# Derivatives Market

## Introduction

Derivatives are financial contracts whose values are derived from the value of an underlying primary financial instrument, commodity or index, such as: interest rates, exchange rates, commodities, and equities. Derivatives include a wide assortment of financial contracts, including forwards, futures, swaps and options. The International Monetary Fund defines derivatives as *"financial instruments that are linked to a specific financial instrument or indicator or commodity and through which specific financial risks can be traded in financial markets in their own right. The value of a financial derivative derives from the price of an underlying item, such as an asset or index. Unlike debt securities, no principal is advanced to be repaid and no investment income accrues."* While some derivatives instruments may have very complex structures, all of them can be divided into basic building blocks of options, forward contracts or some combination thereof. Derivatives allow financial institutions and other participants to identify, isolate and manage separately the market risks in financial instruments and commodities for the purpose of hedging, speculating, arbitraging price differences and adjusting portfolio risks. The risks that are associated with derivatives include market risk (comprising currency, interest rate risk, equity price risk and commodity price risk), credit risk and liquidity risk. The risks of derivatives are more directly related to size and price volatility of the cash flows they represent than they are to the size of the notional amounts on which the cash flows are based. In fact, the risks of derivatives, and the cash flows which are derived from them, are usually only a small portion of the notional amounts. Financial institutions may use derivatives as end-users and dealers. For example, an institution acts as an end-user when it uses derivatives to take positions as part of its proprietary trading or for hedging as part of its asset and liability management. It acts as a dealer when it quotes bids and offers and commits capital to satisfying customers' demands for derivatives. The emergence of the market for derivative products, most notably forwards, futures and options, can be traced back to the willingness of risk-averse economic agents to guard themselves against uncertainties arising out of fluctuations in asset prices. By their very nature, the financial markets can be subject to a very high degree of volatility. Through the use of derivative products, it is possible to partially or fully transfer price risks by locking-in asset prices. As instruments of risk management, derivative products generally do not influence the fluctuations in the underlying asset prices. However, by locking-in asset prices, derivative products minimise the impact of fluctuations in asset prices on the profitability and cash flow situation of risk-averse investors.

Derivative products initially emerged as hedging devices against fluctuations in commodity prices and commodity-linked derivatives remained the sole form of such products for many years. The financial derivatives came into spotlight in post-1970 period due to growing instability in the financial markets. In recent years, the market for financial derivatives, both OTC as well as exchange traded, has grown both in terms of variety of

instruments available, their complexity and also turnover. The factors generally attributed as the major driving force behind growth of financial derivatives are (a) increased volatility in asset prices in financial markets, (b) increased integration of national financial markets with the international markets, (c) marked improvement in communication facilities and sharp decline in their costs, (d) development of more sophisticated risk management tools, providing economic agents a wider choice of risk management strategies, and (e) innovations in the derivatives markets, which optimally combine the risks and returns over a large number of financial assets, leading to higher returns, reduced risk as well as transaction costs as compared to individual financial assets.

## Products, Participants and Functions

Derivative contracts have several variants. The most common variants are forwards, futures, options and swaps:

*Forward* contract is a customised contract between two entities, where settlement takes place on a specific date in the future at today's pre-agreed price.

*Futures* contract is an agreement between two parties to buy or sell an asset at a certain time in the future at a certain price. Futures contracts are special types of forward contracts in the sense that the former are standardised exchange-traded contracts.

*Option* contract gives the right, but not the obligation, to buy or sell a specified quantity of the underlying at a fixed exercise price on or before the expiration date. A call option gives the right to buy and a put option gives the right to sell.

*Swaps* are private agreements between two parties to exchange cash flows in the future according to a pre-arranged formula. The two commonly used swaps are interest rate swaps and currency swaps.

The following three broad categories of participants - hedgers, speculators, and arbitrageurs – trade in the derivatives market:

*Hedgers* face risk associated with the price of an asset. They use futures or options markets to reduce or eliminate this risk.

*Speculators* wish to bet on future movements in the price of an asset. Futures and options contracts can give them an extra leverage; that is, they can increase both the potential gains and potential losses in a speculative venture.

*Arbitrageurs* are in business to take advantage of a discrepancy between prices in two different markets. If, for example, they see the futures price of an asset getting out of line with the cash price, they will take offsetting positions in the two markets to lock in a profit.

The derivatives market performs a number of economic functions. First, prices in an organised derivatives market reflect the perception of market participants about the future and lead the prices of underlying to the perceived future level. The prices of derivatives normally would converge with the prices of the underlying at the expiration of derivative contract. Thus derivatives help in discovery of future as well as current prices. Second, the derivatives market helps to transfer risks from those who have them but may not like them to those who have appetite for them. Third, derivatives, due to their inherent nature, are linked to the underlying cash markets. With the introduction of derivatives, the underlying market may

witness higher trading volumes because of participation by more players who would not otherwise participate for lack of an arrangement to transfer risk. Fourth, speculative trades may shift to a more controlled environment of derivatives market. In the absence of an organised derivatives market, speculators trade in the underlying cash markets. Margining, monitoring and surveillance of the activities of various participants become extremely difficult in these kind of mixed markets. Fifth, an important incidental benefit that flows from derivatives trading is that it acts as a catalyst for new entrepreneurial activity. The derivatives have a history of attracting many bright, creative, well-educated people with an entrepreneurial attitude. They often energise others to create new businesses, new products and new employment opportunities, the benefit of which are immense. Sixth, derivatives markets help increase savings and investment in the long run. Transfer of risk enables market participants to expand their volume of activity.

## Exchange-traded vs. OTC Markets

The OTC market for derivative contracts has been existing in some form or other since many many years. The OTC derivatives markets have some distinctive features vis-à-vis Exchange traded ones, such as (i) the management of counter-party (credit) risk is decentralised and located within individual institutions; (ii) there are no formal centralised limits on individual positions, leverage, or margining; (iii) there are no formal rules for risk and burden-sharing; (iv) there are no formal rules or mechanisms for ensuring market stability and integrity, and for safeguarding the collective interests of market participants; and (v) OTC contracts are generally not regulated by both a regulatory authority and the exchange's self-regulatory organisation, although they are affected indirectly by national legal systems, banking supervision and market surveillance.

Some of the features of OTC derivatives markets embody risks to financial market stability. The following features of OTC derivatives markets can give rise to instability in institutions, markets, and the international financial system: (i) the dynamic nature of gross credit exposures; (ii) information asymmetries; (iii) the effects of OTC derivative activities on available aggregate credit; (iv) the high concentration of OTC derivative activities in major institutions; and (v) the central role of OTC derivatives markets in the global financial system. Instability arises when shocks, such as counter-party credit events and sharp movements in asset prices that underlie derivative contracts, occur which significantly alter the perceptions of current and potential future credit exposures. When asset prices change rapidly, the size and configuration of counter-party exposures can become unsustainably large and provoke a rapid unwinding of positions.

There has been some progress in addressing these risks and perceptions. However, the progress has been limited in implementing reforms in risk management, including counter-party, liquidity and operational risks, and OTC derivatives markets continue to pose a threat to international financial stability. The problem is more acute as heavy reliance on OTC derivatives creates the possibility of systemic financial events, which fall outside the more formal clearing house structures. Moreover, those who provide OTC derivative products, hedge their risks through the use of exchange traded derivatives. In view of the inherent risks associated with OTC derivatives, and their dependence on exchange traded derivatives, Indian law considers them illegal except for specific contracts under FRAs/ IRS on domestic currency as allowed by RBI.

## Derivatives Market in India

The first step towards introduction of derivatives trading in India was the promulgation of the Securities Laws (Amendment) Ordinance, 1995, which withdrew the prohibition on options in securities. The market for derivatives, however, did not take off, as there was no regulatory framework to govern trading of derivatives. SEBI set up a 24-member Committee under the Chairmanship of Dr. L.C. Gupta on November 18, 1996 to develop appropriate regulatory framework for derivatives trading in India. The Committee submitted its report on March 17, 1998 prescribing necessary pre-conditions for introduction of derivatives trading in India. The Committee recommended that derivatives should be declared as 'securities' so that regulatory framework applicable to trading of 'securities' could also govern trading of securities. SEBI also set up a group in June 1998 under the Chairmanship of Prof. J. R. Varma, to recommend measures for risk containment in derivatives market in India. The Report, which was submitted in October 1998, worked out the operational details of margining system, methodology for charging initial margins, broker net worth, deposit requirement and real-time monitoring requirements.

The SC(R)A was amended in December 1999 to include derivatives within the ambit of 'securities' and the regulatory framework was developed for governing derivatives trading. Derivatives were formally defined to include: (a) *a security derived from a debt instrument, share, loan whether secured or unsecured, risk instrument or contract for differences or any other form of security, and (b) a contract which derives its value from the prices, or index of prices, or underlying securities.* The Act also made it clear that derivatives shall be legal and valid only if such contracts are traded on a recognised stock exchange, thus precluding OTC derivatives. The Government also rescinded in March 2000 the three-decade old notification, which prohibited forward trading in securities.

Derivatives trading commenced in India in June 2000 after SEBI granted the final approval to this effect in May 2000. SEBI permitted the derivative segments of two stock exchanges, *viz* NSE and BSE, and their clearing house/corporation to commence trading and settlement in approved derivative contracts. To begin with, SEBI approved trading in index futures contracts based on S&P CNX Nifty Index and BSE-30 (Sensex) Index. This was followed by approval for trading in options based on these two indices and options on individual securities. The trading in index options commenced in June 2001 and trading in options on individual securities commenced in July 2001. Futures contracts on individual stock were launched in November 2001. In June 2003, SEBI/RBI approved the trading in intrest rate derivatives instruments and NSE introduced trading in futures contract on June 24, 2003 on 91 day Notional T-bills and 10 year motional 6 percent coupon bearing as well as the coupon bond. Derivative contracts are traded and settled in accordance with the rules, byelaws, and regulations of the respective exchanges and their clearing house/corporation duly approved by SEBI and notified in the official gazette.

## Global Derivatives Markets

The year calendar year 2002 has been a remarkable year for the global derivatives markets. The year witnessed National Stock Exchange of India making huge strides and moved upward in global ranking. The recent data (covering exchange traded derivatives, including futures, options on futures, and options on securities) published by Futures Industry Association has stated that the total number of contracts traded increased by 36.8% during the year – futures contracts rising by 21.7% and options rising by 47.3%. Volume rose in all sectors of the market, but the category with the greatest increase was trading in equity index derivatives such as index options,

index futures and options on index futures. In 2002, global turnover in this category surged 86.2 % to 2.79 billion contracts worldwide, and the absolute increase - 1.29 billion contracts - accounted for just over 173 percent of the overall increase in volume. The following table gives the year-wise trend of the last 10 years of derivatives trading in terms of contracts.

