3. CONCEPTUAL FRAMEWORK

The prime objective of this chapter is to provide conceptual inputs to the reader about key facts, research questions, assumptions, framework for multiple objectives, and process for addressing research gaps. It also provides a brief about economic indicators and sector indices. It discusses key issues – reliability of IIP, market efficiency and co-integration and VAR model and monetary policy.

3.1 Introduction

The world economy has gradually started recovering due to buoyant economic activities in the emerging economies. However, the developed economies are still suffering from compounded factors, including large fiscal deficits, unemployment, inflation and high debts. All these have resulted in very slow economic growth. The sub-prime crises created an environment of uncertainty and risk. The rising oil and agriculture prices, fueling inflationary pressures and large inflows of capital in the emerging economies have slowed down global economic recovery. However, the Indian growth story is remarkable as its economy has exhibited resilience despite compounded factors, including persistent worldwide recessionary conditions, growing current account deficit and inflationary pressures. The other challenges faced by the Indian economy are volatility in FIIs flows, slowdown in exports resulting in widening balance of payment due shrinking global demands, increasing oil and commodities prices, and existence of alternative attractive markets.

The phenomenal rise of the Sensex from a level of 2600 on 21/9/2001 to a peak of 21,078 on 8/01/2008, when Indian GDP was growing at an average annual rate of 8-9 %, suggests that equities prices were driven by future expectations about India’s growth and its place on the world stage. The slump in 2008 reflects the effect of the global recession which triggered the withdrawal of FII investments to shore-up the balance sheets of their principals in their home countries. The subsequent recovery to 16,000 to 17,000 levels suggests that the precipitous slump in 2008 was an
overreaction and the current levels are the more natural levels. But these are hypotheses that need to be validated by empirical research.

The rapid growth of the equities market raises the question whether this is a natural corollary of growth and of trade liberalization, or did the Sensex of the BSE move autonomously.

The massive withdrawal from India, of their portfolio investment by the FIIs when the sub-prime crisis hit the US and European financial markets, was unrelated to any change in the macroeconomic fundamentals in India. The consequent collapse of equity prices in India was an occurrence that could not have been predicted. However, when the US financial crisis was relatively under control, the FIIs returned to India. Thus, one can conclude that in the medium- to long-term the macroeconomic factors are important.

The remainder of this chapter is organized as follows: Section 2 relates to FIIs and Indian stock market. Section 3 provides information on major sector indices. Section 4 lists research questions, Section 5 gives key assumptions, Section 6 provides the objectives and hypothesis, Section 7 gives the background of the indentified variables including economic indicators and sector indices, Section 8 provides steps to address the research gaps, Section 9 gives assumed relationships between variables, and Section 10 highlights key issues and implications.

### 3.2 FIIs & Indian Stock Market

The Government of India, in 1991-92, initiated gradual structural and economic reforms, and the trade liberalization process in order to bring substantial economic growth, integrate with global economies, and provide market access for attracting foreign investments by removing restrictions and regulations. Due to the growing BOP crisis, the high level committee on the Balance of Payments of 1993, headed by Mr. C Rangarajan, in their report, had recommended to shift the composition of external flows to non-debt creating flows which resulted in moving from a regulatory regime and further allowing FIIs to invest in both debt and equity markets. Subsequently, in January 1993, FIIs in shares and debentures also started.
FIIs in the form of Foreign Portfolio Investments helps in enhancing trading volume and market capitalization, thus, improving functioning of the secondary market by providing an array of attractive investment opportunities of a variety of assets having diversified risk, returns and liquidity profiles. Further, FIIs, in general, may lower cost of capital, provide access to cheap global credits, supplement domestic savings and investments, and help in capital market reforms. However, FIIs may increase inflation, create asset bubbles, bring financial instability and volatility in the stock market due to a sudden reversal of its inflows. According to Dr Subbarao, Governor RBI, “Capital flows aid growth by providing external capital to sustain an excess of investment over domestic savings. By affording the opportunity of using the world market, an open capital account permits both savers and investors to diversify their portfolio to maximize returns and minimize risks”\(^{14}\).

The FIIs follow policies and guidelines of the RBI and Security Exchange Board of India (SEBI)\(^ {15}\) which have changed from time to time due to dynamic domestic and global environment.\(^ {16}\) The guidelines under SEBI (FII) regulation, 1995, provide its linkage with government policy framework for investment limits in specific sectors. The policy framework has evolved since 1992 till today.\(^ {17}\) GOI took a steady and cautious approach for gradual liberalization of quantitative restrictions by focusing on policy relaxations on investment limits, eligibility criterion for investment, and liberalization of investment instruments for FIIs.\(^ {18}\) Under the Foreign Exchange Regulation Act (FERA), FIIs registered with RBI should obtain permission to buy, sell and realize capital gains on investments which are made by an initial corpus remitted to India so as to invest in any recognized stock exchanges through designated banks. The FERA was replaced in 2000 by Foreign Exchange Management Act, (FEMA), 1999, which now controls foreign exchange related transactions for FIIs as approved by the RBI.

\(^{14}\) RBI Annual Report, pp. 09-10.
\(^{15}\) GOI’s press note of 14/9/1992.
\(^{16}\) Guidelines under SEBI(FII) regulation,1995.
\(^{17}\) Table 8.3:Policy Change of FIIs
\(^{18}\) www.nseindia.com: Foreign Investment in India.
The two routes for FIIs are 70:30 routes, wherein, 70% of equity and equity related investments is permissible and balance 30% is for debt. The second route is through 100% debt security investment, however, our focus is on the normal equity FII route. Furthermore, to provide flexibility to FII composition, section 15(2) of SEBI FII regulation pertaining to restrictions of 70:30 investments in equity and debt has been removed from October 2008. FIIs are now permitted to invest in all types of securities including government securities. The investment by FIIs can avail full capital account convertibility. They can invest in a company under portfolio investment route up to 24% of paid up capital of the company.

Foreign investments can come into India in different forms (Figure 3.2-1):

- Investment in the listed companies – FIIs;
- Investments in listed and unlisted companies not coming through stock exchanges – Foreign Direct Investment (FDI), Private Equity and Foreign Venture Capital route;
- Investment through ADR, GDR by the NRIs and people of Indian origin.

Foreign Portfolio Investment (FPI) comprises of GDR/ADR, FIIs and offshore funds and others.

Figure 3.2-1: Foreign Investments in India
Source: ISMR, NSE, Chapter 7, 2011, page 177
In 1991-92 the total foreign investments comprising of FDI & FPI was $0.133 billion. FPI increased from mere $4 million touching $ 3.82 billion in 1994-95 (Table 3.12-1). However there were outflows of - $ 61 million in 1998-99 during the post - Asian crisis when Thai Baht was deregulated on 2/7/1997. There was gradual recovery during 1999-2002.

The fall in the technology and IT stocks caused bubble burst in April 2001 resulting in the decline of FPIs from $ 2.02 billion in 2001-02 to $0.98 billion in 2002-03.

The time frame from 2003 to January 2008, commonly known as bull-run period, is characterized by the strong economic growth. Net inflow during 2007-08 was $27.27 billion, an increase of 290% from $ 7.00 billion in 2006-07.

The sub-prime mortgage crisis occurred during 2007-08 resulting in worldwide recessionary conditions consequently due to weak sentiments of investors; the global securities suffered maximum loss during December 08 to early 09 which resulted in net outflows of FPI of -$13.86 billion during 2008-09. Thus there has been outflows of FPI during two years: 1998-99 & 2008-09. However, attractive domestic market conditions facilitated net inflow of FIIs $30.2 billion during 2009-10, which touched around $32.37 billion in 2010-11 (Table 3.12-2).

The gross purchase of debt and equity FIIs increased from $ 131.97 billion in 2008-09 to $ 218.44 billion in 2010-11, an increase of 65.52% and combined gross sales increased from $141.81 billion to $186.21 billion, an increase of 31.31% during same period. The cumulative investment by FIIs (at acquisition cost) increased by 105.75%; from $59.08 billion to $121.56 billion for March 2009 to March 2011 (Table 3.12-2, Figure 3.2-2).
There have been consistent inflows of FIIs in the equity segment during 2003 to 2008 with a minor dip in 2006-07. A total reversal from outflow of (–)$10.24 billion during 2008-09 to an inflow of $23.37 billion during 2009-10, an increase of 128.2%. This remarkable increase of inflow is consistent with the growth in other emerging economy. There is a further increase by 3.68 % of net investment in equity touching $24.23 billion in 2010-11 from 2009-10 level. (Table 3.2-1)

Table 3.2-1: Net FIIs Investment in Equity & Debt

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Investments by FIIs b $</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equity</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.69</td>
</tr>
<tr>
<td>2002-03</td>
<td>0.53</td>
</tr>
<tr>
<td>2003-04</td>
<td>8.74</td>
</tr>
<tr>
<td>2004-05</td>
<td>9.96</td>
</tr>
<tr>
<td>2005-06</td>
<td>11.02</td>
</tr>
<tr>
<td>2006-07</td>
<td>5.58</td>
</tr>
<tr>
<td>2007-08</td>
<td>13.27</td>
</tr>
<tr>
<td>2008-09</td>
<td>-10.24</td>
</tr>
<tr>
<td>2009-10</td>
<td>23.37</td>
</tr>
<tr>
<td>2010-11</td>
<td>24.23</td>
</tr>
</tbody>
</table>

FII stakes in the different sectors of NSE listed companies is given in the Table 3.12. According to March 2011 statistics, relating to percentage share of main sectors, indicate that Finance (14.38%), Information Technology (13.04%), Banking (10.86%), FMCG (10.07%), and Media & Entertainment (6.28%) are the most attractive for investment (Pie diagram Figure 3.2-3). The total share of FIIs in all sectors in March 2011 is 10.32% of the total shares of companies listed on NSE.

