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A Study on the Pattern of Sectoral Investments of FIIs in National Stock Exchange

A. Uma

Research Scholar, Rayalaseema University, Andhra Pradesh, India

A. Sudhakar

Professor & Dean, Faculty of Commerce,

Dr. B. R. Ambedkar Open University, Hyderabad, Telangana, India

Abstract:

Financial and trade liberalization in developing countries led to the integration of international capital markets which resulted in the growth of Foreign Portfolio Investments (FPI). FII investments first started flowing into India in 1993 and portfolio flows have since then been substantial. Since FIIs are investing heavily in Indian stock market, there is a need to understand the impact of FIIs investment on Indian Companies by analysing the change in their shareholding pattern. FIIs shareholding in the stock market is large enough for them to be able to show an impact on the financial market. Cross correlation among twelve sectors in which FIIs invested during 2001-2015 was done and it was found that the investments by FIIs in Nifty stocks across various sectors are strongly correlated which means that they compensate the pullout from one sector by investing in other sectors. This is also proved by a high degree of correlation between FII investments in various sectors from 2001-2015 and the Nifty index for the period.

Keywords: FIIs, Nifty, shareholding pattern, sectoral investment

1. Introduction

Globalisation and liberalisation in India has brought dramatic changes in the financial sector. Capital formation plays a vital role in the development of an economy. The Balance of Payment Crisis of 1991, led to a comprehensive structured and financial sector reform process in India which was recommended by M. Narasimham Committee, 1991. The financial sector deregulations started after this and also lead to the integration of various segments of financial markets. There was a marvellous metamorphosis of the Indian stock market with the improved market surveillance system; trading mechanism, introduction of new financial instruments etc. This has attracted the International investors to look for investments in the Indian Stock Market. Added to this, the strong macro-economic fundamentals, positive investment climate, sound business outlook, transparency in regulatory system, abolition of long-term capital gains tax attracted more foreign investments which had supplemented the domestic financial institutions active investment and drove the bullish trend in the Indian stock market. Capital inflows into the equity market give the benefits of higher stock prices, lower cost of equity capital which encourages as well as attracts investment by firms.

After the liberalisation process, the Indian stock market started integrating with the rest of the world. SEBI gave permission for Indian companies to issue ADR's, FCCB's & ECB's. So also, foreign companies were allowed to tap the domestic stock markets along with NRIs and OCB's (Overseas Corporate Bodies). FIIs were allowed to invest in all types of securities in India including the Government securities. The FIIs investment is allowed for full capital account convertibility. The development of twenty-four hours' screen based trading, advent of floating exchange rate, liberalisation of capital account, and introduction of new financial products paved the way for linking the capital markets across the world. At this point of time, as India mechanised its stock exchanges it could attract foreign investments to a great extent. The liberalisation process of Indian economy is a very prominent contributor for the increased foreign flows to India. Due to this, the Indian financial market has become more disciplined, the FII investments has broadened the portfolio diversification which causes a long-term increase in the stock prices thereby reducing the equilibrium rate of return. The liberalisation has allowed the foreign portfolio management for diversifying their portfolio and to hedge their risks.

1.1. Need for the Study

Since FIIs are investing heavily in Indian stock market, it is inevitable to study their preference of investments in different sectors by analysing the change in their shareholding pattern. International capital flows have significant advantages for emerging economies around the world. India has gradually shifted towards liberalising its foreign exchange regulations under Foreign Exchange Management Act (FEMA) which has simplified foreign exchange transactions. Strengthening of Indian Currency and its appreciation will give handsome returns to foreign investors when the interest rates across the world are falling and will motivate foreign investors to invest in India.

2. Literature Review

Sonia Chawla and Priyanka Sharma (2014), presented a review of studies on FIIs. Though various studies have shown that FDI investment is high in service sector, movement of FDI and FPI in India is affected by many macroeconomic variables like inflation, GDP, money supply, IIP, WPI, exchange rate, Balance of trade etc., this study has conducted a review of studies so as to establish a relation between macroeconomic variables and the flow of FIIs in India. Shachin Khedekar (2010) studied the 14 triggers for market break out & found that FII flows are one of the key growth drivers of the Indian Capital Market. His study has analyzed the flow of FIIs in 2009 with the outflow in 2008 & found that FIIs have increased their stake in a large number of companies of the stocks constituting the BSE 500 Index. 257 Companies have reported a rise in FII holding and 149 a decline in the period ended March 2010. In 3 companies FIIs stake has remained unchanged. Neeta Tripathi (2008) studied the investment pattern and the selection of Indian companies by the FIIs. She has analyzed the quarterly shareholding pattern data of the BSE from Dec 2001 to 2006 and examined the changes if any in proportion of various shareholders in the overall shareholding pattern of these companies. It was also found that the FIIs invest in the top five key indices which influence the performance of the stock market. Nidhi Dhamija (2008) made an exploratory analysis of the investment of FIIs patterns across firms to examine the role of various factors relating to individual firm level characteristics and macro level conditions influencing FII investments. It was found that the regulatory environment of the host country plays a major role impacting the FIIs. Resham Jain (2006) questioned the investment of FIIs stability in the Indian stock market. The study shows that FIIs are investing in large cap and mid cap stocks irrespective of the sector because growth is their only inclination for investments. The macro economic issues like interest rates hikes in USA, raising oil prices, current account deficit and depreciating rupee leads to the volatility of FII inflows and hence affects their stability.