**Year Wise Trend of Derivatives Trading (in terms of contracts)**

(in millions)

| YEAR | US Exchanges | Non-US Exchanges | TOTAL |
|---|---|---|---|
| 1992 | 550.39 | 387.83 | 938.22 |
| 1993 | 523.36 | 538.36 | 1,061.72 |
| 1994 | 807.87 | 779.83 | 1,587.70 |
| 1995 | 776.64 | 905.99 | 1,682.63 |
| 1996 | 793.63 | 975.34 | 1,717.31 |
| 1997 | 905.16 | 1,025.07 | 1,931.31 |
| 1998 | 1,033.20 | 1,142.65 | 2,175.81 |
| 1999 | 1,100.86 | 1,301.98 | 2,405.80 |
| 2000 | 1,313.65 | 1,675.80 | 2,989.18 |
| 2001 | 1,578.62 | 2,768.70 | 4,382.22 |
| 2002 | 1,844.90 | 4,147.36 | 5,992.25 |

KOPSI 200 stock index option led the table with more than 1.8 billion contracts in 2002. The study pointed out that about two-thirds of trading in KOPSI products came from retail customers in Korea. Trading in single stock futures has more than doubled, from 15 million to more than 32 million contracts. The top 20 contracts for 2002 are presented in Table 7-1. There are 14 stock exchanges in the world that list single stock futures. MEFF (1st) and NSEIL (2nd) have been the leaders in 2002 in single stock future category. Equity derivatives have remained at the top with 86% growth over 2001. The following table gives the contract volume by category.

**Volume by Category**

(in million)

| GLOBAL | 2002 | 2001 | % Change |
|---|---|---|---|
| Equity Indices | 2,789.98 | 1,498.15 | 86.23 |
| Interest Rate | 1,394.27 | 1,233.56 | 13.06 |
| Individual Equities | 1,264.96 | 1,179.01 | 7.29 |
| Energy Products | 209.37 | 166.90 | 25.45 |
| Ag Commodities | 146.96 | 139.40 | 5.42 |
| Non-Precious Metals | 75.59 | 70.15 | 7.76 |
| Foreign Currency/Index | 60.51 | 55.38 | 9.27 |
| Precious Metals | 51.26 | 39.14 | 30.96 |
| Other | 0.80 | 0.75 | 5.74 |
| **Total Volume** | **5,993.71** | **4,382.44** | **36.77** |

The Table 7-2 gives the details of the futures on individual equities, whereas Table 7-3 gives the Global Exchange's position with respect to Futures and Options Volume. It is seen that NSE ranks 30 in the global futures and options volume. Table 7-4 gives the details of top 40 Futures Exchanges of the World in which NSE stands at the 23rd position.

As per the publications of World Federation of Exchanges for June 2003, NSEIL leads the trading value (notional) as well as in terms of number of contracts in single stock futures. The statistics for Stock Options, Single Stock Futures, Stock Index Options and Futures of June 2003 are presented in Table 7-5 A and 7-5 B.

**Table 7-1: Top 20 Contracts for the year 2002**

| Sl. No. | Contract | Exchange | Jan-Dec 2002 | Jan-Dec 2001 | Volume Change | % Change |
|---|---|---|---|---|---|---|
| 1. | KOSPI 200 Options | KSE | 1,889,823,786 | 823,289,608 | 1,066,534,178 | 129.55 |
| 2. | 3-Month Eurodollar Futures | CME | 202,080,832 | 184,015,496 | 18,065,336 | 9.82 |
| 3. | Euro-BUND Futures | EUREX | 191,263,413 | 178,011,304 | 13,252,109 | 7.44 |
| 4. | E-Mini S&P 500 Index Futures | CME | 115,741,691 | 39,434,843 | 76,306,848 | 193.50 |
| 5. | Euro-BOBL Futures | EUREX | 114,678,996 | 99,578,068 | 15,100,928 | 15.16 |
| 6. | Euro-SCHATZ Futures | EUREX | 108,760,955 | 92,637,630 | 16,123,325 | 17.40 |
| 7. | 3-Month Euribor Futures | EURONEXT | 105,756,584 | 91,083,198 | 14,673,386 | 16.11 |
| 8. | 3-Month Eurodollar Options | CME | 105,580,961 | 88,174,799 | 17,406,162 | 19.74 |
| 9. | 10-Year T-Note Futures | CBOT | 95,786,299 | 57,585,828 | 38,200,471 | 66.34 |
| 10. | DJ Euro STOXX 50 Futures | EUREX | 86,354,731 | 37,828,500 | 48,526,231 | 128.28 |
| 11. | CAC 40 Index Options | EURONEXT | 84,342,670 | 107,251,388 | -22,908,718 | -21.36 |
| 12. | 30-Year T-Bond Futures | CBOT | 56,082,284 | 58,579,290 | -2,497,006 | -4.26 |
| 13. | E-Mini NASDAQ 100 Futures | CME | 54,491,180 | 32,550,233 | 21,940,947 | 67.41 |
| 14. | 5-Year T-Note Futures | CBOT | 50,512,085 | 31,122,401 | 19,389,684 | 62.30 |
| 15. | Interest Rate Futures | BM&F | 48,568,401 | 46,241,111 | 2,327,290 | 5.03 |
| 16. | Crude Oil Futures | NYMEX | 45,679,468 | 37,530,568 | 8,148,900 | 21.71 |
| 17. | DAX Options | EUREX | 44,027,830 | 44,102,502 | -74,672 | -0.17 |
| 18. | KOSPI 200 Futures | KSE | 42,868,164 | 31,502,184 | 11,365,980 | 36.08 |
| 19. | DJ Euro STOXX 50 Options | EUREX | 39,477,430 | 19,046,893 | 20,430,537 | 107.26 |
| 20. | 3-Month Sterling Futures | EURONEXT | 34,307,727 | 34,945,053 | -637,326 | -1.82 |

*Source:* www.futureindustry.org

**Table 7-2: Futures on Individual Equities**

(in millions)

| Exchange | 2001 | 2002 |
|---|---|---|
| MEFF | 8,766,165 | 12,645,186 |
| National Stock Exchange of India | 435,701 | 8,557,332 |
| Euronext.liffe | 2,325,744 | 3,935,121 |
| Euronext Lisbon | 0 | 2,928,883 |
| South African Futures Exchange | 811,156 | 2,224,684 |
| Stockholmbörsen (OM) | 1,468,018 | 1,290,181 |
| Budapest Stock Exchange | 879,049 | 452,638 |
| OneChicago | 0 | 151,878 |
| Nasdaq Liffe Markets | 0 | 72,897 |
| Italian Derivatives Market | 0 | 59,853 |
| Euronext Amsterdam | 8,367 | 37,042 |
| Sydney Futures Exchange | 12,545 | 29,286 |
| Hong Kong Exchanges & Clearing | 7,756 | 21,056 |
| Singapore Exchanges | 6,575 | 13,690 |
| Bourse de Montréal | 17,206 | 0 |
| **Total** | **14,738,282** | **32,419,727** |

*Source:* www.futureindustry.org

**Table 7-3: Global Futures and Options Volume**

| Rank | | Exchange | Volume | | % Change |
|---|---|---|---|---|---|
| 2002 | 2001 | | 2001 | 2002 | |
| 1 | 1 | Korea Stock Exchange | 854,791,792 | 1,932,691,950 | 126.1 |
| 2 | 2 | Eurex | 674,157,863 | 801,200,873 | 18.84 |
| 3 | 3 | Euronext | 614,456,513 | 696,323,560 | 13.32 |
| 4 | 4 | Chicago Mercantile Exchange | 411,712,038 | 558,447,820 | 35.64 |
| 5 | 6 | Chicago Board of Trade | 260,333,070 | 343,882,529 | 32.09 |
| 6 | 5 | Chicago Board Options Exchange | 306,667,851 | 267,616,496 | -12.73 |
| 7 | 7 | American Stock Exchange | 205,103,884 | 186,039,445 | -9.3 |
| 8 | 12 | International Securities Exchange | 65,353,969 | 152,399,279 | 133.19 |
| 9 | 8 | New York Mercantile Exchange | 103,025,093 | 133,744,435 | 29.82 |
| 10 | 11 | Brazilian Mercantile & Futures Exchange | 97,870,685 | 101,615,788 | 3.83 |
| 11 | 10 | Philadelphia Exchange | 101,373,433 | 88,955,247 | -12.25 |
| 12 | 9 | Pacific Stock Exchange | 102,701,752 | 85,426,649 | -16.82 |
| 13 | 15 | The Tokyo Commodity Exchange | 56,538,245 | 75,413,190 | 33.38 |
| 14 | 13 | Stockholmbörsen (OM) | 62,735,817 | 60,920,817 | -2.89 |
| 15 | 14 | London Metal Exchange | 59,413,250 | 58,634,004 | -1.31 |
| 16 | 19 | Tel-Aviv Stock Exchange | 33,034,807 | 41,419,705 | 25.38 |
| 17 | 16 | MEFF | 37,027,347 | 41,382,257 | 11.76 |
| 18 | 18 | Sydney Futures Exchange | 35,845,879 | 36,243,524 | 1.11 |
| 19 | 20 | Singapore Exchanges | 30,989,862 | 32,887,395 | 6.12 |
| 20 | 17 | South African Futures Exchange | 36,175,719 | 30,966,583 | -14.4 |
| 21 | 22 | International Petroleum Exchange | 26,410,664 | 30,441,474 | 15.26 |
| 22 | 21 | Central Japan Commodity Exchange | 27,846,712 | 30,011,863 | 7.78 |
| 23 | 24 | New York Board of Trade | 17,891,889 | 20,928,479 | 16.97 |
| 24 | 25 | Osaka Securities Exchange | 17,470,349 | 20,584,972 | 17.83 |
| 25 | 23 | Tokyo Grain Exchange | 22,816,404 | 18,728,266 | -17.92 |
| 26 | 26 | Italian Derivatives Market | 17,081,011 | 17,246,629 | 0.97 |
| 27 | 27 | Tokyo Stock Exchange | 13,535,291 | 14,759,690 | 9.05 |
| 28 | 29 | Korea Futures Exchange | 11,468,991 | 14,623,295 | 27.5 |
| 29 | 28 | Bourse de Montréal | 12,633,929 | 14,491,971 | 14.71 |
| **30** | **42** | **National Stock Exchange of India** | **1,856,734** | **13,287,113** | **615.62** |
| 31 | 33 | Shanghai Futures Exchange | 5,610,335 | 12,173,083 | 116.98 |
| 32 | 30 | Hong Kong Exchanges & Clearing | 10,549,552 | 11,029,404 | 4.55 |
| 33 | 34 | Taiwan Futures Exchange | 4,351,389 | 7,944,254 | 82.57 |
| 34 | 36 | Osaka Mercantile Exchange | 3,387,170 | 5,207,652 | 53.75 |
| 35 | 38 | Kansai Commodities Exchange | 2,907,648 | 4,491,954 | 54.49 |
| 36 | 31 | Tokyo Intl Financial Futures Exchange | 7,642,462 | 4,470,763 | -41.5 |
| 37 | 40 | Kansas City Board of Trade | 2,618,489 | 3,326,836 | 27.05 |
| 38 | 35 | Oslo Stock Exchange | 3,846,074 | 3,175,729 | -17.43 |
| 39 | 32 | Fukuoka Futures Exchange | 6,367,607 | 3,170,986 | -50.2 |
| 40 | 45 | Helsinki Exchanges | 1,143,636 | 2,644,358 | 131.22 |
| 41 | 37 | Winnipeg Commodity Exchange | 3,037,333 | 2,193,283 | -27.79 |
| 42 | 54 | Brokertec Futures Exchange | 89,471 | 2,109,670 | 2257.94 |
| 43 | 39 | Budapest Commodity Exchange | 2,624,463 | 1,624,401 | -38.11 |
| 44 | 44 | Yokohama Commodity Exchange | 1,312,871 | 1,507,210 | 14.8 |
| 45 | 43 | Wiener Börse | 1,801,652 | 1,327,084 | -26.34 |
| 46 | 48 | Malaysia Derivatives Exchange Berhad | 822,805 | 1,276,787 | 55.17 |
| 47 | 47 | Minneapolis Grain Exchange | 998,529 | 1,262,769 | 26.46 |
| 48 | 41 | Budapest Stock Exchange | 2,296,771 | 1,072,966 | -53.28 |
| 49 | 46 | New Zealand Futures Exchange | 1,045,784 | 627,018 | -40.04 |
| 50 | 50 | Copenhagen Stock Exchange | 490,577 | 536,796 | 9.42 |
| 51 | 49 | MidAmerica Commodity Exchange | 592,759 | 483,253 | -18.47 |
| 52 | 51 | Mercado a Termino de Rosario | 223,833 | 408,470 | 82.49 |
| 53 | 55 | OneChicago | 184,081 | N/A | N/A |
| 54 | 56 | Nasdaq Liffe Market | 90,091 | N/A | N/A |
| 55 | 53 | Cantor Exchange | 162,700 | N/A | N/A |
| 56 | 52 | Mercando a Termino de Buenos Aires | 196,273 | N/A | N/A |