Figure 3.2-3: Pie Diagram- Share of FIIs in different sectors for 2011

Source: Compiled from NSE, ISMR, 2011, page 190

The number of FIIs registered with RBI was 3 in 1993. It started increasing from 2003 onwards. There was a sudden jump to 1,319 in 2007-08 and it peaked to 1,626 in 2008-09. Although the Sensex performed better in 2009-10, but the number of new FIIs registered declined to 87. Total number of registered FIIs increased marginally from 1,713 in March 2010 to 1,722 by March 2011. The US, UK, Mauritius and Hong Kong were major countries which are taking the FII route to invest in the Indian capital market.

It was observed that the emerging markets have been growing faster than the advanced economies and are also considered safe and attractive investment destination. The inflows data for the first half of 2010 indicates that the emerging

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20 http://www.sebi.gov.in/sebiweb/home/list/4/24/0/0/Annual-Reports.
markets are leading the economic recovery process. Though the investment pattern for the first half of 2010 is uneven, but India, Japan, Indonesia and Philippines have shown increase in y-o-y increase in investments; however inflows in Brazil and South Africa have been lower.\textsuperscript{21} But, recently, it was seen that FII outflow from India was highest amongst BRIC nation. According to the data compiled by EPFR Global, FIIs withdrew over $ 4 billion in 2011 from India against an inflow of $1.35 billion in 2010.\textsuperscript{22}

The international CAPM by \textit{Frankel (1982)} gives a utility-maximization model for international asset diversification showing that the portfolio risk may be reduced by keeping foreign assets having negative correlation of their returns with the home country’s assets returns.

It was observed by \textit{Poshakwale & Thapa (2010)} that the rapid growth in the flow of foreign equity portfolio investment leads to greater integration of the Indian equity markets with global equity markets.

\subsection*{3.3 Major Sector Indices and Sensex}

Sector Indices have gained importance for the empirical studies globally as they a represent variety of industries and their responsiveness in the interlinked economies. Usage of sector indices provides insight for sector specific investment strategies and suitable policy formulation.

There are 11 sectoral indices at present in the BSE. These sector indices in their decreasing order of free float market capitalization are – Finance, Information Technology, Oil & Gas, FMCG, Transport, Capital Goods, Metal, Telecom, Power, Housing and Health care \textbf{(Table 3.3-1, Figure 3.3-1)}. The statistics show that the Banking shares maximum 24.62%, IT 15.80%, Oil & Gas 14.88% , FMCG 10.38% and Transport 9.41% of market capitalization, totaling to 75.09%.

\textsuperscript{21} “Emerging Market attracts global investors”-FTKMC, Vol 23, August 2010..
\textsuperscript{22} EPFR Global tracks foreign fund flows across markets and different asset classes.(www.epfr.com).
### Table 3.3-1: Sector Wise Market Capitalization Sensex

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sensex/Sectors</th>
<th>Free Float Market Capitalization* (Rs. crore)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensex</td>
<td>1,489,178.66</td>
<td>100.00</td>
</tr>
<tr>
<td>1</td>
<td>Finance (Banking)</td>
<td>361,088.72</td>
<td>24.62</td>
</tr>
<tr>
<td>2</td>
<td>Information Technology</td>
<td>231,657.97</td>
<td>15.80</td>
</tr>
<tr>
<td>3</td>
<td>Oil &amp; Gas</td>
<td>218,167.92</td>
<td>14.88</td>
</tr>
<tr>
<td>4</td>
<td>FMCG</td>
<td>152,282.11</td>
<td>10.38</td>
</tr>
<tr>
<td>5</td>
<td>Transport Equipments</td>
<td>138,025.63</td>
<td>9.41</td>
</tr>
<tr>
<td>6</td>
<td>Capital Goods</td>
<td>116,022.60</td>
<td>7.91</td>
</tr>
<tr>
<td>7</td>
<td>Metal, Metal Products &amp; Mining</td>
<td>99,388.00</td>
<td>6.78</td>
</tr>
<tr>
<td>8</td>
<td>Telecom</td>
<td>51,636.92</td>
<td>3.52</td>
</tr>
<tr>
<td>9</td>
<td>Power</td>
<td>47,145.20</td>
<td>3.22</td>
</tr>
<tr>
<td>10</td>
<td>Housing Related</td>
<td>41,020.57</td>
<td>2.80</td>
</tr>
<tr>
<td>11</td>
<td>Healthcare</td>
<td>9,972.77</td>
<td>0.68</td>
</tr>
</tbody>
</table>

*As on 11/01/2012, Source: www.bseindia.com.

**Figure 3.3-1: % free float market cap of Sectoral Indices**

Free float market capitalization takes into consideration only those shares issued by the company which are readily available for trading in the market. It excludes promoter, government, strategic holdings, and other locked in shares which are generally not the part of trading activity.

The focus area of the study is to determine existence of both short-term and long-term relationships between BSE’s major sectoral indices and Sensex using VAR model on the basis of daily data from 23/08/2004 to 31/12/2010, which has been divided into sub-
periods due to structural breaks. This is done due to the fact that many economic and financial crises happened during the period of study, and it is quite important to check the stability of regression coefficients over this time. The identification of structural breaks and further analysis of sector indices within sub-periods will reduce crisis effect and at the same time will enhance validity of inferences.

The US sub-prime mortgage crisis created financial chaos engulfing the global economy during 2007-09. The crisis manifested how external shock traverses interlinked global economies perishing demand of exports and reversal of capital inflows. Its direct consequence was reflected in the crash of the global stock market, credit crunch, and decline in the growth of production. In 2009, the world trade contracted by 12.5% in volume terms, Asia’s exports declined by 11.5% and imports by around 7.9% (WTO, 2010). The Emerging Asian Economies registered growth of 5.7%, whereas, others registered negative growth in real GDP, US (–2.4%), World (–0.6%) and Euro zone (–4.1%) (IMF 2010; Das 2011). Asian economies including India were also affected due to global meltdown. The GDP contraction in Asia was 15% on seasonally adjusted annualized basis for the fourth quarter of 2008,23 but they firmly led the global recovery. The Asian economies role during recessionary period was recognized24. The three economies, China, Indonesia and, India were the only exception of not showing negative GDP growth and remained resilient in the face of the intense global crisis and recession (Das DK 2010, 2011).

The study uses sectoral indices and the Sensex for transmission of information and understanding its pattern across various sectors which may have utility for institutional investors for emerging markets. A few studies were done using sector indices as a benchmark to track performance of actively managed portfolios (Ewing 2002; Ewing et al. 2003; Wang et al. 2005). Some research conducted using multivariate cointegration analysis by VECM for studying transmission of

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23 IMF (2009), Regional Economic Outlook: Asia & Pacific Washington DC, May.
24 According to D Strauss-Kahn, former MD International Monetary Fund, “Asia has shown remarkable resilience during the global financial crisis and emerged as an economic powerhouse that is leading the global recovery. There are important lessons for other regions. In particular, the extensive reforms undertaken over the past decade have been critical in helping to protect Asia from the full brunt of the crisis.” IMF Press release 10/290.
information are by Fayoumi et al. (2009) for sector index of Amman Stock Exchange (ASE), Poshakwale S & Patra T (2008) for long-run and short-run relationship between major stock indices of the Athens Stock Exchange (ASE), Wang & Yang (2005) for major sector indices of Chinese stock exchange, Ewing BT (2002) for five S&P stock indices and Arbelaez H et al. (2001) for interlinkages of the Colombian stock exchange. These studies have highlighted utility and importance of usage of sector indices; some exhibited long-run relationship as well as short-run relationship, and also exhibited transmission of innovation to interlinked sectors in different proportions in a short span. As no study using VAR has been employed for the post subprime crisis period, this study will be helpful for sector focus investment strategy and policy formulation.

The study will confirm resilience of the Indian economy by understanding the importance and behavior of interrelated sector indices and Sensex in the dynamic economic environment. It also attempts to answer the question: Do the different sector indices get influenced to move together in a similar way in the long-run? Is there a lead lag relationship between the sectoral indices for the short-run? Which are the growth driving and integrating sector index? What are the sector specific policy implications for sustained growth?

### 3.4 Research Questions

Here, an attempt has been made to answer the following research questions:

1. Do the selected macroeconomic variables influence stock price movements during the post liberalization period?
2. Do these variables have long-run and short-run equilibrium relationships?
3. Can the short and long-run relationships between macroeconomic variables be captured by a robust Vector Correction model?
4. Are there some exogenous variables? Is it possible to segregate these to make a better representative model?
5. What are the causal relationships between these variables? Are these unidirectional or bidirectional? What are its policy implications?
6. What is the importance of each variable in generating fluctuations in others?
7. Are there short-term and long-run relationships between Sensex and inflows, outflows and net FIIs? Does a robust VAR exist to explain this?
8. What is the type of causal relationship of purchase, sales and net FII flows with Sensex?
9. What is the impact of structural change on the relationship between Sensex and FIIs and other indices?
10. Do FIIs help in the integration of Sensex with the US equity market?
11. What is the relationship between Sensex, S&P 500 and exchange rate? What are the policy implications?
12. What is the significance of individual sector performance? How the sectoral indices behave during the smaller time frames created due to structural breaks?
13. How their behavior may be related to Sensex return? What is the impact of sector index on Sensex?
14. Is there a long-run equilibrium relationship and influencing effect of different sectoral indices on each other? What is the influence of the past returns of an index on the present returns of Sensex?
15. Does there exits any short-run Granger causal relationship between different sectoral indices of the Indian Stock market? What is the direction of causality?
16. Will diversification decision based on sector specific information create value for the local investors?
17. Is there a market driver index which could explain variation of other indices? Are there any policy implications of these outcomes?

3.5 Key Assumptions

It is assumed that the time series of macroeconomic variables captures past, current and future changes in the business environment and related movement of Indian stock market return.