2.1. Objectives of the Study

1. To identify the preference of FIIs investment in various sectors of Nifty stocks in India.
2. To study the cross correlation between the sectors in which FIIs invest in Nifty stocks in order to identify the pattern of their investments in India.

2.1.1. Factors Influencing the Choice of Companies for Investment by FIIs

Foreign investors have professional expertise and experience of international financial markets. Due to this, they will look for various factors which will help them to increase their return on investments. The emerging economies have developed their financial markets in such a way that they are conducive to the expectations of foreign investors and domestic investors as well. A portfolio may consist of different classes of assets like equity shares, debt related instruments, liquid cash, exchange traded funds, mutual funds etc. The asset allocation of investors depends upon their preferences and it involves proper decision making capabilities of the investors. The asset allocation process is very crucial for international investors because, they have to take investment decision of not only allocation but also the magnitude of funds to be invested in equity, debt and other assets.

FIIs rely on two types of investment research before investing in a country. They are in house research and the research done by external specialized researchers. Thus, the FIIs are equipped with extensive series of research material from diversified sources. This helps them to critically analyse the research reports received regarding each asset class. However, FIIs investment decisions can be identified at the micro level as influencing factors for their selection of companies in India. Few of the factors are:

- a) Company Analysis
- b) Financial Reporting, Transparency and Disclosure Practices
- c) Corporate Governance Practices
- d) Competency of Management
- e) Inclusion/ Induction in International Indexes
- f) International Listing
- g) Grading by International Rating Agencies

The influence of FIIs movement in Nifty can be analysed with the help of studying their pattern of shareholding in Nifty because FIIs are the biggest non-promoter shareholders of NSE. To judge the real influence of the FIIs on the share prices of Nifty companies, the FIIs proportion of holding in a company should be considered.

3. FIIs Investment in Various Sectors in India

FIIs prefer to invest in the following sectors in India

- a) Media and Entertainment
- b) Banking
- c) Finance
- d) Information and Technology
- e) Petrochemicals
- f) Metals
- g) Pharmaceuticals
- h) Automobiles
- i) Service Sector
- j) Consumption Sector
- k) Manufacturing
- l) Miscellaneous.