*Source:* www.futureindustry.org

**Table 7-4: Top 40 Futures Exchanges**

| Rank | | Exchange | Volume | | % Change |
|---|---|---|---|---|---|
| 2002 | 2001 | | 2001 | 2002 | |
| 1 | 1 | Eurex | 435,141,707 | 536,013,920 | 23.18 |
| 2 | 2 | Chicago Mercantile Exchange | 315,971,686 | 444,537,987 | 40.69 |
| 3 | 4 | Chicago Board of Trade | 209,988,002 | 276,316,047 | 31.59 |
| 4 | 3 | Euronext | 210,441,570 | 221,275,462 | 5.15 |
| 5 | 6 | New York Mercantile Exchange | 85,039,984 | 107,359,719 | 26.25 |
| 6 | 5 | Brazilian Mercantile & Futures Exchange | 94,174,452 | 95,912,579 | 1.85 |
| 7 | 7 | The Tokyo Commodity Exchange | 56,538,245 | 75,413,190 | 33.38 |
| 8 | 8 | London Metal Exchange | 56,224,495 | 56,303,779 | 0.14 |
| 9 | 10 | Korea Stock Exchange | 31,502,184 | 42,868,164 | 36.08 |
| 10 | 9 | Sydney Futures Exchange | 34,075,508 | 33,987,967 | -0.26 |
| 11 | 11 | Singapore Exchanges | 30,606,546 | 32,623,190 | 6.59 |
| 12 | 13 | International Petroleum Exchange | 26,098,207 | 30,233,664 | 15.85 |
| 13 | 12 | Central Japan Commodity Exchange | 27,846,712 | 30,011,863 | 7.78 |
| 14 | 14 | Stockholmbörsen (OM) | 23,408,198 | 20,208,149 | -13.67 |
| 15 | 15 | Tokyo Grain Exchange | 22,707,808 | 18,670,931 | -17.78 |
| 16 | 17 | MEFF | 13,398,901 | 17,314,065 | 29.22 |
| 17 | 16 | New York Board of Trade | 14,034,168 | 16,272,144 | 15.95 |
| 18 | 20 | Korea Futures Exchange | 11,468,906 | 14,596,861 | 27.27 |
| 19 | 18 | Tokyo Stock Exchange | 12,465,433 | 13,630,046 | 9.34 |
| 20 | 27 | Shanghai Futures Exchange | 5,610,335 | 12,173,083 | 116.98 |
| 21 | 19 | South African Futures Exchange | 11,868,242 | 11,233,002 | -5.35 |
| 22 | 21 | Osaka Securities Exchange | 10,478,441 | 11,134,754 | 6.26 |
| **23** | **36** | **National Stock Exchange of India** | **1,176,657** | **10,199,111** | **766.79** |
| 24 | 23 | Bourse de Montréal | 7,260,999 | 8,058,498 | 10.98 |
| 25 | 25 | Italian Derivatives Market | 6,035,207 | 7,071,028 | 17.16 |
| 26 | 28 | Taiwan Futures Exchange | 4,346,252 | 6,377,808 | 46.74 |
| 27 | 26 | Hong Kong Exchanges & Clearing | 5,830,672 | 6,228,037 | 6.82 |
| 28 | 29 | Osaka Mercantile Exchange | 3,387,170 | 5,207,652 | 53.75 |
| 29 | 31 | Kansai Commodities Exchange | 2,901,551 | 3,855,739 | 32.89 |
| 30 | 22 | Tokyo Int Financial Futures Exchange | 7,628,909 | 4,470,763 | -41.40 |
| 31 | 24 | Fukuoka Futures Exchange | 6,367,607 | 3,170,986 | -50.20 |
| 32 | 33 | Kansas City Board of Trade | 2,375,133 | 2,755,949 | 16.03 |
| 33 | 38 | Helsinki Exchanges | 988,544 | 2,157,629 | 118.26 |
| 34 | 30 | Winnipeg Commodity Exchange | 2,903,826 | 2,155,796 | -25.76 |
| 35 | 47 | Brokertec Futures Exchange | 89,471 | 2,109,670 | 2257.94 |
| 36 | 35 | Yokohama Commodity Exchange | 1,312,871 | 1,507,210 | 14.80 |
| 37 | 32 | Budapest Commodity Exchange | 2,612,788 | 1,338,846 | -48.76 |
| 38 | 41 | Malaysia Derivatives Exchange Berhad | 822,241 | 1,276,787 | 55.28 |
| 39 | 39 | Minneapolis Grain Exchange | 968,699 | 1,201,543 | 24.04 |
| 40 | 34 | Budapest Stock Exchange | 2,286,300 | 1,072,566 | -53.09 |

*Source:* www.futureindustry.org

**Table 7-5 A: Stock Options and Single Stock Futures : Number of Contracts & Notional Value, June 2003**

| Time Zone | Derivative Exchange | Stock Options | | Single Stock Futures | |
|---|---|---|---|---|---|
| | | Number of contracts Traded | Notional Turnover (In US$ mn.) | Number of contracts Traded | Notional Turnover (In US$ mn.) |
| **North America** | Amex | NA | NA | NA | NA |
| | Bourse de Montreal | 524,281 | 1,548 | NA | NA |
| | Chicago Board of Trade | NA | NA | NA | NA |
| | Chicago Board of Options Exchange | 15,710,788 | NA | - | - |
| | Chicago Mercantile Exchange | - | - | - | - |
| | ISE | 22,295,244 | 77,415 | - | - |
| | MexDer | - | - | - | - |
| | NY Board of Trade | NA | NA | NA | NA |
| | NY Merc | NA | NA | NA | NA |
| | Pacific CE | NA | NA | NA | NA |
| | Philadelphia SE/BOT | NA | NA | NA | NA |
| **South America** | Bolsa de Comm.de Buenos Aires | NA | NA | NA | NA |
| | BM&F | NA | NA | NA | NA |
| | BOVESPA (Brazil ) | 13,066,234 | 15,212 | - | - |
| **Europe, Africa, Middle East** | Athens Derivatives Exchange | 1,590 | 103 | 44,835 | 56 |
| | Budapest SE | 0 | 0 | 51,769 | 265 |
| | Eurex | 18,587,607 | 44,643 | - | NA |
| | Euronext | 16,941,760 | NA | 884,757 | NA |
| | Euronext.LIFFE | 800,721 | 5,121 | 1,244,525 | 4,043 |
| | Futop | 12,213 | 221 | 150 | 3.1 |
| | HEX | 77,550 | 86 | 108,233 | 45 |
| | Italian Exchange | 787,966 | 4,135 | 106,705 | 678 |
| | JSE | 1,436,336 | 887 | 594,202 | 187 |
| | Oslo Bors | 143,538 | NA | - | NA |
| | Spanish Exhcnages | NA | NA | NA | NA |
| | Stockholmsboersen | 3,299,492 | 1,883 | 145,440 | 90 |
| | Tel-Aviv SE | - | - | - | - |
| | Wiener Borse | 128,921 | 282 | - | NA |
| | Warsaw SE | - | NA | 6,608 | 14 |
| **Asia Pacific** | Australian SE | 1,165,945 | 10,110 | 18,807 | 120 |
| | Bombay Stock Exchange | 123 | 0.55 | 265 | 1.3 |
| | Hong Kong Exchanges & Clearing | 311,464 | 886 | 1,381 | 4.2 |
| | Korea Futures Exchange | NA | NA | NA | NA |
| | Korea SE | 10 | 0.03 | - | - |
| | Malaysia Derivatives Exchange | NA | NA | NA | NA |
| | National Stock Exchange of India | 516,101 | 3,242 | 1,694,505 | 10,023 |
| | Osaka Securities Exchange | 1,442 | NA | 1,399,178 | NA |
| | SFE Corporation | NA | NA | NA | NA |
| | Singapore Exchange | NA | NA | NA | NA |
| | TAIFEX | 14,965 | 445 | - | - |
| | Tokyo SE | 48,610 | 3.1 | 16,380 | 24 |
| | Zhengzhou Commodity Exchange | NA | NA | NA | NA |