It is further assumed that the trade policy reforms, economic reforms and liberalization measures are reflected by the macroeconomic variables. The industries are represented by the sectoral indices. Industry response to trade liberalization is reflected in the movement of sector indices and Sensex.
3.6 Objective and Hypothesis

The study explores the response of different industry sectors due to liberalization measures and influence of a large set of macroeconomic variables on the Indian stock market by employing multiple VAR models.

The objective of the first phase of study is to identify a robust VAR model explaining influence of the relevant macroeconomic variables on Sensex and their relationship on the basis of monthly data for the post liberalization period from 1995 to 1999. It will attempt to identify existence of long-run and short-run relationships between these variables and determine market efficiency of Indian stock market. Further, it will examine causality relationships between the variables and precise contribution of each variable in the inter linkages and understand policy implications of the outcomes.

The three related null and alternate hypothesis for Phase 1(P1) $H_{01}$ are:

$H_{0A}$: There is a long-run and short-run relationship between the identified macroeconomic variables and Sensex.

$H_{1A}$: There is neither a long-run nor short-run relationship between the identified macroeconomic variables and Sensex.

$H_{0B}$: There is a robust VAR model to explain the relationships between the macroeconomic variables.

$H_{1B}$: There is no robust VAR model to explain the relationships between the macroeconomic variables.

$H_{0C}$: There are no causality relationships between the macroeconomic variables.

$H_{1C}$: There are causality relationships between the macroeconomic variables.

The objective of the second phase is to study the influence of FIIs on the Sensex return for high frequency daily data from 1/1/1999 to 31/12/2010. Examine the role of FIIs in integrating the Indian stock market with the US equity market. To identify different VAR models comprising of Sensex, S&P 500, inflows and outflows of FIIs,

25 Defined in 1.4
Net FIIs and exchange rate which can explain relationships between these variables. Further it investigates impact of structural breaks on the relationships and behavior of the identified variables.

The hypothesis for the Phase 2 (P2) is:

\( H_{0P2} \): The inflows and outflows of FIIs have influence on the Sensex return. Different VAR models comprising of Sensex returns, purchase and sales of FIIs, net FIIs inflows, Exchange rate and S&P 500 explain interrelationships and causality between them for the sub-periods created by the structural breaks. The US market influences FII inflows or outflows or both.

\( H_{1P2} \): The inflows and outflows of FIIs do not have influence on the Sensex return. There does not exist interrelationships and causality between Sensex returns, purchase & sales FIIs and net FIIs inflows, Exchange rate and S&P 500 determined by the VAR analysis for sub-periods created by the structural breaks. The US market neither influences FII inflows or outflows, or both.

The objective of the third phase of study is to determine existence of both short-term and long-run relationships between BSE’s major sectoral indices and Sensex using VAR models. To identify different VAR models which may explain the unique behavior of major sectoral indices and Sensex return during different timeframes created by the structural breaks. To determine predominant driver index for all sub-periods which is integrating and explaining variations of other sector indices. To find secondary sector driving indices leading others for different sub-periods and, finally, to understand policy implications of the results.

The hypothesis for Phase 3, \( H_{0P3} \) has three major sub-hypotheses:

\( H_{0A} \): There exist short-term and long-run relationships between the major sectoral indices and Sensex.

\( H_{1A} \): There does not exist short-term or long-run or both kind of relationships between the major sectoral indices and Sensex.
\textbf{H}_{0B}: Different VAR models can explain behavior of the major sectoral indices and Sensex return during different timeframes created due to structural breaks.

\textbf{H}_{1B}: VAR models which may explain the behavior of major sectoral indices and Sensex return during different timeframes created due to structural breaks do not exist.

\textbf{H}_{0C}: There is a predominant driver index for all sub-periods and key sector driving indices leading others for different sub-periods.

\textbf{H}_{0C}: There is neither a predominant driver index for all sub-periods or key sector driving indices leading others for different sub-periods.

3.7 Identified Variables

Economic indicators have been identified and selected on the basis current relevance and review of the literature. Eleven sector indices indicating responsiveness of liberalization process have been included for the study. A brief about relevant economic indicators and sector indices is given below.

3.7.1 Economic Indicators

\textbf{Standard and Poor’s 500}

The S&P 500 is a free-float capitalization weighted index of 500 large cap US companies actively traded in the US. It reflects US equity market sentiments and US economy. It comprises of 500 stocks of large publically held companies which are traded either on the NASDAQ or New York Stock exchange. The 500 stocks are chosen on the basis of market size, industry group representation and liquidity. S&P500 is the most commonly followed index after Dow Jones Industrial Average by investors worldwide. It includes both growth stocks and less volatile value stocks reflecting the general level of stock prices.

\textbf{BSE Sensex}

BSE Sensex or Sensex is a free float market capitalization weighted stock market index of 30 companies listed on the Bombay Stock Exchange. These companies,
representing different industrial sectors, are most actively traded on the stock exchange. Following the global trend of best practices, the index calculations were changed to free float market capitalization index on 1/09/2003. The index has almost increased 10 times since 1990. The Sensex has a history of volatility. On May 6th 2006, it declined by 1,100 points during intraday trading and it surged by 2,110.79 points on 18/05/2006. Due to the subprime crisis on 27/07/2007, it saw a huge correction on account of outflow of FIIs.

**Gross Domestic Product (GDP)**

According to the OECD Glossary of Statistical Terms (2008),

\[\text{GDP} = \text{the sum of the gross values added of all resident institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs). The sum of the final uses of goods and services (all uses except intermediate consumption) measured in purchasers' prices, less the value of import of goods and services, or the sum of primary incomes distributed by resident producer units.}\]

The GDP growth rate (factor cost at 2004-05 prices) was 9.6% (2006-07), 9.3% (2007-8), touched a low 6.7% during the global recessionary period 2008-09 and recovered to 8.4% during the subsequent two years as there was ample scope for fiscal and monetary stimulus.

**Whole Sale Price Index (WPI)**

WPI is a measure which reflects changes in the prices paid for goods at various stages of distribution up to the point of retail. It can include prices of raw materials for intermediate and final consumption, prices of intermediate or unfinished goods, and prices of finished goods. The goods are usually valued at purchasers’ prices.

WPI gives an idea of trend for rate of price rise over the year. The movement in the rate of inflation reflects changes in the demand and supply conditions in the economy. The monthly changes in the headline inflation are measured in terms of WPI. The

\[\text{http://stats.oecd.org/glossary/detail.asp?ID=1163}\]

\[27\text{ Economic Survey, 2011-12, pp. 2}\]
WPI based inflation (base year 2004-05) peaked up to 8.0% in 2008-09 from 4.8% in 2007-08. It came down to 3.6% during the recovery period 2009-10 and again touched high of 9.9% during 2010-11.\(^{28}\)

Many research supports negative relationship between Inflation stock market return. [Famma and Schwert (1977), Famma (1981), Chen & Jordan (1993), Patra & Poshakwale (2006)] and have provided explanations on the basis of money demand proxy hypothesis. which implies negative relation between inflation and real activity. However, the research has been rejected by many researchers including by Choudhry (2001) who found that past rate of inflation influences current stock price and a positive relation between stock price and inflation was found for high inflation economies including Mexico and Argentina.

IMF statistics reveals that 24 countries use WPI as an official measure to track inflation whereas 157 countries use CPI. CPI measures the increase in prices a consumer will have to pay for a defined commodity basket revised every 4-5 years due to changes in consumption pattern. India does not have aggregate CPI but sectional CPI.

WPI basket has three commodity groups’ primary articles (22.02%), fuel, power, light and lubricant (14.23%) and manufactured products (63.75%).\(^{29}\) Base year for WPI is 1993-94 and a basket of 435 items.

The WPI has advantages of a comprehensive and economy wide coverage and weights in the commodity basket on the value of quantities traded in the domestic market. The CPIs are consumer group specific and measure the changes over time in the general level of prices of goods and services consumed by the group with a commodity basket being based on consumer expenditure survey and the weights proportionate to the expenditure.

WPI measures inflation at each stage of production while CPI measures inflation only at the final stage of production.

\(^{28}\) Monthly review of the Indian Economy, April 2012
\(^{29}\) Press note of Ministry of Commerce & Industry 15/4/2010
Money Supply (M3)

The money supply is the total amount of money available in an economy at a specific time. The standard measure for defining money includes currency in circulation and demand deposits (depositors’ easily accessed assets on the books of financial institutions).

According to the RBI:

M1: Currency with the public + Deposit money of the public (Demand deposits with the banking system + ‘Other’ deposits with the RBI).

M3: M1+ Time deposits with the banking system = Net bank credit to the Government + Bank credit to the commercial sector + Net foreign exchange assets of the banking sector + Government’s currency liabilities to the public – Net non-monetary liabilities of the banking sector (Other than Time Deposits).30

The modern Quantity Theory of Money developed by Brunner (1961), Friedman (1961) and Friedman and Schwartz (1993) postulates that investors reach an equilibrium position in which they hold a number of assets including money in the portfolio. A monetary disturbance (unexpected increase in the growth rate of money) causes disequilibrium in the portfolio comprising of assets. The asset holder adjusts the portfolio of assets represented by money balances. Due to this adjustment, demand for other competing assets with money balances, including stocks, get changed. Thus, an increase in the money supply creates an excess of money balances and this increases the demand for stocks resulting in rise of the stock price. This reaction, resulting in increase of stock prices due to increase in money supply, is described as money channel by the followers of quantity theory of money.

The contrary explanation for the response of stock prices due to unexpected alteration in the money supply is based on investor expectations about their reaction on account of anticipation about changes in the policy by the monetary authority (RBI). This is known as ‘policy anticipation’ effect. An unexpected increase in the money supply

30 http://en.wikipedia.org/wiki/Money_supply
will make the market participants anticipate tightening of credit to offset prices by imposing higher interest rates. This causes decline in the stock prices as the discount rate will increase and, secondly, expected cash flows will dwindle due to perception of the market participants that economic activity gets depressed due to increase in the interest rates.