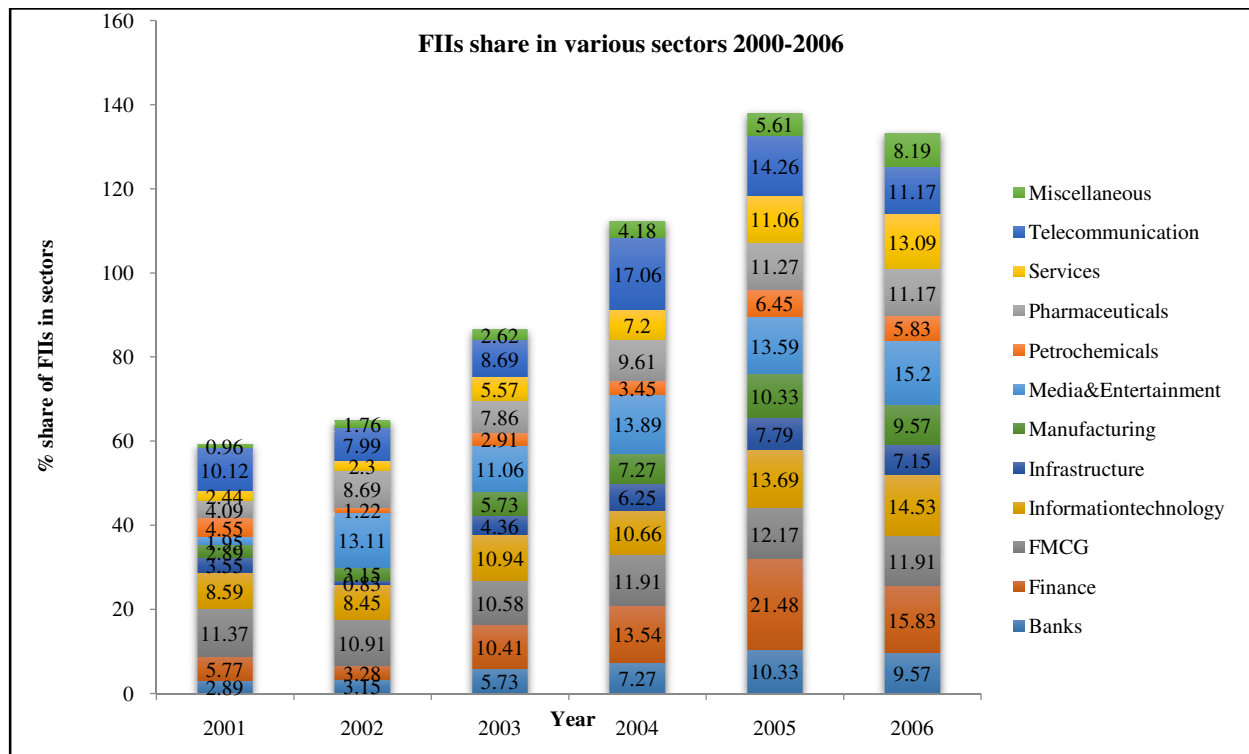


Figure 1
Source: ISMR various issues from 2000-2006

The above chart depicts the FII investments in various sectors from the year 2000 to 2006.

- FIIs have preferred the investment in finance sector which has increased from 5.77% to 15.83%
- FIIs investment in banking sector has increased from 2.89%. to 9.57%
- FII investment in FMCG has been considerable and ranges between 10.58 to 11.91%.
- FII investment in information technology has increased from 8.59% to 14.53%.
- FIIs investment in infrastructure has been fluctuating and has declined to 7.15% after touching a peak of 13.11%
- Investment in the manufacturing sector by FIIs has touched 9.57% from 2.89%.
- Investment in Media and Entertainment sector has increased 10.5% to 15.02%.
- FII investment in petrochemical sector has risen except the year 2006, where it has fallen to 5.83% from 6.45%.
- FII investment in pharma sector also has increased since the year 2000, and has reached 11.17% from 4.09%.
- FII investment in services sector has continuously increased from 2.44% to 13.09%.
- FII investment in Telecom sector has been fluctuating and has peaked in the year 2004, where it touched 17.06% from 10.12% and then on declined to 11.7% in the year 2006.
- Investments in other sectors by FII have increased from 0.9% to 8.19%.

From the above chart, it is clear that FIIs preference was higher in Banking, Services and Media& Entertainment sector.