*Source:* FOCUS, World Federation of Exchanges, July 2003

**Table 7-5 B: Stock Index Options and Futures : Number of Contracts & Notional Value, June 2003**

| Time Zone | Derivative Exchange | Stock Index Options | | Stock Index Futures | |
|---|---|---|---|---|---|
| | | Number of contracts Traded | Notional Turnover (In US$ mn.) | Number of contracts Traded | Notional Turnover (In US$ mn.) |
| **North America** | Amex | NA | NA | NA | NA |
| | Bourse de Montreal | 4,237 | 1,251 | 27,311 | 16,089 |
| | Chicago Board of Trade | NA | NA | NA | NA |
| | Chicago Board of Options Exchange | 9,618,719 | NA | - | - |
| | Chicago Mercantile Exchange | 533,847 | 127,268 | 26,108,682 | 1,672,664 |
| | ISE | - | - | - | - |
| | MexDer | - | - | 19,590 | 1,389,254,100 |
| | NY Board of Trade | NA | NA | NA | NA |
| | NY Merc | NA | NA | NA | NA |
| | Pacific CE | NA | NA | NA | NA |
| | Philadelphia SE/BOT | NA | NA | NA | NA |
| **South America** | Bolsa de Comm.de Buenos Aires | NA | NA | NA | NA |
| | BM&F | NA | NA | NA | NA |
| | BOVESPA (Brazil ) | 106,926 | 504 | - | - |
| **Europe, Africa, Middle East** | Athens Derivatives Exchange | 148,650 | 781 | 278,741 | 1,482 |
| | Budapest SE | 0 | NA | 29,314 | 265 |
| | Eurex | 9,074,739 | 211,277 | 16,659,013 | 634249 |
| | Euronext | 8,345,140 | NA | 4,225,874 | NA |
| | Euronext.LIFFE | 941,400 | | 2,422,906 | |
| | Futop | 1,010 | 221 | 37,697 | 3.1 |
| | HEX | 0 | 0 | 3 | 0 |
| | Italian Exchange | 210,910 | 15,086 | 648,621 | 68,498 |
| | JSE | 1,436,336 | 15 | 595,202 | 12,118 |
| | Oslo Bors | 44,072 | NA | 72,428 | NA |
| | Spanish Exhcnages | NA | NA | NA | NA |
| | Stockholmsboersen | 466,478 | 1,883 | 1,244,177 | 90 |
| | Tel-Aviv SE | 3,315,197 | 32,712 | 1,724 | 18 |
| | Wiener Borse | 843 | 21 | 5,092 | 151 |
| | Warsaw SE | 9,519 | 0.34 | 214,427 | 668 |
| **Asia Pacific** | Australian SE | 60,672 | 1,236 | 18,138 | 249 |
| | Bombay Stock Exchange | 0 | 0 | 35 | 0.13 |
| | Hong Kong Exchanges & Clearing | 205,264 | 12,664 | 612,652 | 33,690 |
| | Korea Futures Exchange | NA | NA | NA | NA |
| | Korea SE | 181,208,980 | 1,276,883 | 4,225,179 | 149,699 |
| | Malaysia Derivatives Exchange | NA | NA | NA | NA |
| | National Stock Exchange of India | 90,769 | 418 | 439,151 | 2,015 |
| | Osaka Securities Exchange | NA | NA | 1,460,493 | 106,141 |
| | SFE Corporation | NA | NA | NA | NA |
| | Singapore Exchange | NA | NA | NA | NA |
| | TAIFEX | 1,827,947 | 19,279 | 755,802 | 642,900 |
| | Tokyo SE | - | - | 1,360,804 | 96,134 |
| | Zhengzhou Commodity Exchange | NA | NA | NA | NA |

*Source:* FOCUS, World Federation of Exchanges, July 2003

## Policy Developments

This section discusses the policy developments during 2002-03.

### *Advisory Committee Recommendations*

SEBI, based on recommendations of the Advisory Committee have modified the risk containment measures and also broadened the list of stocks for trading in derivatives segment. A stock on which stock option and single stock future is proposed to be introduced shall conform to the following broad eligibility criteria:

- Stock shall be chosen from amongst the top 500 stock in terms of average daily market capitalisation and average daily traded value in the previous six month on rolling basis.
- Stocks median quarter-sigma order size over the last six months shall be at least Rs. 5 lakh. The exchange shall follow certain guidelines for the purpose of calculating quarter sigma order size in a stock, which would be as;
    i. Quarter sigma order size shall be calculated by taking four snapshots in a day, (which would be randomly chosen from within four fixed ten-minutes windows spread through the day) from the order book of the stock in the past six months.
    ii. The sigma/volatility estimate shall be daily closing volatility estimate which is also used for day end initial margin calculation in derivative contracts on a stock.. For stocks on which derivative contracts are not traded, the daily closing volatility estimate shall be computed in the manner specified by Prof. J. R. Varma committee on risk containment measures for Index Futures.
    iii. The quarter sigma percentage shall be applied to the average of the best bid and offer price in the order book snapshot to compute the order size to move price of the stock by quarter sigma. The median order to cause sigma price movement shall be determined separately for the buy side and the sell side. The average of the median order size for the buy and the sell side shall be taken as the median quarter sigma order size.
    iv. NSE and BSE would be using a common methodology for carrying out the calculations. The quarter sigma order size in a stock shall be calculated on the 15$^{th}$ of each month on a rolling basis, considering the order book snapshots in the previous six months.

The number of stocks eligible may vary from month to month depending upon the changes in quarter sigma order sizes, average daily market capitalisation and average daily traded value calculated every month on a rolling basis for the past six months. Consequently, the procedure for introducing and dropping stock would follow certain guidelines, *viz.,* (i) options and futures may be introduced on new stocks when they meet the eligibility criteria (ii) in case a stock fails to meet with the eligibility criteria for three months consecutively, no fresh contracts shall be issued on that stock. However, the unexpired contracts would be permitted to trade till expiry and new strikes shall also be introduced in the existing contract months (iii) the Exchange may compulsorily close out all derivative contract positions in a particular underlying when that underlying has ceased to satisfy the eligibility criteria or the exchange is of the view that the continuance of derivative contracts on such underlying is detrimental to the interest of the market keeping in view the market integrity and safety. The decision of

such forced closure of derivative contracts shall be taken in consultation with other exchanges where such derivative contracts are also traded and shall be applied uniformly across all exchanges. For unlisted companies coming out with IPO, if the net public offer is Rs. 500 crore or more, then the exchanges may consider introducing stock options and stock futures on such stocks at the time of its listing in the cash market. Derivative contracts on a new stock index shall be permitted if the stocks contributing 90% weightage in the index are individually eligible for derivative trading as per the eligibility criteria. This requirement shall be applied only at the time of introduction of derivative contract on new indices.

## *Risk Containment Measures*

For the purpose of computing worst scenario loss on a portfolio, the price scan range for stock option and single stock future contracts shall henceforth be linked to liquidity, measured in terms of impact cost for an order size of Rs. 5 lakh, calculated on the basis of order book snapshots in the previous six months. Accordingly, if the mean value of impact cost exceeds 1%, the price scanning range would be scaled up by square root of three. This would be in addition to the requirement of scaling up for the look-ahead period i.e. the time in which mark to market margin is collected.

### Exposure Limits

The exchange shall ensure that the higher of 5% or 1.5 (standard deviation) of the notional value of gross open position in single stock futures and gross short open position in stock option in a particular underlying is collected/adjusted from the liquid net worth of a member on a real time basis. For the purpose of computing 1.5 standard deviations, the standard deviation of daily logarithmic returns of prices in the underlying stock in the cash market in the last six months shall be computed. This value shall be applicable for a month and shall be re-calculated at the end of the month by once again taking the price data on a rolling basis for the past six months.

### Position Limits

The trading member position limits shall be linked to market wide limit. For stocks, in which the market wide position limit is less than or equal to Rs. 250 crore, the trading member limit in such stocks shall be 20% of the market wide limit. For stocks, in which the market wide position limit is greater that Rs. 250 crore, the trading member position limit in such stocks shall be Rs. 50 crore.

## *Eligibility Criteria, Market Structure and Governance of Derivatives Segment*

- The exchanges would also have the freedom to select a security on which derivative contract shall be traded. However, the derivative contract shall require the approval of SEBI in the same way followed presently.
- Separation of Cash and Derivatives Segment of an Exchange and its clearing house/ corporation in the following areas:
    - Legal framework governing trading, clearing and settlement of the derivatives segment (Regulations and/or Bye-laws) shall be separated from cash market segment,

- TGF/SGF of the derivatives segment shall be separate from the TGF/SGF of cash market segment,
- Membership of the derivatives segment shall be separate from the cash market segment,
- The governing council/clearing council/executive committee of the derivatives segment shall also be separate from the cash market segment.

- Functional, Operational and administrative modalities shall be separated at the discretion of the exchange.
- SEBI circular regarding the mandatory appointment of the Chief Executive Officer (CEO) is withdrawn and henceforth the executive director/MD of the exchange and the clearing house/corporation, as the case maybe, shall assume all responsibilities for the duties specified for CEO.
- The stipulation of 100% inspection of derivative trading and clearing members by the derivative exchange/segment in a year has also been withdrawn. The inspection strategy now shall be:
  - To identify the top members to be taken up for compulsory inspection
  - Remaining members to be chosen on sampling basis
  - Mechanism shall ensure that active members do not go un-inspected for several years in succession.

## *Investment limit in Exchange Traded Derivative Contracts*

Trading by FIIs and their sub accounts in derivatives contracts till these are not resulting into settlement by physical delivery of underlying stocks shall not attract the investment limit of 10% or 5% of the total issued capital of the company as prescribed in Regulations 15 (5) and (6) of the SEBI (FII) Regulations, 1995.

## *Introduction of Exchange Traded Interest Rate Derivative*

SEBI in consultation with Government and RBI have framed the Risk Containment Measures and the scheme for introduction of futures contracts on a Notional Government Security with a 10 year maturity and a Notional Treasury Bill with a maturity of 91 days or three months.

### Product Specifications

i. The minimum contract size of the Interest Rate Derivative contract shall not be less than Rs. 2,00,000 at the time of the launch. The Exchange shall initially introduce Long Bond futures and Notional T-bills Futures, and the notional underlying shall be a coupon bond or/and a zero coupon bond. The exchange shall specify the coupon rate and disclose the same to the market prior to introduction of the contracts.

ii. The bonds shall be quoted on the basis of prices, yields or 100-yield, initially up to 2 decimal points and within two months of the introduction of the contract, up to 4 decimal points. The Long Bond futures and Notional T-bill Futures shall initially be settled in cash.

iii. The Exchange shall introduce futures contracts on the notional bonds up to a maturity of one year. The Exchange shall decide whether to have quarterly contracts beyond the first three months, and whether the quarters shall be fixed months of the year or rolling quarterly horizon from the contract introduction date.

iv. The final settlement price of the Long Bond Future and the Notional T-Bill Future shall be determined using a "zero coupon yield curve (ZCYC)". The ZCYC shall be computed from the prices of Government securities traded on the Exchange/s or reported on the NDS of RBI or both.