Sprinkel (1964) in his pathbreaking study examined the relationship between the money supply and stock market using S&P 425 industrial for a long period of 1918-1963 and confirmed the existence of a strong relationship between money supply and the stock market. This was followed by a series of similar studies about the relationship between money supply and stock prices by Keran(1971), Homa & Jaffee(1971), Modigliani(1972) and Conver et al. (2005), etc.

Exchange Rate

Exchange Rate between two currencies is the rate at which one currency ($) will be exchanged in the other currency (Rs). It is a reflection of underlying economic stability, strength and competitiveness with global economies. A floating exchange rate system is based on determination of exchange rate on the basis of market forces. The stock prices are influenced by the exchange rate. It has been seen that flow of foreign investments influence stock performance as well as exchange rate.

It has been observed that the change in exchange rate has both a positive and negative relation with the stock return, depending upon the state of the economy. The depreciation of exchange rate will have an impact on both exporter and importer. Exporters will have competitive advantage over other countries exporters as their sales will increase and their stock price will rise (Yau and Nich, 2006). Mao and Kao (1990) used monthly data from 1973-1983 for six major industrialized countries and found that domestic currency appreciation negatively affected domestic stock price movements for an export dominant economy and positively impacted an import dominant economy. Ajayi & Mougoue (1996) examined the relationship between exchange rates and stock indices of eight developed economies using cointegration and causality test for daily data for 1985-1991 and found that a) an increase in aggregate domestic price has negative short-term effect on the domestic currency
value; b) sustained increase in domestic stock price appreciates domestic currency in the long-run; and c) currency depreciation has a negative impact on the stock price for both short and long-run. **Ong and Izan (1999)** used the Non-linear Least Square method to examine the association between stock prices and exchange rates. They found that the US share price returns fully reflect the information conveyed by the movements in both the Japanese Yen and the French Franc after four weeks. However, this result suggests a very weak relationship between the US equity market and exchange rates. They concluded that depreciation in a country’s currency would cause its share market returns to rise, while an appreciation would have the opposite effect. **Bhattacharya and Mukherjee (2002)** examined the nature of causal relationship between stock market, exchange rate and value of trade balance in India from 1990:4 – 2001:3 using cointegration and long-run Granger non-causality test and found no causal linkage between these variables. To examine the dynamic linkages between the foreign exchange and stock, **Nath and Samantha (2003)** employed the Granger causality test on daily data during the period March 1993 to December 2002. They found that these two markets have no causal relationship. Further to verify if liberalization of both the markets brought them together, no significant causal relationship between the exchange rate and stock price movements was observed, except for the years 1993, 2001 & 2002, during which a unidirectional causal influence from stock index return to return in forex market was found, and a very mild causal influence in the opposite direction was found for 1997 and 2002. **Badhani (2005)** studied long-run and short-run relationship between stock price, exchange rate and net FIIs inflows for monthly data from April 1993 to March 2004 and found no long-run relationship between exchange rate and stock, price but observed short-term causality from change in exchange rate to stock returns.

Some recent factors have impacted FIIs inflows, creating extreme pressure on the exchange rate. The result was seen in terms of depreciation of the Indian Rupee. This is due to the compounded factors including introduction of General Anti Avoidance Rules (GAAR), increase in the long-run capital gain announced in the budget 2012-13, which resulted in the withdrawal by FIIs from Indian equity, and rating agency
Standard & Poor cut India’s outlook to negative from stable, because of high demand of $ for imports and rising oil import bill.

**Interest Rate**

Modigliani & Cohan (1979) stated that interest rate is one of the most important determinants of the stock prices. Fama (1991) suggested that the stock prices reflect earning, dividends and interest rate expectations, as well as information about economic activity. Abdullah & Hayworth (1993) came to the conclusion that interest rates are vital to stock price movements. An increase in the interest rate reduces future corporate profitability by causing recession or raising cost of fund. The relationship between stock price and interest rate reflects the ability of investors to change combination of his portfolio between stocks and bonds (Erdem et al. 2005). An increase in the interest rate raises the required rate of return; negatively affects the value of the asset and encourages an investor to change his portfolio in favor of bond. A decline in the interest rate increases the present value of dividend.

**G-secs**

Government securities are called Gilt edge securities or G-secs which are provident fund by their nature. These are risk free securities which also provide reasonable returns and, therefore, offer most suitable investment opportunity for provident fund.

**Treasury Bills**

These are short-term investment opportunity, generally for a year, and are useful in managing short-term liquidity. Government issues 3 types of Treasury bills through auctions: 91-days, 182 days and 364 days.

**Term Structure**

The term structure of interest rate is known as the yield curve. It indicates, at a given point of time, the relative level of short-term and long-term interest rate.
Oil Price

According to a study by Goldman Sachs in 2011, Value-At Risk analysis indicates that a rise in global oil price per barrel will reduce India’s economic growth (GDP) by 0.2% and the current account deficit will rise by 0.4%. The crude oil production during 2010-11 was 37.71 million metric tonnes which is 11.91% higher than 33.69 million metric ton produced during 2009-10. The country imported 26.31 million metric tonnes including 8.95 million metric tonnes of LNG during 2010-11. The oil import bill was around $101.31 billion (1$ = Rs 45). Many studies using VAR model have been conducted for oil importing countries, in particular for US, to examine effect of oil price on macroeconomic variables. It was observed for US that the oil price increase has a negative impact on economic activities (Hamilton 1983). For oil exporting countries, there were mixed results. Bjornld (2000) found that Norway was positively influenced by volatility in the oil prices, whereas, Abseysinghe (2001) saw Indonesia and Malaysia were negatively influenced by oil price rise in the long-run.

Some studies have been conducted recently on the impact of international oil price shock on the Indian economy.

Bhattacharya & Bhattacharya (2001) in their study employed VAR model on the monthly data from April 1994 to December 2000 to examine interaction of inflation in oil with non-oil inflation and growth in money and output. They found that 20% point shock in oil prices leads to a 1.3% point increase in inflation in other commodities at its peak which occurs 5-7 months after the shock.

Kumar (2005) studied the impact of oil price shocks on the growth of industrial production using VAR model for 1975:1 to 2004:3. It was found that oil price granger cause IIP and negatively affects the growth of IIP. A 100% rise in the oil prices lowers the growth of industrial production by 1%.

Bhattacharya & Kar (2005) examined the impact of international oil price shock on the domestic economy for both the short and long-run for the period 1970-2003. They observed that oil price shock is stagflationary, as in short-run a 100% increase in the

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31 Basic Statistics on Indian Petroleum and Natural Gas (2010-11), Economic Division, Ministry of Petroleum & Natural Gas.
international price of oil results in the growth falling by 3% and inflation rising by 18%.

Cologni A & Manera (2005) in their research about oil prices, inflation and interest rates by employing structural co integrated VAR model for G-7 countries showed that most of the countries considered that there seems to be an impact of unexpected oil price shocks on the interest rates, suggesting a contractionary monetary policy response directed to fight inflation. This results in an increase in the interest rates which are transmitted to the real economy by reducing output growth and inflation rate.

Ito K (2008) used the VEC model to empirically investigate the effects of oil price and monetary shocks on the Russian economy covering the period between 1977:1 and 2007:4. It was found that 1% increase in oil prices contributes to real GDP growth by 0.25% over the next 12 quarters, whereas, inflation grows by 0.36%. It was also observed that monetary shock through the interest rate channel immediately affects real GDP and inflation as predicted by the theory.

Umar G & Abdulhakeem (2010) employed VAR to study impact of crude oil price changes on the four macroeconomic variables GDP, money supply, unemployment and consumer price index. Its impact on CPI was insignificant. This implies that the three variables in Nigeria are significantly explained by exogenous highly volatile variable and the economy is vulnerable to external shocks.

Gold Price

There are several hypotheses regarding gold price movement. The first hypothesis is gold is the ‘safe heaven’ on the financial market. Safe heavens are the assets that people would like to invest when uncertainty and fear increases. This hypothesis has been tested on the basis of different ‘fear measures’ such as volatility in the stock market, customer expectation of the future, and bond risk premium (the difference in yield between Aaa and Bbb bonds). The other fear indicators could be inflation rate, real long-term interest rate, exchange rate. The second is the negative beta asset
hypothesis (gold goes up when everything goes down). The third hypothesis is gold as an “inflation hedge” in the volatile market. The fourth is gold as another currency.

**Fei, Fan and Adibe (2010)** conducted a study on the theory of gold movements by analyzing the US monthly data from January 1956 to October 2008 to test these hypothesis. They employed for “fear indicators” inflation rate, long-term interest rate, real economic activity (IIP) and exchange rate. They found that gold’s relationships with fear and inflation are not what people believe. Gold should not be regarded as a mysterious asset that is immune to fluctuations and behaves uniquely. It should be regarded as another currency whose value is a reflection of the US $ and US monetary policy.

The Indian historical monthly data for the period of study from 1995 to 2009 indicates variation in the movement of Sensex value and gold prices with periods of high and lows. Figure 3.7-1 provides correlation coefficient between gold price & Sensex. The correlation coefficient varied from minimum –0.91808 (2008) to maximum 0.917499 (2005).