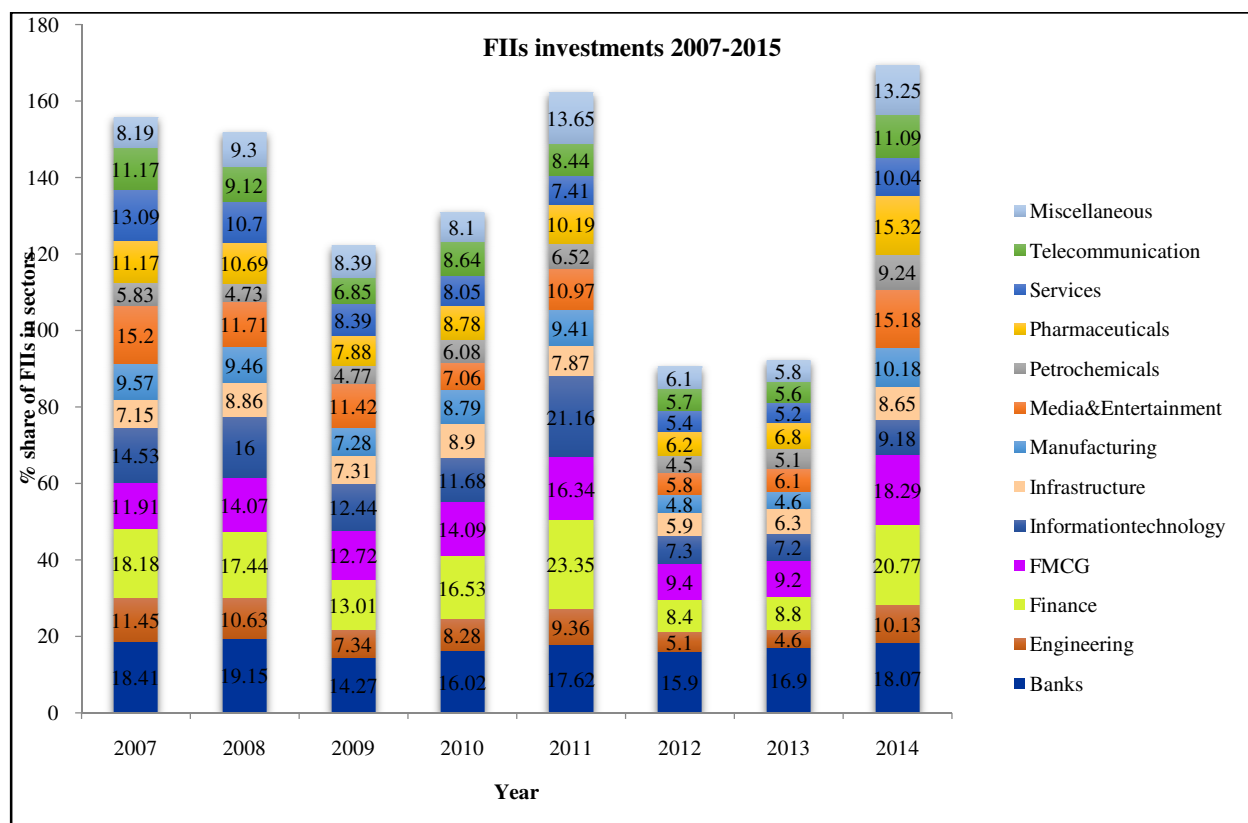


Figure 2

Source: ISMR various issues from 2007-2015

The above chart indicates the FIIs preferred investments in various sectors since 2007-08 to 2014-15.

- FIIs investment in Banking sector has been constant around 18% since 2007-15.
- FIIs investment in engineering sector has declined from 11.45% in 2007-08 to 10.13% in 2014-15.
- Finance sector has seen a growth from 18.8% to 20.77% since 2007-2015.
- FMCG sector has been attracting FIIs investment and the growth is from 11.91% to 18.29% from 2007-15.
- Information Technology sector has witnessed a fall in FIIs investment from 14.53% to 9.18% from 2007-15.
- FIIs investment in infrastructure sector has not fluctuated much and has grown gradually from 7.15% in 2007 to 8.65% in 2015.
- FIIs investment in manufacturing sector also has not varied much. It was around 9.57% in 2007 and has touched 10.18% in 2015.
- Media and Entertainment sector has not witnessed much fluctuation in FIIs investment and is almost the same since 2007 to 2015 at 15.2%.
- There is a continuous growth in FIIs preference of investment in Petro chemicals sector wherein it has grown from 5.83% in 2007 to 9.24% in 2015.
- Pharmaceuticals sector has witnessed an increase in FIIs investment from 11.7% in 2007 to 15.32% in 2015 with a slight downfall in 2012-14.
- FIIs investment in Services sector has declined from 13.09% in 2007 to 10.04% in 2015.
- Telecommunication sector has not seen much of fluctuation in FIIs investment and is almost constant around 11.2% since 2007 to 2015 except for a fall in 2012-14.
- FIIs investment in all other miscellaneous sectors has increased from 8.19% in 2007 to 13.25% in 2014-15.

The above analysis depicts that FIIs preferred FMCG sector the most as their investments have grown by 7.5% from 2007-15, followed by Miscellaneous sector which has grown by 5.06%, Pharmaceuticals and Petrochemicals by 3.62% and 3.41% respectively, Infrastructure by 1.5% and Manufacturing sector by 0.61%. There was no growth in the Banking, Telecommunication and Media & Entertainment sectors. Whereas, Engineering, Services and Information Technology sectors have witnessed a decline in FIIs investments. Almost all the sectors have witnessed a downfall in FIIs investments during 2012-14 and have recovered after that.

Correlation	Lnauto	Lnbanks	Lnconsumption	Lnfinance	Lnfmcg	Lnit	Lnmedia	Lnmatal	Lnpetrochem	Lnpharma	Lnservices
LNAUTO	1.0000										
LNBNKS	0.9575	1.0000									
LNCONSUMPTION	0.9731	0.9127	1.0000								
LNFNANCE	0.9322	0.9953	0.8847	1.0000							
LNFMCG	0.7587	0.6710	0.8655	0.6430	1.0000						
LNIT	0.9339	0.8641	0.9453	0.8273	0.7664	1.0000					
LNMEDIA	0.8559	0.8925	0.7542	0.8892	0.3848	0.7043	1.0000				
LNMETAL	0.9503	0.8628	0.9804	0.8259	0.8477	0.9581	0.6899	1.0000			
LNPETROCHEM	0.8979	0.8157	0.9200	0.7712	0.7663	0.9534	0.6438	0.9508	1.0000		
LNPHARMA	0.9810	0.9543	0.9520	0.9271	0.7120	0.9499	0.8391	0.9411	0.9158	1.0000	
LNSERVICES	0.9700	0.96543	0.9649	0.9483	0.7550	0.9451	0.8284	0.9366	0.9215	0.9733	1.0000

Table 1: Correlation between various sectors of FII investments from January2001- December2005

Source: CMIE Prowess Database

The above table shows the correlation between FII investments in various sectors. This table consists of 5 years of quarterly data starting from the year 2001 January to the year 2005 December. The various sectors considered for correlation are Automobile, Banking, Finance, FMCG, IT, Media, Metal, Petrochemicals, Services, Pharmaceutical and Consumption sector. The log values for the entire data are taken for the purpose of compounding effect and the correlation analysis is as follows.