## *Risk Containment Measures*

The parameters for risk containment model shall include the following:

### i. Initial Margin or Worst Scenario Loss

The Initial Margin requirements shall be based on the worst scenario loss of a portfolio of an individual client to cover 99% VaR over one day horizon across various scenarios of price changes, based on the volatility estimates, and volatility changes. The estimate at the end of day t ($\sigma_t$) (sigma) shall be estimated using the previous volatility estimate i.e. as at the end of t-1 day ($\sigma_{t-1}$), and the return ($r_t$) observed in the futures market during day t. The formula shall be $(\sigma_t)^2 = \lambda (\sigma_{t-1})^2 + (1 - \lambda)(r_t)^2$ where (i) $\lambda$ is a parameter which determines how rapidly volatility estimates changes. The value of $\lambda$ is fixed at 0.94 and (ii) $\sigma$ (sigma) means the standard deviation of daily returns in the interest rate futures contract. In case of Long Bond Futures, the price scan range shall be $3.5\sigma$ and in no case the initial margin shall be less than 2% of the notional value of the Futures Contracts. For Notional T-Bill Futures, the price scan range shall be $3.5\sigma$ and in no case the initial margin shall be less than 0.2% of the notional value of the futures contract.

### ii. Calendar Spread Charge

The Calendar spread margin is charged in addition to the Worst Scenario Loss of the portfolio. For interest rate futures contracts a calendar spread margin shall be at a flat rate of 0.125% per month of spread on the far month contract subject to minimum margin of 0.25% and a maximum margin of 0.75% on the far side of the spread with legs up to 1 year apart.

### iii. Exposure Limits

The notional value of gross open positions at any point in time in Futures contracts on a the Notional 10 year bond shall not exceed 100 times the available liquid net worth of a member. For futures contracts on the Notional T-bill, the notional value of gross open positions at any point in the contract shall not exceed 1000 times the available liquid net worth of a member.

### iv. Real Time Computation

Initially, the zero coupon yield curve shall be computed at the end of the day. However, the Exchange/yield curve provider shall endeavour to compute the zero coupon yield curve on a real time basis or at least several times during the course of the day.

### v. Margin Collection and Enforcement

The mark to market settlement margin for Interest Rate Futures Contracts shall be

collected before start of the next day's trading, in cash. If mark to market margins is not collected before start of the next day's trading, the clearing corporation/house shall collect correspondingly higher initial margin to cover the potential for losses over the time elapsed in the collection of margins. The higher initial margin shall be calculated as specified in the Prof. J.R. Varma committee reports on risk containment measures for index futures.

**vi. Position Limits**

In the case of Interest Rate Futures Contracts, positions limits shall be specified at the client level and for near month contracts. The client level position limits shall be Rs. 100 crore or 15% of open interest whichever is higher.

## *Accounting for Equity Index Options and Equity Stock Options*

The Institute of Chartered Accountants of India (ICFAI) issued guidance note on accounting for index options and stock options from the view point of the parties who enter into such contracts as buyers/holder or sellers/writers.

Following are the guidelines for accounting treatment in case of cash settled index options and stock options:

### Accounting at the inception of the contract

The seller/writer of the option is required to pay initial margin for entering into the option contract. Such initial margin paid would be debited to 'Equity Index Option Margin Account' or to 'Equity Stock Option Margin Account', as the case may be. In the balance sheet, such account should be shown separately under the head "Current Assets".

The buyer/holder of the option is not required to pay any margin. He is required to pay the premium. In his books, such premium would be debited to 'Equity Index Option Premium Account' or 'Equity Stock Option Premium Account', as the case may be. In the books of the seller/writer, such premium received should be credited to 'Equity Index Option Premium Account' or 'Equity Stock Option Premium Account', as the case may be.

### Accounting at the time of payment/receipt of margin

Payments made or received by the seller/writer for the margin should be credited/debited to the bank account and the corresponding debit/credit for the same should also be made to 'Equity Index Option Margin Account' or to 'Equity Stock Option Margin Account', as the case may be.

Sometimes, the client deposit a lump sum amount with the trading/clearing member in respect of the margin instead of paying/receiving margin on daily basis. In such case, the amount of margin paid/received from/into such accounts should be debited/credited to the 'Deposit for Margin Account'. At the end of the year the balance in this account would be shown as deposit under 'Current Assets'.

### Accounting for open options as on balance sheet date

The 'Equity Index Option Premium Account' and the 'Equity Stock Option Premium Account' should be shown under the head 'Current Assets' or 'Current Liabilities', as the case may be. In the books of the buyer/holder, a provision should be made for the amount by which the premium paid for the option exceeds the premium prevailing on the balance sheet date. The

provision so created should be credited to "Provision for Loss on Equity Index Option Account" or to the "Provision for Loss on Equity Stock Options Account", as the case may be. The provision made as above should be shown as deduction from "Equity Index Option Premium" or "Equity Stock Option Premium" which is shown under 'Current Assets'.

In the books of the seller/writer, the provision should be made for the amount by which premium prevailing on the balance sheet date exceeds the premium received for that option. This provision should be credited to "Provision for Loss on Equity Index Option Account" or to the "Provision for Loss on Equity Stock Option Account", as the case may be, with a corresponding debit to profit and loss account. "Equity Index Options Premium Account" or "Equity Stock Options Premium Account" and "Provision for Loss on Equity Index Options Account" or "Provision for Loss on Equity Stock Options Account" should be shown under 'Current Liabilities and Provisions'.

In case of any opening balance in the "Provision for Loss on Equity Stock Options Account" or the "Provision for Loss on Equity Index Options Account", the same should be adjusted against the provision required in the current year and the profit and loss account be debited/credited with the balance provision required to be made/excess provision written back.

### Accounting at the time of final settlement

On exercise of the option, the buyer/holder will recognise premium as an expense and debit the profit and loss account by crediting "Equity Index Option Premium Account" or "Equity Stock Option Premium Account". Apart from the above, the buyer/holder will receive favorable difference, if any, between the final settlement price as on the exercise/expiry date and the strike price, which will be recognised as income.

On exercise of the option, the seller/writer will recognise premium as an income and credit the profit and loss account by debiting "Equity Index Option Premium Account" or "Equity Stock Option Premium Account". Apart from the above, the seller/writer will pay the adverse difference, if any, between the final settlement price as on the exercise/expiry date and the strike price. Such payment will be recognised as a loss.

As soon as an option gets exercised, margin paid towards such option would be released by the exchange, which should be credited to "Equity Index Option Margin Account" or to "Equity Stock Option Margin Account", as the case may be, and the bank account will be debited.

### Accounting at the time of squaring off an option contract

The difference between the premium paid and received on the squared off transactions should be transferred to the profit and loss account.

Following are the guidelines for accounting treatment in case of delivery settled index options and stock options:

The accounting entries at the time of inception, payment/receipt of margin and open options at the balance sheet date will be the same as those in case of cash settled options. At the time of final settlement, if an option expires unexercised then the accounting entries will be the same as those in case of cash settled options. If the option is exercised then shares will be transferred in consideration for cash at the strike price. For a call option the buyer/holder will receive equity shares for which the call option was entered into. The buyer/holder should debit the relevant equity shares account and credit cash/bank. For a put option, the buyer/

holder will deliver equity shares for which the put option was entered into. The buyer/holder should credit the relevant equity shares account and debit cash/bank. Similarly, for a call option the seller/writer will deliver equity shares for which the call option was entered into. The seller/writer should credit the relevant equity shares account and debit cash/bank. For a put option the seller/writer will receive equity shares for which the put option was entered into. The seller/writer should debit the relevant equity shares account and credit cash/bank. In addition to this entry, the premium paid/received will be transferred to the profit and loss account, the accounting entries for which should be the same as those in case of cash settled options.

### *Adjustments in Futures and Options during Corporate Action*

SEBI decided that the Exchanges may determine the manner of adjustment in derivative contracts at the time of corporate actions in conformity with the following principles:-

- Basis for any adjustment shall be such that the value of the position of the market participants on cum and ex-date for corporate action shall continue to remain the same as far as possible.
- The exchanges shall take into account internationally followed best practices.
- The exchanges shall act consistent with the earlier circulars issued regarding adjustment for corporate actions as well as the decisions of the erstwhile sub-committee.
- Circumstances of a particular case shall be given due consideration by the exchange, giving high priority to the interest of investors in the market.
- Exchanges should ensure uniformity across all exchanges regarding adjustment methodology for a corporate action.

### *FII Trading in Derivatives*

FIIs were permitted to trade in all the exchange traded derivative contracts subject to the position limits. Trading by FIIs and their sub accounts in derivatives contracts till these are not resulting into settlement by physical delivery of underlying stocks shall not attract the investment limit of 10% or 5% of the total issued capital of the company as prescribed in Regulations 15 (5) and (6) of the SEBI (FII) Regulations, 1995.

## Market Design

Only two exchanges, namely the NSE and BSE, offer platform for trading of derivatives. However, as we shall see later, during the year 2002-03, BSE accounted for less than 1% of turnover in the market. Hence in this section, the market design has been discussed taking derivative segment (called Futures and Options (F&O) segment) of NSE as an example.

### *Trading Mechanism*

The derivatives trading system at NSE, called NEAT-F&O trading system, provides a fully automated screen-based trading for Nifty futures and options and stock futures and options on a nationwide basis as well as an online monitoring and surveillance mechanism. It supports an anonymous order driven market, which operates on a strict price/time priority. It provides tremendous flexibility to users in terms of kinds of orders that can be placed on the system.

Various time and price-related conditions like Good-till-Day, Good-till-Cancelled, Good-till-Date, Immediate or Cancel, Limit/Market Price, Stop Loss, etc. can be built into an order. Trading in derivatives is essentially similar to that of trading of securities in the CM segment. There are four entities in the trading system:

1. *Trading members:* Trading members are members of NSE. They can trade either on their own account or on behalf of their clients including participants. The exchange assigns a Trading member ID to each trading member. Each trading member can have more than one user. The number of users allowed for each trading member is notified by the exchange from time to time.
2. *Clearing members:* Clearing members are members of NSCCL. They carry out risk management activities and confirmation/inquiry of trades through the trading system. These clearing members are trading members and clear trades for themselves and/or others.
3. *Professional clearing members:* A professional clearing members is a clearing member who is not a trading member. Typically, banks and custodians become professional clearing members and clear and settle for their trading members.
4. *Participants:* A participant is a client of trading members like financial institutions. These clients may trade through multiple trading members but settle through a single clearing member.

The trading terminals of F&O segment were available in 291 cities at the end of March 2003. Besides, the trading terminals can be accessed through the Internet by the investors from anywhere.