![Figure 3.7-1: Correlation between Gold price & Sensex](Source: Complied from the data from Prowess & www.lbma.org.uk)

**Export, Import and Balance of Trade**

The balance of trade is the difference between the value of exports and imports for an economy for a period of time. A positive balance is called a trade surplus, whereas, negative balance is called trade deficit. The balance of trade is subdivided into
balance for goods and service. The trade deficit may signal for exchange rate adjustment. This impacts investor’s confidence which consequently influences inflow of capital, creating volatility in the stock market. Growing trade deficit has created pressure on the Indian Rupee. Table 3.7-1 provides selected indicators for the external sector from 2005-2011. The exports touched $250.5 billion in 2010-2011 from $182.4 billion in 2009-10, an increase of 37.3%. Imports also increased to $381.1 billion from $300.6 billion during the same period. The trade deficit was $118.2 billion (2009-10) and it touched $130.6 billion (2010-11), an increase by 10.5%. Further, the current account deficit increased from $38.2 billion in 2009-10 to $45.9 billion from 2010-11.32

Table 3.7-1: Selected Indicators for External Sector

<table>
<thead>
<tr>
<th>Selected Indicators of External</th>
<th>As % of GDP Market price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>2005-</td>
</tr>
<tr>
<td>Exports</td>
<td>12.6</td>
</tr>
<tr>
<td>Imports</td>
<td>18.8</td>
</tr>
<tr>
<td>Trade Balance</td>
<td>-6.2</td>
</tr>
<tr>
<td>Invisible Balance</td>
<td>5.0</td>
</tr>
<tr>
<td>Goods &amp; Service Balance</td>
<td>-3.4</td>
</tr>
<tr>
<td>Current Account Balance</td>
<td>-1.2</td>
</tr>
<tr>
<td>External Commercial</td>
<td>0.3</td>
</tr>
<tr>
<td>FDI(net)</td>
<td>0.4</td>
</tr>
<tr>
<td>Portfolio Investment(net)</td>
<td>1.5</td>
</tr>
<tr>
<td>Total Capital Account (net)</td>
<td>3.0</td>
</tr>
</tbody>
</table>

*Source RBI

**Foreign Exchange Reserves**

Foreign Exchange reserves are liquid assets with the central bank (RBI) for the purpose of intervening in the foreign exchange market. It is total of current account balance, capital account (net) and error & omissions. According to a recent IMF report, India is the sixth largest holder of foreign exchange reserves after China, Japan, Russia, Brazil and Switzerland at the end of December 2011. The foreign exchange reserves were at very low level of $5.8 billion at the end of March 1991 which was just sufficient for few days’ imports. It gradually increased to $25.2

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billion (1995), $ 38 billion (2000), $ 192.2 billion (2007), declined from $ 314.6 billion (May 2008) to $ 252 billion (March 2009). It again touched $279.1 (2010) and reached $ 304.8 billion (March 2011). In terms of ratio of reserves to imports of goods and service, it was 75.5% (2006), touched a maximum 95.1% in 2007 and declined to 66.4% in 2010. The reserves are largely due to inflows of portfolio investments and FDIs. Hypothetically, the foreign exchange reserves should have positive relationship with Sensex.

3.7.2 Sector Indices

Bankex

Bankex traces movement of the leading banking sector stocks listed on the BSE. It captures around 90% market capitalization of all banking stocks represented by 12 listed stocks. It started in June 2003 on free float market capitalization. It has highest share of 24.62% amongst BSE sector indices. Three major banks ICICI (26.15%), HDFC (25.61%) and SBI (15.39%) have maximum percentage of weight in the Bankex and are the drivers of banking industry.

The Rs 64 trillion\(^{33}\) Indian banking industry has made phenomenal progress since the Narasimham committee report (1991) on the banking sector reforms, which are in line with the 1991 economic reforms. The gradual reform process included interest rate deregulation, directed credit rules, statutory preemptions and entry deregulation for both domestic and foreign banks. According to Standard & Poor Rating Services, “Indian banking system has a high level of stable core customer deposits supported by the system of good franchise and extensive branch network, yet growing domestic savings.” Some measures adopted by the Indian banking relates to improving the risk management framework, diversification of revenue streams, technological innovation, adopting global best practices (International Financial Reporting Standards, IFRS, and BASEL II), focus on financial inclusion, offering innovative products and consolidation.

The RBI is the regulator which monitors the macroeconomic environment, formulates policies and provides direction. During the recessionary period in 2008-09, RBI was swift to reduce policy rates (both repo and reverse repo), provided liquidity to the economy and took adequate measures to support the banking system. The Indian banking system was resilient during the global financial crisis and banks have came out clean with strong transparent balance sheets and have gradually reduced nonperforming assets. However, the cost of intermediation is high and banking penetration is still low.

Indian Banking has the potential to become Rs 200 trillion industry by 2020 provided the growth rate is maintained at 8%. Both public and private sector banks are aggressively focusing to improve technology infrastructure, enhance customer satisfaction by innovation, and developing sustainable competitive advantage by absorption of internet and mobile banking technology.

**BSE IT**

BSE IT was launched on August 2004 on free float market capitalization method. The major companies having high percentage of shares in BSE IT are Infosys (47.94%), TCS (29.73%) and Wipro (10.27%).

The Indian IT industry is divided into two markets: domestic and exports. The export market accounts for 75% of the total revenue. According to the McKinsey report “Perspective 2020: Transform Business, Transform India” – the export component of Indian industry is expected to reach US$ 175 billion and the domestic component to US$ 50 billion in revenue by 2020. The IT Services was the fastest growing segment, growing at 22.7% in FY2011 and accounted for exports of US$ 33.5 billion. Application development is the biggest segment, which is being driven by increased customer interest around cloud, mobile and collaboration technology. Cloud computing makes an immediate impact on infrastructure outsourcing by rapidly converting to share and Cloud-hosted IT. India is one of the leading destinations for

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34 BSE 29th May, 2012.
outsourcing of software testing services, which account for 32% of the total global sourcing share.

The four major components of IT & ITeS industry are IT services, business process outsourcing, engineering services and R&D, and software products. According to NASSCOM, India’s IT & BPO sector revenue (excluding hardware) was $87.6 billion for 2011-12. The proportion of IT & ITeS sector to GDP revenue increased from 1.2% in 1997-98 to 7.5% in 2011-12. Software exports to the US were around $69 billion during 2011-12, a rise from $59 billion in 2010-11 and by 16.95%. The ITeS export shares were 78.4% of total industry revenue. During 2010-11, the growth rate for the domestic sector was 20.6% and for exports 18.8% while for 2011-12 it was 9.7% and 16.4%.36

The major challenges for the IT & ITeS are increasing global competition, rising domestic cost of skilled workers, infrastructure constraints, protectionist policies by major customers and exchange rate risk.

**BSE Oil & Gas**

BSE Oil & Gas index was launched in August 2004 on free float market capitalization method. It comprises of 10 public and privately owned companies. Reliance & ONGC Corporation with weights of 52.18% and 22.64%, respectively, in the Oil & Gas index are the market drivers.

India is the world’s fifth largest energy consumer. Oil accounts for 30% of the total energy consumption. Oil & Gas is dominated by state owned companies. There are around 20 refineries, 17 in the public sector and 3 in the private sector which account for 70% of the total refinery crude output. India is the fourth largest importer and sixth largest consumer of oil. 70% of crude oil is imported. 100% FDI is allowed in exploration and production (E&P) projects and 49% is allowed in refinery. New Exploration Licensing Policy (NELP) was enacted in 1999 to encourage investment.

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across the value chain and 103 oil and gas discoveries have been made in 34 blocks. The oil imports are expected to be $142 billion during 2011-12.\textsuperscript{37}

**BSE FMCG**

FMCG sector index has 10.38 weights in the market capitalization. ITC and HUL are the major drivers with weight in the index of 54.61% and 19.59%.

According to Confederation of Indian Industry (CII) report, the Indian FMCG sector is the fourth largest sector with a total market size of $13.1 billion which will touch $33.4 billion by 2015.\textsuperscript{38} The sector has shown consistent growth and is unique and indifferent to performance of other sectors despite recessionary conditions. The FMCG sector is supported by well established distribution network with strong competition between the organized and unorganized sector. According to McKinsey Global Institute (MGI) study, “Bird Gold: The rise of Indian consumer’s market,”\textsuperscript{39} the total consumption in India will multiply making India the fifth largest consumer market by 2025, with urban India accounting for 68% consumption and rural consumption growing to 32% by 2025. The major driving factors of the sectors are: disposable income, inflation, government regulatory policies and changing preferences and lifestyle.

**BSE Auto**

Auto index has 9.41% share in the BSE. The five leading companies have around 86% weight in the index – Tata Motors (29.62%), Mahindra & Mahindra (19.55%), Bajaj Auto (14.20%), Hero Motor Corporation (11.96%) and Maruti Suzuki (10.74%). According to Society of Indian Automobile Association of India (SIAM), the turnover of automobile increased from $43.296 billion in 2009-10 to $58.583 billion in 2010-11. Passenger cars share 16.25%, commercial vehicles 4.36%, three wheelers 3.39%, and two wheelers 76% of the domestic market. Total number of vehicles produced has increased from 1.4 million in 2009-10 to 1.79 million in 2010-

\textsuperscript{37} Economic Advisory Council to the Prime Minister, Feb. 2012
\textsuperscript{38} Report of Confederation of Indian Industry (CII) on FMCG sector. \url{http://www.cii.in/Sectors.aspx?enc=prvePUj2bdMtgTnvPwvisYH+5EnGiyGXO9hLECyTuNvWUH5M WzEuAiG8dFH+/Z7F}
\textsuperscript{39} \url{http://www.mckinsey.com/Insights/MGI/Research/Asia/The_bird_of_gold}
11. The Automotive Mission Plan 2006-16, prepared by the government and industry, indicates that the auto industry turnover will increase to $145 billion and the industry’s contribution to GDP will enhance from 5% to 10% by 2016.40 100% FDI is allowed in the sector. The major factors hindering the growth of the automobile sector are: interest rate, inflation, steel prices, exchange rate volatility, excise duty, road tax, increase in crude oil prices and emission norms.

**Capital Goods Index**

Free Float market capitalization percentage for CG Index is 7.91%. Two major companies Larsen & Toubro Ltd and BHEL carry weights 55.66% and 15.64%, respectively.