1. The correlation between automobile sector and banks, consumption, finance, IT, metal, pharma and services are very high at 0.93 and above. Whereas the correlation between automobile and FMCG, media and petrochemical is around 0.80 to 0.89 this is also considered to be a high positive correlation.
2. The correlation between banking sector with consumption, pharma, finance and services are above 0.91 which is a high positive correlation whereas the correlation between banks and IT, Media, metal and petrochemical varies between 0.81 to 0.89 which is considered good. The correlation between banking and FMCG is moderate which stands at 0.67.
3. The correlation between consumption sector and all other sectors ranges from 0.86 to 0.98 which is a high positive correlation whereas the correlation between consumption and media is moderate at 0.75.
4. The correlation between the finance sector and all other sectors ranges between 0.82 to 0.99 which is a high positive correlation whereas the correlation between finance and petrochemical stands moderately at 0.77 and with FMCG at 0.64 which is also considered as a positive correlation.
5. The correlation between FMCG and metal, consumption is high at 0.85. Whereas the correlation between FMCG IT, petrochemical, services are moderate at 0.71 to 0.76. The correlation between FMCG and media is the least at 0.38 which is although a positive correlation is quite low in its relationship.
6. The correlation between IT sector and all the sectors except media, finance, banking and FMCG is above 0.93 which is a very high positive correlation. The correlation between IT, bank, finance is around 0.85 whereas with media it is 0.70 which is a moderate positive correlation.
7. The correlation between media and metal, IT, consumption stands very high at above 0.95 whereas the correlation between media and banking, finance, FMCG, pharma and services range between 0.8 to 0.86 and is a good correlation. The correlation between media and metal, petrochemical is very moderate at 0.65.
8. The correlation between metal and automobile, consumption, IT, petrochemical, pharma and services is very high at 0.93 and above. The correlation between metal and banking, finance, FMCG ranges between 0.82 to 0.86 which is also a good correlation whereas the correlation between metal and media is very moderate at 0.68.
9. The correlation between petrochemical and consumption, IT, pharma and services is very high and ranges between 0.91 to 0.95. The correlation between petrochemical and automobile, banking is also high and is between at 0.81 to 0.89. The correlation between petrochemical and finance, FMCG is above moderate and not that good and ranges between 0.76 to 0.77 whereas the correlation between petrochemical and media is very moderate at 0.64.
10. The correlation between pharma and all other sectors except FMCG and media is above 0.92 which is a very high positive correlation. The correlation between pharma and media stands at 0.83 which is also quite good whereas with FMCG it is above moderate at 0.71.
11. The correlation between services and all other sectors except FMCG and media ranges between 0.92 to 0.97 which is a very high positive correlation. The correlation between services and media is also good at 0.83 whereas with FMCG it is above moderate at 0.75.

12. The analysis of the five-year data reveals that although there is a positive correlation between FII investments in various sectors, it can be concluded that the FIIs are choosy while investing in FMCG and media.

correlation	Inauto	Inbanks	Inconsumption	Infinance	Infmcg	Init	Inmedia	Inmetal	Inpetrochem	Inpharma	Inservices
LNAUTO	1.0000										
LNbanks	0.8912	1.0000									
LNCONSUMPTION	0.9060	0.9504	1.0000								
LNFINANCE	0.8762	0.9659	0.9274	1.0000							
LNFMCG	0.8339	0.9534	0.9269	0.9896	1.0000						
LNIT	0.6602	0.8028	0.8387	0.7122	0.7418	1.0000					
LNMEDIA	0.7194	0.8154	0.8322	0.8301	0.8481	0.7314	1.0000				
LNMETAL	0.8935	0.8382	0.9427	0.8005	0.7872	0.7619	0.6739	1.0000			
LNPETROCHEM	0.5144	0.4442	0.4569	0.4904	0.4797	0.1498	0.7065	0.3317	1.0000		
LNPHARMA	0.7074	0.8959	0.8741	0.8429	0.8541	0.8795	0.8648	0.7391	0.4159	1.0000	
LNSERVICES	0.8741	0.9678	0.9635	0.9768	0.9752	0.7772	0.8797	0.8374	0.5469	0.8962	1.0000

Table 2: Correlation between various sectors of FII investments from January2006- December2010

Source: CMIE Prowess Database

The above table shows the correlation between FII investments in various sectors. This table consists of 5 years of quarterly data starting from the year 2006 January to the year 2010 December. The various sectors considered for correlation are Automobile, Banking, Finance, FMCG, IT, Media, Metal, Petrochemicals, Services, Pharmaceutical and Consumption sector. The log values for the entire data are taken for the purpose of compounding effect and the correlation analysis is as follows.