## *Membership Criteria*

NSE admits members on its F&O segment in accordance with the rules and regulations of the Exchange and the norms specified by SEBI. It follows 2-tier membership structure stipulated by SEBI to enable wider participation. Those interested in taking membership on F&O segment are required to take membership of 'CM and F&O segment' or 'CM, WDM and F&O segment'. Trading and clearing members are admitted separately. Essentially, a clearing member (CM) does clearing for all his trading members (TMs), undertakes risk management and performs actual settlement. The eligibility criteria for membership on F&O segment is summarised in Table 7-6. The trading members are required to have qualified users and sales persons, who have passed a certification programme approved by SEBI. At the end of March 2003, there were 553 members in the F&O segment.

## *Contract Specifications*

Contract specification for derivatives contracts traded in NSEIL are summarised in Annexure 7-1.

### Index Futures

The index futures contract on NSE is based on S&P CNX Nifty Index. These contracts expire on the last Thursday of the expiry month and have a maximum of 3-month expiration cycle. A new contract is introduced on the next trading day following the expiry of the near month contract. At a point of time, three contracts are available for trading, with 1 month,

**Table 7-6 A: Eligibility Criteria for Membership on F&O Segment of NSE**

| Particulars | New Members | | Existing Members |
|---|---|---|---|
| | CM and F&O Segment | CM, WDM and F&O Segment | |
| Net Worth[1] | Rs. 100 lakh | Rs. 200 lakh | Rs. 100 lakh |
| Interest Free Security Deposit (IFSD)[2] | Rs. 125 lakh | Rs. 275 lakh | Rs. 8 lakh |
| Collateral Security Deposit (CSD)[2] | Rs. 25 lakh | Rs. 25 lakh | – |
| Annual Subscription | Rs. 1 lakh | Rs. 2 lakh | Rs. 1 lakh |

Note: 1. Net worth of Rs. 300 lakh is required for clearing membership.
2. Additional Rs. 25 lakh is required for clearing membership. In addition, the clearing member is required to bring in IFSD of Rs. 2 lakh and CSD of Rs. 8 lakh per trading member in the F&O segment.

**Table 7-6 B: Requirements for Professional Clearing Membership**

| Particulars | F&O Segment | CM and F&O Segment |
|---|---|---|
| Eligibility | Trading members of NSE/SEBI registered custodians/recognised banks | |
| Net Worth | Rs. 300 lakh | |
| Interest Free Security Deposit (IFSD) | Rs. 25 lakh | Rs. 34 lakh |
| Collateral Security Deposit (CSD) | Rs. 25 lakh | Rs. 50 lakh |
| Annual Subscription | Nil | Rs. 2.5 lakh |

Note: The PCM is required to bring in IFSD of Rs. 2 lakh and CSD of Rs. 8 lakh per trading member in the F&O segment.
*Source:* NSE.

2 months and 3 months to expiry. Each futures contract has a separate limit order book. All passive orders are stacked in the system in terms of price-time priority and trades take place at the passive order price (similar to the existing capital market trading system). The best buy order for a given futures contract will be the order to buy the index at the highest index level whereas the best sell order will be the order to sell the index at the lowest index level. Trading is for a minimum lot size of 200 units.

## Index Options

The trading in index options on NSE is based on S&P CNX Nifty with a maximum of 3 months expiration cycle. The options contracts are European style and are cash settled. There are a minimum of 5 strike prices, two 'in-the-money', one 'at-the-money' and two 'out-of-the-money' for every call and put option. Hence, at a given point in time there are a minimum of 3 * 5 * 2 or 30 options contracts. These expire on the last Thursday of the month. Upon expiry of a contract, the new index options contract is introduced in the same manner as index futures contract. Just as in the case of futures contracts, each option product has its own order book and its own prices. Trading is in minimum market lot size of 200 units.

## Stock Options

The stock options are based on select individual securities. These are American style and settled in cash. The expiration cycle for stock options is the same as for index futures and index options. A new contract is introduced on the trading day following the expiry of the

near month contract. NSE provides a minimum of five strike prices for every option type (i.e., call & put) during the trading month. There are two in-the-money (ITM) contracts, two out-of-the-money contracts (OTM) and one at-the-money (ATM) contract.

### Stock Futures

These contracts are based on select securities. These are also cash settled. The expiration cycle for stock futures is the same as for index futures, index options and stock options. A new contract is introduced on the trading day following the expiry of the near month contract.

### Interest Rate Futures

Interest Rate Futures Contracts are contracts based on the list of underlying as may be specified by the Exchange and approved by SEBI from time to time. To begin with, interest rate futures contracts on a Notional 91-day T-bill and Notional 10 year bonds (6% coupon bearing and zero coupon underlyings was introduced by NSEIL in the F&O Segment of the Exchange as stipulated by the SEBI. The interest rate future contracts are available for a period of maturity of one year with three months continuous contracts for the first three months and fixed quarterly contracts for the entire year. New contracts will be introduced on the trading day following the expiry of the near month contract. Interest rate future contracts shall expire on the last Thursday of the expiry month. If the last Thursday is a trading holiday, the contracts shall expire on the previous trading day. Further, where the last Thursday falls on the annual or half-yearly closing dates of the bank, the expiry and last trading day in respect of these derivatives contracts would be pre-poned to the previous trading day. The permitted lot size for the interest rate futures contracts is 2000. The minimum value of a interest rate futures contract would be Rs. 2 lakhs at the time of introduction. The price steps in respect of all interest rate future contracts admitted to dealings on the Exchange is Re.0.01. The Futures contracts having face value of Rs 100 on notional ten year coupon bearing bond and notional ten year zero coupon bond would be based on price quotation and Futures contracts having face value of Rs. 100 on notional 91 days treasury bill would be based on Rs. 100 minus (-) yield.

Base price of the Interest rate future contracts on introduction of new contracts are theoretical futures price computed based on previous days' closing price of the notional underlying security. The base price of the contracts on subsequent trading days would be the closing price of the futures contracts. However, on such of those days when the contracts were not traded, the base price will be the daily settlement price of futures contracts. There would be no day minimum/maximum price ranges applicable for the futures contracts. However, in order to prevent/take care of erroneous order entry, the operating ranges for interest rate future contracts shall be kept at +/- 2% of the base price. In respect of orders which have come under price freeze, the members would be required to confirm to the Exchange that the order is genuine. On such confirmation, the Exchange at its discretion may approve such order. If such a confirmation is not given by any member, such order shall not be processed and as such shall lapse. Orders which may come to the Exchange as a quantity freeze shall be 2,500 contracts amounting to 5,000,000 which works out on the day of introduction to approximately Rs 50 crore.

Daily Mark to Market settlement and Final Mark to Market settlement in respect of admitted deals in Interest Rate Futures Contracts would be cash settled by debiting/ crediting of the clearing accounts of Clearing Members with the respective Clearing Bank. All positions

(brought forward, created during the day, closed out during the day) of a F&O Clearing Member in Futures Contracts, at the close of trading hours on a day, would be marked to market at the Daily Settlement Price (for Daily Mark to Market Settlement) and settled. All positions (brought forward, created during the day, closed out during the day) of a F&O Clearing Member in Futures Contracts, at the close of trading hours on the last trading day, would be marked to market at Final Settlement Price (for Final Settlement) and settled.

## *Charges*

The maximum brokerage chargeable by a TM in relation to trades effected in the contracts admitted to dealing on the F&O segment of NSE is fixed at 2.5% of the contract value in case of index futures and 2.5% of notional value of the contract [(Strike price + Premium) * Quantity)] in case of index options, exclusive of statutory levies.

The transaction charges payable by a TM for the trades executed by him on the F&O segment are fixed at Rs. 2 per lakh of turnover (0.002%) (each side) or Rs. 1 lakh annually, whichever is higher. The TMs contribute to Investor Protection Fund of F&O segment at the rate of Rs. 10 per crore of turnover (0.0001%) (each side).

## *Basket Trading Facility*

In order to provide a facility for easy arbitrage between futures and cash markets, NSE provides basket-trading facility. This enables generation of portfolio offline order files in the derivatives trading system and its execution in the cash segment. A trading member can buy or sell a portfolio through a single order, once he determines its size. The system automatically works out the quantity of each security to be bought or sold in proportion to their weights in the portfolio.

## *Nifty futures at SGX-DT*

With commencement of trading in derivatives of securities in India, foreign bourses have evinced interest to introduce trading in derivatives based on Indian indices. Under an agreement, Singapore Exchange Derivatives Trading Limited (SGX-DT) was granted a license to trade futures and options contracts based on the S&P CNX Nifty Index.

SGX-DT launched the SGX S&P CNX Nifty Index futures contract on September 25, 2000. The contract is based on the S&P CNX Nifty Index, which is owned by IISL, a subsidiary of NSE. The SGX S&P CNX Nifty Index futures is traded in US $, with a contract size equivalent to US $ 20 multiplied by the S&P CNX Nifty Index. Based on the closing index value of 1358.05 on August 18, 2000, the size of each futures contract is about US $ 27,161 (approximately 5 times that of the contract traded in NSE). The contract is cash settled and is traded on the Exchange's electronic trading platform (SGX ETS) from Monday to Friday. The trading of Nifty futures in SGX was introduced for enabling international market participants gain exposure to the Indian stock market in a highly cost-effective manner.

## *Regulations for Risk Management*

The following risk management measures have been prescribed by SEBI:

i. **Liquid Networth Requirements:** A clearing member's minimum liquid net worth must be at least Rs. 50 lakh at any point of time.

ii. **Initial Margin Computation:** A portfolio based margining approach has been adopted which takes an integrated view of the risk involved in the portfolio of each individual client comprising of his positions in all derivative contracts. The initial margin requirements are based on worst scenario loss of a portfolio of an individual client to cover 99% VAR over one day time horizon. Provided, however, in the case of futures contracts, whether on index, on individual securities or on Interest rate futures, where it may not be possible to collect the mark to market settlement value, before the commencement of trading on the next day, the initial margin may be computed over a two day time horizon, applying the appropriate statistical formula. The methodology for computation of Value at risk percentage is as per the recommendation of SEBI from time to time.

Initial margin requirements for a member are as follows:

a. For Client positions – It shall be netted at the level of individual client and grossed across all clients, at the Trading/Clearing Member level, without any setoffs between clients.

b. For proprietary positions – It shall be netted at Trading/Clearing Member level without any setoffs between client and proprietary positions.

For the purpose of SPAN Margin, various parameters shall be specified hereunder or such other parameters as may be specified by the relevant authority from time to time:

- ***Calendar Spread Charge*:** Calendar Spread Charge covers the calendar (inter-month etc.) basis risk that may exist for portfolios containing futures and options with different expirations. In the case of Futures and Options contracts on Index and Individual securities, the margin on calendar spread shall be calculated on the basis of delta of the portfolio consisting of futures and options contracts in each month.

  A calendar spread positions shall be treated as non-spread (naked) positions in the far month contract, 3 trading days prior to expirations of the near month contract.