The Capital Goods sector is a core industry and it contributes 12% to total manufacturing activity which is around 15% of the GDP.41 According to an estimate for 9% growth in GDP during the 12th Five Year Plan, the manufacturing industry should grow by 11-13% per annum, which implies that the expected growth for CG industry should be between 17% and 19%.

Capital goods and engineering sector market is around $69.23 billion (1$=Rs45) and is growing at a CAGR of 14.12%. Two major sectors are heavy electrical and power equipment, and engineering goods. 100% FDI is allowed through automatic route, no industrial license is needed and Imports of second hand CGs are allowed.

Some major issues are poor infrastructure, under utilization of capacity, shortage of power and skilled labor, high cost of capital, technology upgradation, high interest rates and high cost of inputs, increasing taxes and duties, and global competition.

**BSE Metal Index**

The Metal index representing 13 metal and mining companies has a weight of 6.78% of market capitalization in the Sensex. The major companies driving index are: Tata

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41 Capital Goods and Engineering Sector, October 2011, Ministry of Heavy industries & Public Enterprise.
Steel, Coal India, Jindal Steel, Hindalco and Sterlite Industry which are having weights of 20.87%, 15.49%, 14.15%, 11.95% and 10.8% in the index, respectively, as on 1/6/2012. The Metal index has high beta. It had a bull run from its low in 2001 till it peaked out in 2008, touched the lowest point during the sub prime crisis and recovered subsequently.

Metal is the core sector comprising of two major market segments, ferrous (iron & steel) and non-ferrous (copper, zinc and aluminum). India is the 4th largest producer of the crude steel in the world after China, Japan and USA and will be 2nd largest by 2015-16. It is also largest producer of sponge iron since 2002. The Iron & Steel industry contributes 2% of GDP and its weight in the IIP is 6.2%. The growth of the sector is linked with the demand in construction, automobiles and the power sector. The current per capita consumption of steel is around 45 kg as against an average of 198 kg of world. This gap indicates a huge growth potential for the industry and opportunity for capacity addition and technology absorption. The major challenges are high raw material and operational costs, regulatory government policy and need for number of approvals, poor infrastructure growth, FDI ceiling, raw material availability (coking coal), threat from cheap imports due to the low import duty, exchange rate fluctuation and competition from the global players.

**Power Index**

Power Index has 3.22% share in the BSE. The five leading companies have around 61.46% weight of the index. These are NTPC Ltd (19.81%), BHEL (14.85%), Power Grid (14.09%) and TATA Power (12.71%).

At present, coal based thermal power accounts for 82% of power generation. According to an estimate, if India continues to grow at 8% for the next 10 years, the power demand will increase from present the 120 Giga Watt (GW) to 315-325 GW by 2017. The four key factors for increased demands are: a) faster growth of the Indian manufacturing sector, b) residential consumption growing by 14% over the next 10 years, c) connection to 125,000 villages by 2012 under “Power to All” program, and d) realization of demand suppressed due to load shedding. The four key issues

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42 Economic Survey 2011-12.
concerning growth of the Power sector in India as identified in the McKinsey Report (2011)\textsuperscript{43} are viability and market risks, a slow pace of capacity addition, inadequate fuel supplies and operational inefficiencies.

Some other factors curbing the growth power sector are: import regulations, exchange rate fluctuations, lack of financing, financial risk, inefficiency in the Public sector, and slow government clearances.

**BSE Realty**

Due to the growing links between infrastructure development and economic growth, the realty index was introduced. The base year is 2005 with base index value 1,000. The realty index has 2.8% share in the Sensex in terms of free float market capitalisation. DLF and Unitech are the two major companies with weights 36.2% and 14.2%, respectively.

Infrastructure sector has seen rapid growth due to Public Private Partnership (PPP), liberalization of FDI norms, tax holidays and easing funding terms to facilitate foreign inflows. However, there are numerous current problems including tightening of liquidity due to higher interest rates, high cost of construction and weak demand. Flitch rating identified few factors affecting the realty sector in their recent report, ‘2012 Outlook: India Realty sector’\textsuperscript{44}. Some negative factors are: a) sluggish demand due to high Equated Monthly installments (EMIs) due to higher interest rate, increasing inflation and oversupply of commercial space, b) margin pressure due to depressed demand, c) Regulatory issues increase of interest rates, and d) liquidity pressure.

Thus, the focus could be on cheap government funding, enhancing FDI flows providing government comfort in projects, reducing inflation, interest rates, input costs, and encouraging PPP projects.

\textsuperscript{44} Flitch Report on Indian Realty Sector ‘2012 Outlook :India Real Estate Sector’.
Health Care Index

The Health Care index has lowest weight of 0.68% of free float market capitalization in the Sensex. Four major players with their respective weights in the Health care index are: Sun Pharma (17.76%), Dr. Reddy’s Lab (16.24%), Cipla Ltd (12.12%) and Lupin Ltd (10.01%).

According to KPMG report (2011), the Indian Healthcare industry encompasses segments like Hospitals (50%), Pharmaceuticals (25%), and Insurance & Medical Equipment (15%), and Diagnostics (10%).45 As per IBEF estimation, the sector size of the Indian Healthcare was around $40 billion in 2009. India’s healthcare spending, in terms of percentage of GDP (4.10 %), is less than half the global average. The revenue of Indian Pharmaceutical Industry was $16 billion in 2009 which is expected to touch 40 billion in 2014. The industry has been growing at a CAGR of 13-15% y-o-y. The Indian pharmaceutical drug production accounts for around 10% of the global drug production The Pharma market will be 10th largest market in the world by 2015. Its major strengths are: growth potential, low manufacturing cost, increased FDI and focus on investment in R&D. Threat areas are failure to comply with patent legislation, price control by the government and weak copyright policies. Some major factors influencing the industry are patent litigations, exchange rate fluctuation, R&D expenditure and high excise duty.

3.8 How Identified Research Gaps are Addressed

The research gaps are addressed by finding out a suitable VECM model based on a large set of relevant macroeconomic variables influencing the Sensex. Descriptive statistics identifies unique hidden patterns of each variable. The model finds cointegrating equations comprising different sets of macroeconomic variables which are responsible to bring system at varying speeds to equilibrium. The dynamic model provides information about causality relationships between the variables. The IRF and VDC will demonstrate precise relationships between the variables. The model is further refined by segregating endogenous and exogenous variables by imposing

binding restrictions. It will improve understanding about interlinkages between the variables and Sensex and help in finding policy implications.

The study will address the gaps by employing dynamic VAR models to determine whether the hypothesized relationships are also consistent for the Indian capital market. It will further attempt to verify whether the underlying relationship changes over a period of time in response to rapidly changing global and domestic economic conditions, identified by structural breaks.

Since limited work has been conducted about relationship of sector indices, different VAR models for each sub-period comprising of relevant sector indices been identified. These VAR models behave differently due to structural breaks giving variety of relationships including short-term, long-term and causality. The responses of these sector indices are further studied by generalized impulse response and VDC. The outcomes will improve understanding about influence liberalization on each sector and their responsive roles and by finding appropriate policy implications.

3.9 Assumed Relationships between Variables

The hypothesized relation between the identified macroeconomic variables on the basis of the literature review for Phase 1 & 2 is:

1st Phase

\[ \text{Sensex} = f (+IIP, +EXR, +EXPO, +IMPO, +FER, +S&P500, +GP,-M3,-WPI,-OP) \]

It is assumed that there exist long-run, short-run and causality relationships between macroeconomic variables.

2nd Phase

The assumed relation is:

\[ \text{Sensex} = f (+FIIP, +S&P500, +EXR, +NETFII,-FIIS) \]

It is possible that the relationship may change due to unique economic conditions created by the distinct structural breaks.
Limited foreign studies have been conducted about the relationship and influence of major sector indices and the stock market index, and hardly any work has been done by the Indian researcher in this area.

It is assumed that both short-run and long-run relationship exists between sectoral indices. Bankex is assumed to be the major driving, influencing and integrating index. Role of other significant influencing indices will depend on different time frames created by the structural breaks. Metal, CG, Power, Realty and Oil & Gas may be other influencing sectoral index. Least integrated index will give opportunity for diversification for short-term investments. These sectoral indices will have unique causation relationship with each other depending upon different economic conditions. VAR models, Granger Causality test, generalized impulse response analysis and VDC will help in understanding inter-linkages and formulating sector specific policies.

### 3.10 Key issues and implications

#### 3.10.1 Index of Industrial Production and its Reliability

The IIP has been used for the analysis of the Indian industrial sector. The IIP has multiple problems. It uses the old base year 1993-94, out dated weights, and fixed basket of products, as well as many dormant companies. It has been observed that new products and companies are not represented in IIP. A comparison of growth estimates provided by the IIP with actual sales growth of companies shows divergent results illustrating IIP inadequacy. The IIP has demonstrated unreliability in the past, particularly for the recent years 2008-09, 2009-10, and 2010-11. According to the IIP data for 2009-2010, the rise in the manufactured products’ output was 10.9% but it was found that there was no growth or it was much slower. The growth in 2009-2010 for manufacturing sector was merely 2% as there was drop in the sales volumes due to inflation in the manufactured products and smaller coverage of registered companies for IIP (Report on outlook of Indian Industry, CMIE October 2010). In 2008-09, the IIP understated the growth of the manufactured output; however, in 2009-10 it overstated significant growth, in particular for the seven out of 14 sectors. According
to the IIP figures, the growth of machinery during 2009-10 was 21%, whereas, calculations from the CMIE database showed merely 2.6%. This discrepancy is due to limited coverage of items by IIP. On the basis of sales revenue, in the IIP the weightage given to rubber & plastic is higher, whereas, petroleum products are given lower weightage, which is contrary to the actual state of affairs. The obsolete weights given to the products is the main reason for IIP’s failure to capture correctly the trend in the production, in particular for rubber, plastic, petroleum & coal product group. Further, IIP is unable to capture seasonality of industrial production. According to the two official papers by MC Sanghi of the Industry ministry and another by RK Kamra of Statistics ministry, IIP understates growth due to usage of the old base year, unrevised weightages, and obsolete basket of products (Editorial: Economic Times dated 4/2/2011). The index was constructed on the base 1993-94 but although many items of production have become considerably important since then and others turned less so, the composition of items was not correctly reflected. The unrevised weightage of products in the index have underplayed relative changes in the outputs. The Kamra & Chakarbarti study shows that correlation between the IIP and results provided by the detailed Annual Survey of Industries is as low as 0.64. Therefore, for accurate estimates more frequent revision of the base year is necessary. According to international practice, the base year is revised quinquennially together with revision of weight of each item of production. The IIP measures the output of select group of units every month, whereas, the Annual Survey of Industries (ASI) is a comprehensive survey as it is based on data from the annual statement of accounts of different units. In order to make the data comparable, the financial data is converted into output data and is mapped with IIP. The difference in the growth rate is as high as 15% for 1998-99. The lower IIP values indicates the continuation of the downward bias, historically observed in IIP in comparison with ASI (Economic Times 28/1/2011).