1. The correlation between automobile sector and consumption, banking, metal, and services are very high ranging from 0.89 to 0.91 which is a high positive correlation. Whereas the correlation between automobile and FMCG, finance is between 0.83 to 0.87 which is also considered to be a high positive correlation. The correlation between automobile, pharma, and media is around 0.71 which is a moderate correlation. The correlation between automobile and IT is 0.66 and petrochemical is 0.51 which is an average correlation.
2. The correlation between banking sector with consumption, pharma, finance, FMCG and services are above 0.90 which is a high positive correlation whereas the correlation between banks and IT, Media, metal varies between 0.80 to 0.83 which is considered good. The correlation between banking and petrochemical is quite low which stands at 0.44.
3. The correlation between consumption sector and finance, FMCG, metal, banking, automobile and services is above 0.91 which is a very high positive correlation whereas the correlation between consumption and IT, media and pharma ranges between 0.83 to 0.87 which is a good correlation. The correlation between consumption and petrochemical is low at 0.45.
4. The correlation between the finance sector and FMCG, consumption, services and banking is very high and ranges between 0.92 to 0.98 which is a very high positive correlation. Whereas the correlation between finance and automobile, media, metal and pharma ranges between 0.83 to 0.84 which is also a good positive correlation. The correlation between finance and IT is at 0.71 which is moderate correlation. The correlation between finance and petrochemical is very moderate at 0.5.
5. The correlation between FMCG and banking, consumption, finance and services ranges between 0.92 to 0.99 which is a very high positive correlation. On the other hand, the correlation between FMCG and media and pharma is around 0.85 which is a good correlation. The correlation between FMCG and IT, metal is moderate at 0.74, 0.78 respectively. The correlation between FMCG and petrochemical is the lowest at 0.48.
6. The correlation between IT sector and banking, pharma, consumption ranges between 0.80 to 0.88 which is a good positive correlation. The correlation between IT and finance, FMCG, media, metal and services ranges between 0.71 to 0.77 which is a moderate positive correlation. The correlation between IT and automobile is 0.66 which is also a moderate correlation whereas IT and petrochemical is very low at 0.15.
7. The correlation between media and banking, consumption, finance, FMCG, pharma and services ranges between 0.81 to 0.88 which is a high positive correlation whereas the correlation between media and automobile, IT and petrochemical ranges between 0.71 to 0.73 and is a good correlation.
8. The correlation between metal and consumption is very high at 0.94. The correlation between metal and automobile, banking, finance, services ranges between 0.80 to 0.89 which is also a good correlation whereas the correlation between metal and FMCG, IT and pharma ranges between 0.73 to 0.79 which is high correlation. The correlation between metal and media is quite low at 0.67.
9. The correlation between petrochemical and media is high at 0.71 which is a high moderate correlation. The correlation between petrochemical and automobile, services is at 0.51 and 0.54 respectively which is a moderate correlation. The

correlation between petrochemical and banking, consumption, finance, FMCG and pharma ranges between 0.41 to 0.49 which is a lesser moderate correlation. Whereas, the correlation between petrochemical and metal is at 0.33 and IT at 0.15 which is a low correlation.

10. The correlation between pharma and banking, services is at 0.9 which is a very high positive correlation. The correlation between pharma and consumption, finance, FMCG, IT, media ranges between 0.84 to 0.87 which is also quite good whereas with automobile and metal it is above moderate at 0.71 to 0.74. The correlation between pharma and petrochemical is the least at 0.42.
11. The correlation between services and banking, consumption, finance and FMCG is around 0.97 which is a very high positive correlation. The correlation between services and automobile, media, metal and pharma ranges between 0.83 to 0.89 which is also a good positive correlation. Whereas with IT is 0.78 which is a high moderate correlation and is the least with petro at 0.55.

From the above analysis, it can be concluded that, FIIs did not prefer the petrochemical sector during this period and the correlation between petrochemical and majority of the other sectors were well below the moderate level.