- ***Short Option Minimum Charge:*** The short option minimum charge is equal to 3% of the notional value of all short index option positions. Notional value, with respect to an option contract, is computed as the product of the short open position in that option contract multiplied by the previous day's closing price of the underlying security, or such other price as may be specified by the clearing corporation from time to time. For stock options it is equal to 7.5% of the notional value of all the short positions in options on individual stocks. Notional value, with respect to an option contract, is computed as the product of the short open position in that option contract multiplied by the previous day's closing price of the underlying security, or such other price as may be specified by clearing corporation from time to time.

- ***Net Option Value:*** Net Option Value is computed as the difference between the Long Option positions and the Short Option positions, valued at the last available closing price of the relevant option contract.

- ***Premium Margin:*** Premium Margin shall mean and include premium amount due to be paid to clearing corporation towards premium settlement, at client level. Premium margin for a day shall be levied till the completion of pay-in towards the premium settlement.

- ***Assignment Margin for option contracts on individual securities:*** Assignment Margin shall be levied on assigned positions of Clearing Members towards Interim and Final Exercise Settlement obligations for option contracts on individual securities, till such obligations are fulfilled.

  Assignment margin shall be the Net Exercise Settlement Value payable by a Clearing Member towards Interim and Final Exercise Settlement and shall be deductible from the effective deposits of such Clearing Member available towards margins. Such amount charged towards assignment margin shall be available to the Clearing Member towards initial margins and exposure on the Exercise Settlement pay-in day.

- ***Exposure Limits (2nd line of defense):*** Clearing Members shall be subject to Exposure limits in addition to initial margins. Liquid Networth of a Clearing member at any point of time -shall exceed the Exposure Limit as detailed hereunder:

  In case of Index Futures contracts, the exposure limit shall be 33.33 times the liquid networth i.e. 3% of the notional value of the futures positions, based on the last available trading price of the relevant futures contract shall not exceed the liquid networth. For Short Index Options contracts the exposure limit shall also be 33.33 times the liquid networth i.e. 3% of the notional value of the option positions, based on the last available closing price of the relevant underlying security shall not exceed the liquid networth.

  In case of futures contracts on individual securities the exposure limits is collected/ adjusted from the liquid networth of a member on a real time basis from the higher of 5% or 1.5 standard deviation of the notional value of gross open position in futures on individual securities in a particular underlying. For this purpose, the standard deviation of daily logarithmic returns of prices in the underlying stock in the cash market in the last six months shall be computed on a rolling and monthly basis at the end of each month. The applicable exposure limits is intimated by clearing corporation from time to time.

  In case of Short Option contracts on individual Securities the exposure limits which is higher of 5% or 1.5 standard deviation of the gross short open positions in options on individual securities in a particular underlying shall be collected/ adjusted from the liquid networth of a member on a real time basis. For this purpose, the standard deviation of daily logarithmic returns of prices in the underlying stock in the cash market in the last six months shall be computed on a rolling and monthly basis at the end of each month. The applicable exposure limits shall be intimated by clearing corporation from time to time.

  Exposure limits in case of calendar spread positions in futures contract shall be treated as open position of one third of the value of the far month futures contract. However the spread positions shall be treated as a naked position in far month contract three trading days prior to expiry of the near month contract.

- ***Position Limits:*** Position limits have been specified by SEBI at trading member, client, market and FII levels respectively:

  *Trading Member Position Limits:* There is a position limit in derivative contracts on an index of 15% of the open interest of all derivative contracts on the same underlying

or Rs.100 crore, whichever is higher, in all the futures and options contracts on the same underlying. The trading member positions limits is linked to the market wide limits. For securities in which the market wide position limit is less than or equal to Rs. 250 crore, the trading member limit in such securities shall be 20% of the market wide position limit. For securities, in which the market wide position limit is greater than Rs. 250 crore, the trading member position limit in such stocks shall be Rs. 50 crore.

The positions of all FIIs/Sub accounts shall be monitored at the end of the day for limits of 7.5 % of the open interest of all derivative contracts on the same underlying or Rs. 50 crore, whichever is higher, in all the futures and option contracts on the same underlying security as per existing applicable position limits.

For futures contracts open interest shall be equivalent to the open positions in that futures contract multiplied by its last available closing price. For option contracts, open interest shall be equivalent to the open positions multiplied by the notional value. Notional value with respect to an option contract is computed as the product of the open position in that option contract multiplied by the last available closing price of the underlying.

*Client Level Position Limits:* The gross open position across all the derivative contracts on the specified underlying for each specific client shall not exceed higher of 1% of the free float market capitalization (in terms of number of shares) OR 5% of the open interest in all derivative contracts in the same underlying stock (in terms of number of shares). It shall be mandatory for the Clearing Members/Trading Members to ensure that their individual clients trading/clearing through them comply with the above limits.

*Client-wise position limits for interest rate futures contracts:* Each Trading Member/Clearing Member shall ensure that his clients do not exceed the specified position limit. The position limits shall be at the client level and for near month contracts and shall be 15% of the open interest or Rs. 100 crore, whichever is higher

*Market Wide Position Limits:* The market wide limit of open positions (in terms of the number of units of underlying stock) on all futures and option contracts on a particular stocks shall be lower of 30 times the average number of shares traded daily, during the previous calendar month, in the relevant underlying security in the underlying segment of the relevant exchange, OR, 10% of the number of shares held by non-promoters in the relevant underlying security i.e. 10% of the free float, in terms of number of shares of a company.

## Clearing and Settlement

National Securities Clearing Corporation Limited (NSCCL) undertakes clearing and settlement of all trades executed on the futures and options (F&O) segment of the NSE. It also acts as legal counterparty to all trades on the F&O segment and guarantees their financial settlement.

### *Clearing Entities*

Clearing and settlement activities in the F&O segment are undertaken by NSCCL with the help of the following entities:

## *Clearing Members*

In the F&O segment, some members, called self clearing members, clear and settle their trades executed by them only either on their own account or on account of their clients. Some others, called trading member–cum–clearing member, clear and settle their own trades as well as trades of other trading members (TMs). Besides, there is a special category of members, called professional clearing members (PCM) who clear and settle trades executed by TMs. The members clearing their own trades and trades of others, and the PCMs are required to bring in additional security deposits in respect of every TM whose trades they undertake to clear and settle.

## *Clearing Banks*

Funds settlement takes place through clearing banks. For the purpose of settlement all clearing members are required to open a separate bank account with NSCCL designated clearing bank for F&O segment. The Clearing and Settlement process comprises of the following three main activities:

1. Clearing
2. Settlement
3. Risk Management

## *Clearing Mechanism*

The clearing mechanism essentially involves working out open positions and obligations of clearing (self-clearing/trading-cum-clearing/professional clearing) members. This position is considered for exposure and daily margin purposes. The open positions of CMs are arrived at by aggregating the open positions of all the TMs and all custodial participants (CPs) clearing through him, in contracts in which they have traded. A TM's open position is arrived at as the summation of his proprietary open position and clients' open positions, in the contracts in which he has traded. While entering orders on the trading system, TMs are required to identify the orders, whether proprietary (if they are their own trades) or client (if entered on behalf of clients) through 'Pro/Cli' indicator provided in the order entry screen. Proprietary positions are calculated on net basis (buy - sell) for each contract. Clients' positions are arrived at by summing together net (buy - sell) positions of each individual client. A TM's open position is the sum of proprietary open position, client open long position and client open short position. Table 7-7 illustrates determination of open position of a CM, who clears for two TMs having two clients.

**Table 7-7- : Determination of Open Position of a Clearing Member**

| TMs clearing through CM | Proprietary Trades | | | Trades: Client 1 | | | Trades: Client 2 | | | Open Position | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Buy | Sell | Net | Buy | Sell | Net | Buy | Sell | Net | Long | Short |
| ABC | 4,000 | 2,000 | 2,000 | 3,000 | 1,000 | 2,000 | 4,000 | 2,000 | 2,000 | 6,000 | |
| PQR | 2,000 | 3,000 | -1,000 | 2,000 | 1,000 | 1,000 | 1,000 | 2,000 | -1,000 | 1,000 | 2,000 |
| **Total** | **6,000** | **5,000** | **2,000 -1,000** | **5,000** | **2,000** | **3,000** | **5,000** | **4,000** | **2,000 -1,000** | **7,000** | **2,000** |

## *Settlement Mechanism*

All futures and options contracts are cash settled, i.e. through exchange of cash. The underlying for index futures/options of the Nifty index cannot be delivered. These contracts, therefore, have to be settled in cash. Futures and options on individual securities can be delivered as in the spot market. However, it has been currently mandated that stock options and futures would also be cash settled. The settlement amount for a CM is netted across all their TMs/clients, with respect to their obligations on MTM, premium and exercise settlement.

### Settlement of Futures Contracts on Index or Individual Securities

Futures contracts have two types of settlements, the MTM settlement which happens on a continuous basis at the end of each day, and the final settlement which happens on the last trading day of the futures contract.

### MTM Settlement

All futures contracts for each member are marked-to-market (MTM) to the daily settlement price of the relevant futures contract at the end of each day. The CMs who have a loss are required to pay the mark-to-market (MTM) loss amount in cash which is in turn passed on to the CMs who have made a MTM profit. This is known as the daily mark-to-market settlement. CMs are responsible to collect and settle the daily MTM profits/losses incurred by the TMs and their clients clearing and settling through them. Similarly, TMs are responsible to collect/pay losses/profits from/to their clients by the next day. The pay-in and pay-out of the mark-to-market settlement are affected on the day following the trade day (T+1). After completion of daily settlement computations, all the open positions are reset to the daily settlement price. Such positions become the open positions for the next day.

Table 7-8 explains the MTM calculation for a member. The settlement price for the contract for today is assumed to be 105. The table gives the MTM charged on various positions. The margin charged on the brought forward contract is the difference between the previous day's settlement price of Rs.100 and today's settlement price of Rs.105. Hence on account of the position brought forward, the MTM shows a profit of Rs. 500. For contracts executed during the day, the difference between the buy price and the sell price determines the MTM. In this example, 200 units are bought @Rs.100 and 100 units sold @Rs.102 during the day. Hence the MTM for the position closed during the day shows a profit of Rs.200. Finally,

**Table 7-8: Computation of MTM at the end of the day**

| Trade details | Quantity bought/sold | Settlement price | MTM |
|---|---|---|---|
| Brought forward from previous day | 100@100 | 105 | 500 |
| Traded during day | | | |
| Bought | 200@100 | | |
| Sold | 100@102 | 102 | 200 |
| Open position (not squared up) | 100@100 | 105 | 500 |
| **Total** | | | **1,200** |

the open position of contracts traded during the day, is margined at the day's settlement price and the profit of Rs.500 credited to the MTM account. So the MTM account shows a profit of Rs. 1,200.

### Final Settlement of Futures

On the expiry day of the futures contracts, after the close of trading hours, NSCCL marks all positions of a CM to the final settlement price and the resulting profit/loss is settled in cash. Final settlement loss/profit amount is debited/credited to the relevant CM's clearing bank account on the day following expiry day of the contract.

