in the Indian equity market, not only in terms of return (performance of Nifty) but also the risk (volatility in Nifty), which are also affected by previous return of Nifty and volity in Nifty respectively.

6.7. Summary

In this chapter, the effect of FII investment in the Indian equity market is studied. In this study, it is found that not only FII investment affect various constituents of the Indian equity market, but there is bidirectional causality exist between FII investment and various constituents of the Indian equity market. In causality study, the following list of constituents which are significant to cause FII investment were identified.

1. Market Capitalisation of NSE
2. Market Capitalisation of BSE
3. Turnover of NSE
4. Turnover of BSE
5. Auto Index
6. Bankex
7. Health Index
8. Consumer Durable Goods Index

It is observed that most of all the constituents listed above are affecting FII investment at the lag of 12, but only the Turnover of BSE and Auto Index affect FII investment at lag 4. Additionally, it can be observed that an Auto index is affecting FII investment but at the same time FII investment does not cause Auto index. As in this chapter, major focus was

on the study of effect FII investment in the Indian financial market, it is observed that the following constituents of the Indian equity market are affected by FII investment in the Indian equity market.

1. Market Capitalisation of NSE at lag 12
2. Market Capitalisation of BSE at lag 12
3. Turnover of NSE at lag 12
4. Turnover of BSE at lag 4
5. Bankex at lag 12
6. Health Index at 12
7. Consumer Durable Goods Index at lag 12
8. Nifty at lag 1 & 2 jointly

From the above list, it can be observed that most of all the constituents of the Indian equity market are affected by FII investment at lag 12. FII investment affects the turnover of BSE at lag 4.

Considering the causality between major indices (Sensex and Nifty) it is also found that there was no significant causality between these indices and FII investment. But when the Granger causality under VAR applied, it is found that FII investment causes Nifty 50 at lag 1 & 2 jointly. It means two months FII investment jointly cause the performance of Nifty 50, but not a vice versa. Thus, it is summarized that FII investment in Indian equity market significantly affects the performance of the Indian equity market. Hence in the last section of the chapter, the relationship between FII investment (independent variable) and the performance of the Indian equity market (dependent variable) is estimated, where Nifty is considered as a proxy to measure the performance of the Indian equity market. The relationship between FII investment in the Indian equity market and the performance of the Indian equity market is established as follow.

D(NIFTY) = 2.519 + 0.0179(D(CUM_FIIs_EQ)) - 97.361(SB_2009M07) + 121.355(SB_2014M03) - 0.047 (AR(2)) + 0.164(MA(1))

Where SB_2009M07 and SB_2014M03 represent structural break during July 2009 and March 2014 respectively. But this regression model is having Threshold Autoregressive Conditional Hetroskedasticity as follow.

GARCH = 305.289 + 0.116*RESID(-1)^2 - 0.033*RESID(-1)^2*(RESID(-1)<0) + 0.539*RESID(-2)^2 - 0.618*RESID(-2)^2*(RESID(-2)<0) + 0.071*GARCH(-1) + 0.699*GARCH(-2)

From both of the models, it can be inferred that the performance of the Indian equity market is affected by the FII investment, various structural breaks in FIIs investments and also by its past performance. At the same time, it is also found that volatility in the performance of the Indian equity is also affected by previous time period volatility.

CHAPTER: 7. SUMMARY AND CONCLUSION

On 14th of September in 1992, Foreign Institutional Investors (FIIs) were permitted to invest in the Indian financial market. The first guidelines about foreign institutional investors (FIIs) were issued on 15th October 1993. As per the guidelines provided, FIIs are required to be registered with SEBI as well as RBI. Initially limits of FIIs were kept at 5% in any company, which was subject to 24% overall limit of foreign investment. These limits were increased to 10% for single foreign portfolio investor in each company with subject to Sector-specific overall limit of foreign investment. SEBI issued guidelines related to KYC norms for FPIs and DDPs time to time. In June 2014 SEBI introduced a new class for foreign investors called Foreign Portfolio Investors (FPIs) which was formed through merging FIIs, QFIs and the sub-account of FIIs. There were 9,136 FIIs registered in India by the year 2017-18 with SEBI. Since FIIs permitted to invest in India, it grew at the CAGR of at 26.05%, 33.08% and 27.43% in the Indian equity market, the debt market and total investment respectively by the end of the last financial year 2018-19. In the year 2016-17 FIIs turnover to the total turnover of NSE and BSE was 21% and a FIIs turnover to the total F&O turnover on NSE was 13.7%. USA was the most dominant country with 33.08% of total AUC of foreign investment in Indian and 35.73% of AUC of foreign investment in the Indian equity market as on May 2019. It is found that FIIs prefer Banking sector most, followed by the other Financial sectors, Software and services, Oil and Gas, Automobile, Pharmaceuticals and followed by other sectors. As on March 2018, out of top 10 companies in which FIIs has the highest stake, three of them were banks i.e. IndusInd Bank (52%), Axis Bank (50%) and ICICI (48%) and the highest investment of FIIs was found 74% in NBFC i.e HDFC. Considering the existing FII investment pattern and trend, it becomes significant to study FII investment in the Indian equity market. Our summary and conclusion for the objectives of the study are as below:

Objective 1: To study the investment pattern of FIIs in the Indian Equity Market

To study the pattern of the investment of FIIs in the Indian equity market, it is found that FII investment trend is continuously increasing at 26.05% of CAGR. But at the same time it is found that slop of FII investment trend various from time to time. Thus, structural breaks and major events causing structural breaks are also studied. A time-series model for

determining the forecasting model is used. In this estimation of the model, it is found that first difference of the log transformation of FII investment in the Indian equity market time-series is the most appropriate transformation for the forecasting and determining the trend of FII investment in the Indian equity market. it is found that ARIMA (1,1,1) model provides the best forecasting results. The following equation of ARIMA (1,1,1) model is found.

$$D\_LN\_FIIs\_EQ = 0.019 + 0.726(AR(1)) - 0.479(MA\ (1))$$

But when the expert-modeller in SPSS software is applied, it is found that the existence of seasonality in the model and provided following optimum SARIMA model that is ARIMA (1,1,0) (1,0,1) for the time-series data of FII investment in the Indian equity market without any transformation. SARIMA model is as follow.

$$FIIs\_Cum\_Eq = 3.404 + 0.385(AR1) + 0.956\ (SA1) + 0.925\ (SMA1)$$

As the time series forecasting model of FII investment is determined, it is observed that fluctuations in the investment make the series unstable. Certain events were recognised which cause structural breaks in the time-series data of FII investment in India. Hence structural breaks are studied in FII investment in the Indian equity market. To study structural breaks in FII investment two approaches were used. In the first approach, the break dates are found through multiple structural break test. In this approach, it is found that mainly April 2009 and May 2015 were the major break dates, which were significantly affected the trend of FII investment in the Indian equity market. The break time of April 2009 was the time period of the end of the subprime crisis in the US and in Europe bailout program were taken place. In break time of May 2015 India's taxmen imposed MAT on FPI. Considering these two major structural breaks, following time-series model for the first difference of investment in the Indian equity market is established.

$$D\_FIIs\_EQ = 1421.246 + 6816.735(SB\_2009M04) - 6975.938(SB\_2015M05)$$

Above equation with the positive coefficient for the structural break in April 2009 explains the positive impact of the end of Subprime prices in US and bailout program in Europe; whereas the negative coefficient of a structural break in May 2015 explains the negative impact of imposing of MAT by Indian government on FII investment in the Indian equity market.

In the second approach, it is found that few events are significant in affecting FII investment in the Indian equity market. Out of the observed events, the following events were found significant for FII investment.

1. 13th, 14th, and 15th Lok Sabha election during October 1999, May 2004 and April-May 2009 respectively;
2. The boom in IT and Telecom companies in the US in December 1999;
3. Announcement of GAAR in March 2012;
4. QFI allowed investing in Indian mutual fund and Indian equity shares in June 2012;
5. Declaration of MAT in May 2005;
6. Greece crisis in August 2015;
7. Tax revision in GST rates in December 2018; and
8. In February 2019 airstrike of Indian Air Force against Pulwama attack and announcement of interim budget 2019-20.

Though many of these national and international events are affecting FIIs investment, continuous growth and upward trend are found in FIIs investment in the Indian equity market.

As FIIs are the dominant player in the Indian equity market, the trend of their investment is important to study. To understand the trend of FII investment in the Indian equity market various events affecting the trend are important to study. Thus, for a better understanding of the trend and the pattern of FIIs investments, various factors affecting the FII investment in the Indian equity market have been studied. The further study contributed towards the second objective of the study.

Objective 2: To study the determinants of FII investment decision in the Indian Equity Market

In order to study the determinants of FII investment in the Indian equity market, first of all, it is explored through the literature review; then primary data have been collected from the experts using the structured questionnaire. In the analysis of primary data, it is found that there is a positive relationship between the performance of the Indian equity market (Sensex and Nifty as Proxy) and FII investment decision in India. When FIIs take investment decision to choose companies in Indian stock market, they prefer sectors like Financial Service, Oil and Gas, IT and Banking as most favourable sectors, in terms of capitalisation FIIs more

prefer large-cap stocks and in terms of the factors related to the performance of the company's EPS and DPS are the most important factors considered by FIIs.