Correlation	Lnauto	Lnbanks	Lnconsumption	Lnfinance	Lnfmcg	Lnit	Lnmedia	Lnmatal	Lnpetrochem	Lnpharma	Lnservices
LNAUTO	1.0000										
LN BANKS	0.5417	1.0000									
LN CONSUMPTION	0.8416	0.7375	1.0000								
LN FINANCE	0.5755	0.9932	0.7676	1.0000							
LN FMCG	0.7563	0.0404	0.6124	0.0963	1.0000						
LN IT	0.4158	0.9243	0.6637	0.9327	-0.0791	1.0000					
LN MEDIA	0.6459	0.7915	0.9266	0.8241	0.3692	0.8108	1.0000				
LN METAL	0.5062	0.5496	0.8466	0.5553	0.4272	0.5215	0.8510	1.0000			
LN PETROCHEM	0.7716	0.7774	0.9614	0.8159	0.4699	0.7741	0.9646	0.7995	1.0000		
LN PHARMA	0.6585	0.7513	0.9193	0.7830	0.3819	0.8016	0.9671	0.8517	0.9536	1.0000	
LN SERVICES	0.6004	0.9659	0.8309	0.9786	0.1313	0.9485	0.9021	0.6525	0.8970	0.8728	1.0000

Table 3: Correlation between various sectors of FII investments from January 2010- December 2015

Source: CMIE Prowess Database

The above table shows the correlation between FII investments in various sectors. This table consists of 5 years of quarterly data starting from the year 2011 January to the year 2015 December. The various sectors considered for correlation are Automobile, Banking, Finance, FMCG, IT, Media, Metal, Petrochemicals, Services, Pharmaceutical and Consumption sector. The log values for the entire data are taken for the purpose of compounding effect and the correlation analysis is as follows.

1. The correlation between automobile sector and consumption is high at 0.84 which is a high positive correlation. Whereas the correlation between automobile and FMCG, petrochemical is at 0.75 and 0.77 respectively which is also considered to be a high moderate correlation. The correlation between automobile and services, pharma, media is around 0.60 to 0.65 which is a moderate correlation. The correlation between automobile and metal, finance, banking ranges between 0.50 to 0.57 which is a moderate correlation and with IT it is the least with 0.42.
2. The correlation between banking sector with finance, IT and services are above 0.93 which is a high positive correlation. The correlation between banks and consumption, pharma, petrochemical and Media, varies between 0.73 to 0.79 which is considered good correlation. The correlation between banking and metal and automobile is quite low which stands at 0.54 and the least with FMCG at 0.04.
3. The correlation between consumption sector and media, petrochemical, pharma is above 0.92 which is a very high positive correlation, but the correlation between consumption and metal, automobile, and services is at 0.84 which is a good positive correlation. The correlation between consumption and banking, finance is at 0.73 and 0.77 respectively which is a high moderate correlation. The correlation between consumption and FMCG and IT is very moderate at 0.61 and 0.66 respectively.
4. The correlation between the finance sector and IT, services and banking is very high and above 0.93 which is a very high positive correlation. The correlation between finance and petrochemical media is at 0.81 and 0.82 respectively which is also a good positive correlation. The correlation between finance and consumption and pharma and ranges between 0.76 to 0.78 which is highly moderate correlation. The correlation between finance and metal, automobile is very moderate at 0.55 and 0.57 respectively. Whereas the correlation between finance and FMCG is least at 0.09.

5. The correlation between FMCG and automobile sector is at 0.75 which is a high moderate positive correlation followed by consumption at 0.61. The correlation between FMCG and metal, petrochemical, media and pharma are below moderate and ranging between 0.36 to 0.46. The correlation between FMCG and services, finance and banking are very negligible ranging between 0.04 to 0.01. The correlation between FMCG and IT is negative at -0.08.
 6. The correlation between IT sector and banking, finance and services is very high above 0.93 which is a high positive correlation. The correlation between IT and media and pharma is at 0.81 which is a good positive correlation. The correlation between IT and petrochemical is highly moderate at 0.77. The correlation between IT and consumption is moderate at 0.66. The correlation between IT and metal, automobile is just moderate at 0.5. Whereas, the correlation between IT and FMCG is negative at -0.08.
 7. The correlation between media and consumption, petrochemical, pharma and services is very high and above 0.90 which is a high positive correlation. The correlation between media and IT, banking, finance and metal is also high which ranges between 0.80 to 0.85 and is a good correlation. The correlation between media and automobile is very moderate at 0.65 and is lowest with FMCG at 0.37.
 8. The correlation between metal and consumption, media, pharma and petrochemical ranges between 0.80 to 0.85. The correlation between metal and services is 0.65 which is moderate correlation. The correlation between metal and automobile, banking, finance, IT and ranges between 0.50 to 0.56 which is just moderate correlation. The correlation between metal and FMCG is least and quite low at 0.42.
 9. The correlation between petrochemical and consumption, media and pharma is very high at 0.96 which is a high positive correlation. The correlation between petrochemical and services, finance is at 0.89 and 0.81 respectively which is a good positive correlation. The correlation between petrochemical and banking, automobile, IT and metal ranges between 0.77 to 0.79 which is a high moderate correlation. Whereas the correlation between petrochemical and FMCG is the least at 0.47.
 10. The correlation between pharma and consumption, media and petrochemical is very high above 0.92 which is a very high positive correlation. The correlation between pharma and IT, metal is at 0.80 to 0.85 respectively which is also quite good. The correlation between pharma and banking, finance is highly moderate at 0.75 and 0.78 respectively. The correlation between pharma and automobile is just moderate at 0.65 and very low with FMCG at 0.38.
 11. The correlation between services and banking, finance, IT, media and petrochemical is around 0.90 which is a very high positive correlation.
 12. The correlation between services with consumption and pharma ranges between 0.83 to 0.87 which is also a good positive correlation. The correlation between services and automobile, metal is at 0.60 and 0.65 respectively which is a very moderate correlation and it is the least with FMCG at 0.13.
- It can be concluded that, during this period, FIIs were apprehensive in investing in the FMCG sector and the correlation is almost less than moderate with majority of sectors