The new series, with base year 2004-05, was proposed by the working group on IIP, which will provide realistic reflection of the current industrial scenario. According to DK Joshi of CRISIL, “the new IIP series will be more realistic as it includes part of unorganized sector and would capture production appropriately.” The weight of
mining will rise from 104.7 to 141.5 and for electricity from 101.6 to 103.1 (Table 3.10-1).

<table>
<thead>
<tr>
<th>Sector</th>
<th>1993-94</th>
<th>2004-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>104.73</td>
<td>141.57</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>793.58</td>
<td>755.27</td>
</tr>
<tr>
<td>Electricity</td>
<td>101.69</td>
<td>103.16</td>
</tr>
<tr>
<td>Total</td>
<td>1000.00</td>
<td>1000.00</td>
</tr>
</tbody>
</table>

*after recommendation from Planning Commission

Table 3.10-1: Change in Weights of IIP

The weight of food products and beverages in the new index will rise to 72.76 from 55.32, whereas, for textile it will increase to 61.64 from 48.9 (Table 3.10-2).

<table>
<thead>
<tr>
<th>Item Groups</th>
<th>Original weights</th>
<th>Changed weights **</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food products &amp; beverages</td>
<td>55.32</td>
<td>72.76</td>
</tr>
<tr>
<td>Textiles</td>
<td>48.9</td>
<td>61.64</td>
</tr>
<tr>
<td>Apparels</td>
<td>12.56</td>
<td>27.82</td>
</tr>
<tr>
<td>Wood &amp; Wood products</td>
<td>1.13</td>
<td>10.51</td>
</tr>
<tr>
<td>Motor vehicles etc</td>
<td>51.03</td>
<td>40.64</td>
</tr>
<tr>
<td>Furniture</td>
<td>10.59</td>
<td>29.97</td>
</tr>
</tbody>
</table>

**Including Unorganized Sector

The number of manufacturing items have been revamped, there is increase in manufacturing items in the new series from 473 to 620 (Table 3.10-3).

<table>
<thead>
<tr>
<th>Sector</th>
<th>1993-94</th>
<th>2004-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>64</td>
<td>61</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>473</td>
<td>620</td>
</tr>
<tr>
<td>Electricity</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>538</td>
<td>682</td>
</tr>
</tbody>
</table>

The 1993-94 based IIP series showed moderation of growth in the beginning of October 2008, whereas, the new IIP series indicated a sharp contraction in the industrial production due to the 2008 crisis. The new index shows the impact of crisis having been more severe as the industrial growth was red during April to October 2008 (Figure 3.10-1).
The export growth was negative during this period which was not captured by the old IIP series. The new base year has remarkable policy implication as it shows CG growth remains high, indicating increase in the demand of CG based industry. Whereas, consumer durable growth is reduced, confirming that the people are not consuming more and have lowered their expectation. This is contrary to the results based on old series.

Thus, the new IIP index shows a close reflection of the current industrial scenario. It gives appropriate sectoral weightage, revamps manufacturing components, puts greater emphasis to unorganized sector and captures the industrial situation better; consequently, econometric analysis based on new IIP should provide realistic and reliable results.

### 3.10.2 Market Efficiency and Cointegration

According to Fama (1970), “…a market in which price always ‘fully reflect’ available information is called ‘efficient’…” Thus, in an efficient market price rationally, fully and instantaneously reflect all relevant available information and no profit opportunities are left unexplained. Further, the unanticipated portion of stock return in an efficient market is unpredictable and it does not differ from zero. The actual return minus return based on fundamental analysis is called the unanticipated portion.
Fama (1970) defined market efficiency in the form of weak, semi-strong or strong.

A market is said to be a weak form efficient if the historical prices are of no use for predicting future price changes. The historical prices are already discounted in the current price and will have no value in predicting future price changes. The weak form of market efficiency means that unanticipated return is uncorrelated with previous unanticipated returns. The market has no knowledge and memory of the past returns and it will not help in determining the future returns. In the weak form tests, the information set is historical prices.

A market is of semi-strong form efficient in case all publicly known and available information is reflected in the security prices. Thus it assumes both weak form set of information and all public information relating to security such as earning, dividend and management changes. Semi-strong market efficiency means that the market return is uncorrelated with any publically available information. Semi-strong form test relates to whether prices efficiently adjust to publically available information.

A market is strong form efficient if all information, both public and inside private information, is reflected in prices. Strong form of market efficiency means the unanticipated return is not correlated with any information be it public or insiders, since all available information are being reflected in the present returns.

It is impossible to test the strong form of efficient market hypothesis but weak and semi strong may be tested.

Market Efficiency, Cointegration & Granger Causality

Cointegration can be interpreted in terms of market efficiency which relates to the absence of predictability. Cointegration does not violate informational efficiency as defined by Fama. Market efficiency is also considered as lack of arbitrage opportunities. Granger (1986) emphasized that asset price cannot be cointegrated in an efficient market.

In an efficient market, past information is of no use for predicting future prices and market should react only to the new information. Price changes or return cannot be
predicted in an efficient market. Thus, an efficient stock market has incorporated all current and expected changes that occurred in the macroeconomic variables; this implies that there will be no causal relationship between changes in the macroeconomic variables and the stock prices for efficient market.

3.10.3 VAR Model and Monetary Policy

The VAR model was developed by Sims (1980) to conduct macroeconomic study. It is a hybrid between the univariate time series model and simultaneous equation model. The purpose of VAR estimation is examining relationships between variables. It has several advantages. The structural model requires the researcher to specify some variables being exogenous; this is a kind of “identifying restriction”. Under a VAR, all the variables have equations; thus, every variable is endogenous, which is an important point. VAR is more flexible than univariate AR model and is able to capture more features of the data. It is popular as it is possible to use OLS for each equation as all variables on the RHS are predetermined. Researchers prefer VAR modeling due to precise forecasting. Its forecasting ability is better than ARIMA. According to Sims (1980), VAR would be useful when interpreting time series, in forecasting, and for understanding the effects of policy changes. “VAR analysis provides prolific means of identifying macroeconomic shocks to variables like technology and monetary policy and of examining the causal effects of such shock.”

Rotemberg J & Mizon G (1993) employed VAR models to study US monetary policy for data description and as an input for quantitative theoretical analysis. Hendry & Mizon (1993) and Johansen and Juselius (1994) used VAR model as a starting point for estimating error correction models for understanding properties for macroeconomic time series. According to Rudebusch G (1998), “The great appeal of using VARs for studying monetary policy transmission is that they appear to be able to identify the effect of policy without a complete structural model of the economy.”

There has been increased interest in the study of the monetary policy in the last two decades by foreign researchers. This happened due to deregulation of financial

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markets resulting in the shift in orientation of the monetary policy from regulations to open market operations. The second reason for its wide usage is that many open market economies, including the emerging Indian economy, emphasize on transparent policy rules and fixing monetary targets. This makes study of monetary policy using VAR much more interesting and relevant for quantitative and econometric analysis.

While conducting monetary policy, the RBI is concerned with controlling inflation, reducing fiscal deficit, intervening for stability of exchange rate and increasing inflows of investments. This is achieved by using appropriate monetary policy instruments including repo rate, cash reserve ratio and SLR, with objectives to maintain growth rate and develop a positive investment climate. The prime focus of the monetary policy is to influence interest rates, inflation and credit availability by bringing changes in the supply of money available in the economy. The RBI uses two types of tools, quantitative tools to indirectly control volume of credit and inflation for maintaining price stability and qualitative tools to control supply of money in selective productive sectors of the economy.

Many studies based on the US and European economies using VAR models covering wide range of issues have been conducted. The studies were done on the impact of monetary shocks administered by the Central bank in form of change in interest rates on monetary variables such as inflation or impact of positive spending shocks by the government, and sudden tax reduction on the real growth rate, or determining relation between inflation and unemployment. Theses research using VAR models have enabled to analyze interrelations between various macroeconomic policies, for example, Sargent and Wallace (1981) showed how monetary and fiscal policies are interrelated. These studies indicated the broad contours of relationships which were common to large economies. This also shows a need for similar studies for emerging Indian economy. The other reason is that with rapid globalization, the policy framework which worked earlier may not have the same efficacy and may need changes.

It has been seen that most empirical studies conducted about monetary policy using VAR models have considered partial models employing limited variables. This
commonly used practice is risky to understand complex relationships between the endogenous variables defining the economic environment. According to Jacobson et al. (1999), “...the risk with such an approach is that the different models have properties that make them inconsistent with another. If so, they provide a shaky ground for policy analysis”. Thus, usage of partial model approach leads to limited policy analysis and provides an incomprehensive overview. On the other hand, no single model can answer all broad set questions or could also be valid for all kinds’ timeframes; however, it will be able to at least provide a framework to address contemporary research questions.