In the primary survey other factors are also studied, which can be broadly classified into two categories 1) Economic factors and 2) International or global level factors. it is found that FIIs considers economic factors like purchasing power parity, GDP growth rate, inflation indexes, fiscal deficit, interest rate in domestic country, problem in domestic country of FIIs, growth opportunity in domestic country of FIIs, growth rate of the host countries, growth as well challenges in developing countries and initiatives and challenges of new government of India toward economic performance (after 2014). Further analysis of primary data is done through the factor analysis. The factor analysis is used to reduce all the factors identified through exploratory study and literature review and grouped them into fewer factors. Through the factor analysis, major six factors were found influencing FII investment in India. Such factors are as listed below.

1. failure of government in the implementation of economic policy
2. challenges posed by the international environment
3. purchasing power of Indian rupee
4. opportunities and challenges in the domestic country of FIIs
5. attractiveness of economic policy of the host country
6. initiatives of new government

After identifying these factors, to confirm their influence on FII investment in the Indian equity market, the secondary data were collected from various reliable sources viz. websites of RBI, CDSL, NSDL, BSE and NSE, as a proxy of earlier factors studied. These secondary data werer analysed through the study of causality between these factors (DII investment, GDP, IIP, WPI, Call Rate, Exchange Rate, Average USD reserve) and purchase, sales and net investment of FIIs in India. In this causality study, it is found that DIIs purchase, DIIs sale and change in IIP cause FIIs net investment in the Indian equity market. Whereas change in the exchange rate of the US dollar, call rate and Indian USD foreign exchange reserve cause FIIs sell in the Indian equity market. None of the factor found causing FIIs purchase in the Indian equity market. In addition to this, the bidirectional causality is also found between DIIs purchase in the Indian equity market and FIIs net investment in the Indian equity market. In the study of causality, it is found that FIIs purchase in the Indian equity market clauses DIIs net investment, FIIs sell in the Indian equity market cause DIIs net

investment and DIIs sale in the Indian equity market and FIIs net investment in the Indian equity market cause DIIs net investment, DIIs purchase and USD foreign exchange reserve in India.

Once the causality between various factors and FII investment in the Indian equity market is studied, towards the achievement of the last objective of study the relationship between FII investment in the Indian equity market and the performance of the Indian equity market, the causality between FII investment in the Indian equity market and the performance various indices of the Indian equity market as proxy of the Indian equity market is done. In this causality, it is found that there is bidirectional causality between sectoral indices like Auto, Bankex and Healthcare and FII investment in the Indian equity market. Thus, it is found that not only the FII investment affects the Indian sectoral indices but also the performance of these indices affect the FII investment in the Indian equity market.

Objective 3: To study the effect of FII investment in the Indian Equity Market

To serve towards the last objective of the study a causal study is done between FII investment and Nifty 50 as a proxy of the Indian equity market. Here the unidirectional causality is found between FII investment in the Indian equity market and Nifty 50. It implies that FII investment affects the performance of Nifty 50 and not a vice versa. This unidirectional causality leads me to establish the relationship between FII investment in the Indian equity market and the performance of the Indian equity market (Nifty 50). Finally, it is found that the performance of Nifty 50 is influenced by FII investment in the Indian equity market in a significant manner. This relationship have been shown through the model established, which can be represented in terms of the mean model showing the regression model with the support of variance model explaining Threshold Autoregressive conditional Heteroskedasticity (TARCH) as follow.

D(NIFTY) = 2.519 + 0.0179(D(CUM_FIIs_EQ)) - 97.361(SB_2009M07) + 121.355(SB_2014M03) - 0.047 (AR(2)) + 0.164(MA(1))

GARCH = 305.289 + 0.116*RESID(-1)^2 - 0.033*RESID(-1)^2*(RESID(-1)<0) + 0.539*RESID(-2)^2 - 0.618*RESID(-2)^2*(RESID(-2)<0) + 0.071*GARCH(-1) + 0.699*GARCH(-2)

From both of the models, it can be concluded that the performance of the Indian equity market is affected by the FII investment, various structural breaks in FIIs investments and also by its past performance. At the same time, it is also found that volatility in the performance of the Indian equity is also affected by previous time period volatility.

The above conclusion implies that the role of FII investment in the Indian equity market is significant and it affects the performance of the Indian equity market as well its volatility. Thus, all types of the investors who are interested in dealing in the Indian equity market must take into account the movement of FII investment in the Indian equity market for the rational investment decision in the equity market. At the same time to protect the interest of investors in the Indian equity market, the government should always look forward towards the policy which not only maintains the interest of existing FII investment but also attracts new FII investment through forming such policies.