Correlation	Lnauto	Lnbanks	Lnconsumption	Lnfinance	Lnfmcg	Lnit	Lnmedia	Lnmetal	Lnpetrochem	Lnpharma	Lnservices
LNAUTO	1.0000										
LN BANKS	0.9576	1.0000									
LN CONSUMPTION	0.9869	0.9485	1.0000								
LN FINANCE	0.9692	0.9829	0.9586	1.0000							
LN FMCG	0.9646	0.9056	0.9852	0.9377	1.0000						
LN IT	0.9584	0.9505	0.9780	0.9360	0.9445	1.0000					
LN MEDIA	0.9370	0.9206	0.9230	0.9684	0.9164	0.8792	1.0000				
LN METAL	0.9752	0.9293	0.9928	0.9327	0.9711	0.9789	0.8892	1.0000			
LN PETROCHEM	0.9738	0.9503	0.9665	0.9565	0.9410	0.9518	0.9317	0.9549	1.0000		
LN PHARMA	0.9807	0.9583	0.9873	0.9522	0.9542	0.9847	0.9074	0.9833	0.9668	1.0000	
LN SERVICES	0.9838	0.9840	0.9844	0.9832	0.9536	0.9769	0.9374	0.9709	0.9807	0.9861	1.0000

Table 4: Correlation between various sectors of FII investments from January 2001- December 2015

Source: CMIE Prowess Database

The above table shows the correlation between FII investments in various sectors. This table consists of 15 years of quarterly data starting from the year 2001 January to the year 2015 December. The various sectors considered for correlation are Automobile, Banking, Finance, FMCG, IT, Media, Metal, Petrochemicals, Services, Pharmaceutical and Consumption sector. The log values for the entire data are taken for the purpose of compounding effect and the correlation is analysed as follows.

1. There is a high degree of correlation between the automobile sector and all other sectors which is above 0.9.

2. There is a high positive correlation between Banking sector and all other sectors which is also above 0.9.
3. The correlation between Consumption and all other sectors also shows a high positive correlation which is above 0.9.
4. The correlation between Finance and all other sectors is also very high and above 0.9.
5. FII investment in Media and its correlation between other sectors shows a high positive correlation which is above 0.9.
6. Similarly, FII investment in IT and its correlation between other sectors shows a high positive correlation which is above 0.9.
7. The correlation between FMCG and all other sectors is also very high and above 0.9.
8. The correlation between Petrochemical and all other sectors is considerably high and positive which is around 0.9.
9. The correlation between FII investment in Metal and all other sectors is quite high around 0.9.
10. The correlation between Pharmaceutical and all other sectors is relatively high and around 0.96.
11. The correlation between Services and all other sectors stands high and is approximately around 0.93.

It can be concluded that the correlation between FII investments and various sectors has shown a high positive correlation averaging at around 0.90 during the overall period starting from 2000-2015.

3.1. Correlation between FIIs Sectoral Investments and Nifty Index for the Period 2001-2015

In order to validate the cross-correlation results between various sectors in which FIIs invest in NSE stocks, a correlation was done between Nifty Index points and the FIIs investments and the result proved a high degree of correlation at **0.92**. The result confirms that FIIs continue to prefer their investments in India across sectors and although, few sectors have experienced high fluctuations in FIIs investment, it gets compensated by investments in other sectors.

4. Conclusion

FIIs are choosy in their investments and they do take precautions before investing in a particular sector based on the performance of the sector. Over the years, it is found that the FIIs find the Banking sector as the safest bet because, there is not much of fluctuation in this sector and the correlation of this sector with most of the other sectors are quite high. However, FIIs were a bit cautious while investing in FMCG sector as there is high fluctuation in their investments and also their correlation with most of the other sectors are little moderate. It means that FIIs do follow a certain pattern of investment i.e., if they pull out their investments in a particular sector, they do compensate it by way of investments in other sectors.

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