Before Sims launched VAR models, the predominant empirical approach in macroeconomics was to estimate a large system of equations built around the Keynesian macroeconomic model. The estimated systems of equations were used in interpreting time series, forecasting and understanding policy issues. Sims found that existing methods depended on “incredible” identification assumptions and, thereby, interpretation of “what causes what” for macroeconomic time series were flawed. He argued that misestimated models will not help in monetary policy analysis as well as for forecasting. As an alternative, he proposed that empirical analysis of macroeconomic variables could be done by VAR models. A key area of VAR methodology is impulse response analysis, which is helpful in describing how fundamental shocks propagate through the macroeconomy. VAR analysis relies on fewer and less specific theoretical assumptions. It is used focusing on what policy shocks occurred and their possible effects.

It has been observed that forecasting with VAR models has outperformed other methods such as forecasting based on simple univariate model or on pure random walk. Small VAR system may not be entirely stable and may, thus, not be stable predictor of future variables. As a result, state-of-the-art VAR forecasting tends to include more than three variables and allow for time-varying coefficients. The added generality quickly increases the number of parameters to be estimated. This problem can be overcome by using VAR estimated using Bayesian prior BVARs (Litterman, 1996 and Sims, 1993).
One of the most important assumptions for VAR analysis of the monetary policy is to allow endogenous monetary policy actions to be distinguished from the exogenous. The endogenous policy is reactive, and it responds to the development in the economy. On the other hand, exogenous policy comprises of all other actions and is autonomous in nature. Therefore, separation of monetary policy actions into endogenous and exogenous components is important for effective VAR analysis of monetary policy issues. In our study, the identified VAR model has been subsequently refined by segregating its endogenous and exogenous macroeconomic variables.

Subsequent to his first path breaking paper in 1980, Sims (1986) discussed alternative identification schemes which were more structural than the first, which was a recursive⁴⁷ one. Sims, Stocks and Watson (1990) gave the method explaining how to estimate and draw inference for VAR system with non-stationary time series. Sims (1992) discussed the effects of monetary policy on the macroeconomy, based on the results from a six variable VAR for monthly time series for five largest economies. Sims (2003, 2006) initiated the “rational inattention” approach, which may potentially explain how different agents may act on different information sets. It is not that they cannot access the abundant information, but it is costly to interpret it.

Sims and Sargent were awarded the Noble Prize in 2011 due to their seminal contributions in finding methods and their applications in successfully explaining interplay between monetary policy, fiscal policy, and economic activity. They explained how macroeconomic aggregates such as GDP, investment, unemployment, and inflation behave over time. How are these variables affected by the rapid changes in the economic environment and economic policies? He analyzed effectiveness of monetary policy in stabilizing undesirable fluctuations in macroeconomic aggregates. They improved the understanding about the role of central banks in their ability to influence the economy.

⁴⁷ Recursive identification method is the most common identification method which Sims (1980, 1989) used and it is called recursive scheme.
3.11 Summary and Conclusion

The chapter provided conceptual inputs and key current economic facts and figures used as the background for the three phases of the study. It summarizes objectives, research questions, hypothesis and assumptions employed in the study. A brief about identified macroeconomic indicators and sector indices has been elaborated. It has also described assumptions about relationships between the macroeconomic variables based on literature review and existing theory. Sequential steps for addressing the identified gaps in existing research and exploring, for the first time, by a study based on sectoral indices using econometric analysis has been explained. It has also described concepts and relationship between the market efficiency and cointegration. It discussed about the reliability of IIP and impeding problems due to usage of IIP series constructed using 1993-94 as the base year. Lastly, it highlighted usage of VAR models for time series analysis and its application to study monetary policy.
### 3.12 Tables and Figures

Table 3.12-1: FDI & FPI Investments from 1991 To 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>FDI (b$)</th>
<th>FPI (b$)</th>
<th>Total (b$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991-92</td>
<td>0.129</td>
<td>0.004</td>
<td>0.133</td>
</tr>
<tr>
<td>1992-93</td>
<td>0.315</td>
<td>0.244</td>
<td>0.559</td>
</tr>
<tr>
<td>1993-94</td>
<td>0.586</td>
<td>3.567</td>
<td>4.153</td>
</tr>
<tr>
<td>1994-95</td>
<td>1.314</td>
<td>3.824</td>
<td>5.138</td>
</tr>
<tr>
<td>1995-96</td>
<td>2.144</td>
<td>2.748</td>
<td>4.892</td>
</tr>
<tr>
<td>1996-97</td>
<td>2.821</td>
<td>3.312</td>
<td>6.133</td>
</tr>
<tr>
<td>1997-98</td>
<td>3.557</td>
<td>1.828</td>
<td>5.385</td>
</tr>
<tr>
<td>1998-99</td>
<td>2.462</td>
<td>-0.061</td>
<td>2.401</td>
</tr>
<tr>
<td>1999-00</td>
<td>2.155</td>
<td>3.026</td>
<td>5.181</td>
</tr>
<tr>
<td>2000-01</td>
<td>4.029</td>
<td>2.76</td>
<td>6.789</td>
</tr>
<tr>
<td>2001-02</td>
<td>6.13</td>
<td>2.021</td>
<td>8.151</td>
</tr>
<tr>
<td>2002-03</td>
<td>5.035</td>
<td>0.979</td>
<td>6.014</td>
</tr>
<tr>
<td>2003-04</td>
<td>4.322</td>
<td>11.377</td>
<td>15.699</td>
</tr>
<tr>
<td>2004-05</td>
<td>6.051</td>
<td>9.315</td>
<td>15.366</td>
</tr>
<tr>
<td>2006-07</td>
<td>22.826</td>
<td>7.003</td>
<td>29.829</td>
</tr>
<tr>
<td>2007-08</td>
<td>34.835</td>
<td>27.271</td>
<td>62.106</td>
</tr>
<tr>
<td>2009-10</td>
<td>37.182</td>
<td>32.375</td>
<td>69.557</td>
</tr>
</tbody>
</table>

Source RBI, table 31 page 53, 2010

Table 3.12-2: Investment by Foreign Institutional Investors

<table>
<thead>
<tr>
<th>Year</th>
<th>Purchase (b$)</th>
<th>Sales (b$)</th>
<th>Net (b$)</th>
<th>Cumulative Net (b$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992-93</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>1993-94</td>
<td>1.78</td>
<td>0.15</td>
<td>1.63</td>
<td>1.64</td>
</tr>
<tr>
<td>1994-95</td>
<td>2.43</td>
<td>0.90</td>
<td>1.53</td>
<td>3.17</td>
</tr>
<tr>
<td>1995-96</td>
<td>2.84</td>
<td>0.81</td>
<td>2.04</td>
<td>5.20</td>
</tr>
<tr>
<td>1996-97</td>
<td>4.41</td>
<td>1.98</td>
<td>2.43</td>
<td>7.63</td>
</tr>
<tr>
<td>1997-98</td>
<td>5.18</td>
<td>3.53</td>
<td>1.65</td>
<td>9.28</td>
</tr>
<tr>
<td>1998-99</td>
<td>3.93</td>
<td>4.32</td>
<td>-0.39</td>
<td>8.90</td>
</tr>
<tr>
<td>1999-00</td>
<td>13.90</td>
<td>11.42</td>
<td>2.47</td>
<td>11.37</td>
</tr>
<tr>
<td>2000-01</td>
<td>16.10</td>
<td>13.94</td>
<td>2.16</td>
<td>13.53</td>
</tr>
<tr>
<td>2001-02</td>
<td>10.51</td>
<td>8.67</td>
<td>1.84</td>
<td>15.37</td>
</tr>
<tr>
<td>2002-03</td>
<td>9.90</td>
<td>9.34</td>
<td>0.57</td>
<td>15.94</td>
</tr>
<tr>
<td>2003-04</td>
<td>31.67</td>
<td>21.66</td>
<td>10.01</td>
<td>25.94</td>
</tr>
<tr>
<td>Sectors</td>
<td>% share of Foreign Institutional Investors holdings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banks</td>
<td>17.62</td>
<td>16.02</td>
<td>14.27</td>
<td>19.15</td>
</tr>
<tr>
<td>Engineering</td>
<td>9.36</td>
<td>8.28</td>
<td>7.34</td>
<td>10.63</td>
</tr>
<tr>
<td>Finance</td>
<td>23.35</td>
<td>16.53</td>
<td>13.01</td>
<td>17.44</td>
</tr>
<tr>
<td>FMCG</td>
<td>16.34</td>
<td>14.09</td>
<td>12.72</td>
<td>14.07</td>
</tr>
<tr>
<td>IT</td>
<td>21.16</td>
<td>11.68</td>
<td>12.44</td>
<td>16</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>7.87</td>
<td>8.9</td>
<td>7.31</td>
<td>8.86</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>9.41</td>
<td>8.79</td>
<td>7.28</td>
<td>9.46</td>
</tr>
<tr>
<td>Media &amp; Entertainment</td>
<td>10.97</td>
<td>7.06</td>
<td>11.42</td>
<td>11.71</td>
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<tr>
<td>Petrochemicals</td>
<td>6.52</td>
<td>6.08</td>
<td>4.77</td>
<td>4.73</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>10.19</td>
<td>8.78</td>
<td>7.88</td>
<td>10.69</td>
</tr>
<tr>
<td>Services</td>
<td>7.41</td>
<td>8.05</td>
<td>8.39</td>
<td>10.7</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>8.44</td>
<td>8.64</td>
<td>6.85</td>
<td>9.12</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>13.65</td>
<td>8.1</td>
<td>8.39</td>
<td>9.3</td>
</tr>
<tr>
<td><strong>Total stake of FIIs in all sectors</strong></td>
<td><strong>10.32</strong></td>
<td><strong>9.58</strong></td>
<td><strong>8.4</strong></td>
<td><strong>10.62</strong></td>
</tr>
</tbody>
</table>

Source: SEBI, complied from ISMR, NSE, page 185, 2011