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Joshi, M. C., & Desai, J. N. (2015). Role of Foreign Institutional Investors in India: An Investigation. INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, ECONOMICS & MANAGEMENT, 5(10), 1-5. (ISSN: 2231-4245, UGC Specified Journal No. 6543)

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Gujarat Technological University

PhD *Viva Voce* Report

TITLE OF THE THESIS:

Name of the Scholar	Enrollment No.	Day & Date of Public Viva Voce	Discipline/ Branch	Venue

Based on the thesis defense of above mentioned PhD Thesis, the overall recommendation on the thesis is as follows (Please tick any one of the following option):

☐ The performance of the candidate was satisfactory. We recommend that he/she be awarded the PhD Degree.

☐ Any further modifications in research work recommend by the panel after 3 months from the date of first *viva-voce* upon request of the Supervisor or request of Independent Research Scholar after which *viva-voce* can be re-conducted by the same panel again. The suggestions for improving the thesis based on the discussions during the oral examination is detailed in a separate sheet to be incorporated in the thesis.

☐ The performance of the candidate was unsatisfactory. We recommend that he/she should not be awarded the PhD Degree. A separate sheet is enclosed describing unsatisfactory performance.

Further, it is certified that the examiner who participated in the thesis defense through electronic medium (if any), have confirmed the above recommendation after the *viva-voce* (through email as attached; if any) and the same may be considered sufficient record for acceptance.

BOARD OF EXAMINERS:

Sl No	Name	Designation	Institute	Signature
1.		**Supervisor/ Co-Supervisor***		
2.		**External Examiner 1**		
3.		**External Examiner 2**		
4.		**External Examiner 3**		
5.		**External Examiner who participated through e-medium (if any)**		

*The Co-Supervisor may sign in place of Supervisor if he/she has been assigned with the academic and administrative affairs/ responsibilities of the above mentioned scholar.

Encl.:

1) Separate sheet for suggestions / comments on the thesis (if any) endorsed by the Supervisor/ Co-Supervisor and the external examiners. The same to be provided to the scholar for revision/ modification in the thesis.
2) Email of external examiner (if any) who participated in the thesis defense through electronic medium.
3) Undertaking for final submission of hard copy of Ph.D. thesis & CD.

For Office Use Only (Strike off whichever is not applicable)- **Notification may / may not be issued**

Honorable Vice Chancellor

Gujarat Technological University

PhD *Viva Voce* Report

TITLE OF THE THESIS:

A Study of Foreign Institutional Investors' (FII) Investment in Indian Equity market

Name of the Scholar	Enrollment No.	Day & Date of Public Viva Voce	Discipline/ Branch	Venue
Joshi Mrunal Chetanbhai	139997292006		Management	GTU, Chandkheda, Ahmedabad

Based on the thesis defense of above mentioned PhD Thesis, the overall recommendation on the thesis is as follows (Please tick any one of the following option):

☐ The performance of the candidate was satisfactory. We recommend that he/she be awarded the PhD Degree.

☐ Any further modifications in research work recommend by the panel after 3 months from the date of first *viva- voce* upon request of the Supervisor or request of Independent Research Scholar after which *viva-voce* can be re-conducted by the same panel again. The suggestions for improving the thesis based on the discussions during the oral examination is detailed in a separate sheet to be incorporated in the thesis.

☐ The performance of the candidate was unsatisfactory. We recommend that he/she should not be awarded the PhD Degree. A separate sheet is enclosed describing unsatisfactory performance.

Further, it is certified that the examiner who participated in the thesis defense through electronic medium (if any), have confirmed the above recommendation after the *viva-voce* (through email as attached; if any) and the same may be considered sufficient record for acceptance.

BOARD OF EXAMINERS:

Sl No	Name	Designation	Institute	Signature
1.		**Supervisor/ Co-Supervisor***		
2.		**External Examiner 1**		
3.		**External Examiner 2**		
4.		**External Examiner 3**		
5.		**External Examiner who participated through e-medium (if any)**		

Encl.:

1) Separate sheet for suggestions / comments on the thesis (if any) endorsed by the Supervisor/ Co-supervisor and the external examiners. The same to be provided to the scholar for revision/ modification in the thesis.
2) Email of external examiner (if any) who participated in the thesis defense through electronic medium.
3) Undertaking for final submission of hard copy of Ph.D. thesis & CD.

For Office Use Only (Strike off whichever is not applicable)- **Notification may / may not be issued**

Honorable Vice Chancellor