### Settlement Prices for Futures

Daily settlement price on a trading day is the closing price of the respective futures contracts on such day. The closing price for a futures contract is currently calculated as the last half an hour weighted average price of the contract in the F&O Segment of NSE. Final settlement price is the closing price of the relevant underlying index/security in the capital market segment of NSE, on the last trading day of the contract. The closing price of the underlying Index/ security is currently its last half an hour weighted average value in the capital market segment of NSE.

### Settlement of Options Contracts on Index or Individual Securities

Options contracts have three types of settlements, daily premium settlement, exercise settlement, final exercise settlement.

### Daily Premium Settlement

Buyer of an option is obligated to pay the premium towards the options purchased by him. Similarly, the seller of an option is entitled to receive the premium for the option sold by him. The premium payable amount and the premium receivable amount are netted to compute the net premium payable or receivable amount for each client for each option contract. Premium settlement is cash settled and settlement style is premium style. The CMs who have a premium payable positions are required to pay the premium amount to NSCCL which is in turn passed on to the members who have a premium receivable position. This is known as daily premium settlement. CMs are responsible to collect and settle for the premium amounts from the TMs and their clients clearing and settling through them. The pay-in and pay-out of the premium settlement is on T+1 day. The premium payable amount and premium receivable amount are directly debited/credited to the CMs clearing bank account.

### Interim Exercise Settlement

Interim exercise settlement takes place only for option contracts on securities. An investor can exercise his in-the-money options at any time during trading hours, through his trading member. Interim exercise settlement is effected for such options at the close of the trading hours, on the day of exercise. Valid exercised option contracts are assigned to short positions in the option contract with the same series (i.e. having the same underlying, same expiry date and same strike price), on a random basis, at the client level. The CM who has exercised the option receives the exercise settlement value per unit of the option from the CM who has been assigned the option contract. The interim exercise settlement value is the difference between

the strike price and the settlement price of the relevant option contract. Exercise settlement value is debited/credited to the relevant CMs clearing bank account on T+2 day.

## Final Exercise Settlement

Final exercise settlement is effected for all open long in–the–money strike price options existing at the close of trading hours, on the expiration day of an option contract. All such long positions are exercised and automatically assigned to short positions in option contracts with the same series, on a random basis. The investor who has long in–the–money options on the expiry date will receive the exercise settlement value per unit of the option from the investor who has been assigned the option contract. For index options contracts, exercise style is European style, while for options contracts on individual securities, exercise style is American style. Final Exercise is Automatic on expiry of the option contracts. Final settlement loss/ profit amount for option contracts on Index is debited/ credited to the relevant CMs clearing bank account on T+1 day. On the other hand, final settlement loss/profit amount for option contracts on Individual Securities is debited/ credited to the relevant CMs clearing bank account on T+2 day .Open positions, in option contracts, cease to exist after their expiration day.

Final Exercise settlement price for an option contract shall be the closing price of the relevant underlying security in the Normal Market of the Capital market segment of NSE, on the last trading day of the Options Contract. The closing price of the relevant underlying security shall be calculated on the basis of the last half an hour weighted average price of the relevant underlying security or such other price as may be decided by the relevant authority from time to time.

## Exercise Process

The period during which an option is exercisable depends on the style of the option. On NSE, index options are European style, i.e. options are only subject to automatic exercise on the expiration day, if they are in–the–money. As compared to this, options on securities are American style. In such cases, the exercise is automatic on the expiration day, and voluntary prior to the expiration day of the option contract, provided they are in–the–money. Automatic exercise means that all in–the–money options would be exercised by NSCCL on the expiration day of the contract. The buyer of such options need not give an exercise notice in such cases. Voluntary exercise means that the buyer of an in–the–money option can direct his TM/CM to give exercise instructions to NSCCL. In order to ensure that an option is exercised on a particular day, the buyer must direct his TM to exercise before the cut-off time for accepting exercise instructions for that day. Usually, the exercise orders will be accepted by the system till the close of trading hours. Different TMs may have different cut–off times for accepting exercise instructions from customers, which may vary for different options. An option, which expires unexercised becomes worthless. Some TMs may accept standing instructions to exercise, or have procedures for the exercise of every option, which is in–the–money at expiration. Once an exercise instruction is given by a CM to NSCCL, it cannot ordinarily be revoked. Exercise notices given by a buyer at anytime on a day are processed by NSCCL after the close of trading hours on that day. All exercise notices received by NSCCL from the NEAT F&O system are processed to determine their validity. Some basic validation checks are carried out to check the open buy position of the exercising client/TM and if option contract is in–the–money. Once exercised contracts are found valid, they are assigned.

### Assignment Process

The exercise notices are assigned in standardized market lots to short positions in the option contract with the same series (i.e. same underlying, expiry date and strike price) at the client level. Assignment to the short positions is done on a random basis. NSCCL determines short positions, which are eligible to be assigned and then allocates the exercised positions to any one or more short positions. Assignments are made at the end of the trading day on which exercise instruction is received by NSCCL and notified to the members on the same day.

### Exercise Settlement Computation

The exercise settlement price is the closing price of the underlying (index or security) on the exercise day (for interim exercise) or the expiry day of the relevant option contract (final exercise). The exercise settlement value is the difference between the strike price and the final settlement price of the relevant option contract. For call options, the exercise settlement value receivable by a buyer is the difference between the final settlement price and the strike price for each unit of the underlying conveyed by the option contract, while for put options it is difference between the strike price and the final settlement price for each unit of the underlying conveyed by the option contract. Settlement of exercises of options on securities is currently by payment in cash and not by delivery of securities. It takes place for in-the-money option contracts. The exercise settlement value for each unit of the exercised contract is computed as follows:

Call options = Closing price of the security on the day of exercise - Strike price

Put options = Strike price - Closing price of the security on the day of exercise

For final exercise, the closing price of the underlying security is taken on the expiration day. The exercise settlement by NSCCL would ordinarily take place on 2nd day following the day of exercise. Members may ask for clients who have been assigned to pay the exercise settlement value earlier.

## *Settlement of Institutional Deals*

NSCCL provides a special facility to Institutions/Foreign Institutional Investors (FIIs)/MFs etc. to execute trades through any TM, which may be cleared and settled by their own CM. Such entities are called CPs. To avail of this facility, a CP is required to register with NSCCL through his CM. A unique CP code is allotted to the CP by NSCCL. All trades executed by a CP through any TM are required to have the CP code in the relevant field on the trading system at the time of order entry. Such trades executed on behalf of a CP are confirmed by their own CM (and not the CM of the TM through whom the order is entered), within the time specified by NSE on the trade day through the on-line confirmation facility. Till such time the trade is confirmed by CM of concerned CP, the same is considered as a trade of the TM and the responsibility of settlement of such trade vests with CM of the TM. Once confirmed by CM of concerned CP, such CM is responsible for clearing and settlement of deals of such custodial clients.

FIIs have been permitted to trade in all the exchange traded derivative contracts subject to compliance of the position limits prescribed for them and their sub-accounts, and compliance with the prescribed procedure for settlement and reporting. A FII/a sub-account of the FII, as the case may be, intending to trade in the F&O segment of the exchange, is required to

obtain a unique Custodial Participant (CP) code allotted from the NSCCL. FIIs/sub–accounts of FIIs which have been allotted a unique CP code by NSCCL are only permitted to trade on the F&O segment. The FII/sub–account of FII ensures that all orders placed by them on the Exchange carry the relevant CP code allotted by NSCCL.

## *Risk Management*

NSCCL has developed a comprehensive risk containment mechanism for the F&O segment. The salient features of risk containment mechanism on the F&O segment are:

1. The financial soundness of the members is the key to risk management. Therefore, the requirements for membership in terms of capital adequacy (net worth, security deposits) are quite stringent.
2. NSCCL charges an upfront initial margin for all the open positions of a CM. It specifies the initial margin requirements for each futures/options contract on a daily basis. It also follows value-at-risk (VaR) based margining through SPAN. The CM in turn collects the initial margin from the TMs and their respective clients.
3. The open positions of the members are marked to market based on contract settlement price for each contract. The difference is settled in cash on a T+1 basis.
4. NSCCL's on-line position monitoring system monitors a CM's open positions on a real-time basis. Limits are set for each CM based on his capital deposits. The on-line position monitoring system generates alerts whenever a CM reaches a position limit set up by NSCCL. NSCCL monitors the CMs for MTM value violation, while TMs are monitored for contract-wise position limit violation.
5. CMs are provided a trading terminal for the purpose of monitoring the open positions of all the TMs clearing and settling through him. A CM may set exposure limits for a TM clearing and settling through him. NSCCL assists the CM to monitor the intra-day exposure limits set up by a CM and whenever a TM exceed the limits, it stops that particular TM from further trading.
6. A member is alerted of his position to enable him to adjust his exposure or bring in additional capital. Position violations result in withdrawal of trading facility for all TMs of a CM in case of a violation by the CM.
7. A separate settlement guarantee fund for this segment has been created out of the capital of members. The fund had a balance of Rs. 13,002 million at the end of March 2003.

The most critical component of risk containment mechanism for F&O segment is the margining system and on-line position monitoring. The actual position monitoring and margining is carried out on–line through Parallel Risk Management System (PRISM). PRISM uses SPAN(r) (Standard Portfolio Analysis of Risk) system for the purpose of computation of on-line margins, based on the parameters defined by SEBI.

## *Settlement of Interest rate Futures*

Daily settlement price for an Interest Rate Futures Contract would be the closing price of such Interest Rate Futures Contract on the trading day. The closing price for an interest rate futures contract would be calculated on the basis of the last half an hour weighted average price of such interest rate futures contract. In absence of trading in the last half an hour, the theoretical price would be taken or such other price as may be decided by the relevant authority

from time to time. Theoretical daily settlement price for unexpired futures contracts, would be the futures prices computed using the (price of the notional bond) spot prices arrived at from the applicable ZCYC Curve. The ZCYC would be computed by the Exchange or by any other agency as may be nominated in this regard from the prices of Government securities traded on the Exchange or reported on the Negotiated Dealing System of RBI or both taking trades of same day settlement(i.e. t=0). In respect of zero coupon notional bond, the price of the bond would be the present value of the principal payment discounted using discrete discounting for the specified period at the respective zero coupon yield. In respect of the notional T-bill, the settlement price would be 100 minus the annualized yield for the specified period computed using the zero coupon yield curve. In respect of coupon bearing notional bond, the present value would be obtained as the sum of present value of the principal payment discounted at the relevant zero coupon yield and the present values of the coupons obtained by discounting each notional coupon payment at the relevant zero coupon yield for that maturity. For this purpose the notional coupon payment date would be half yearly and commencing from the date of expiry of the relevant futures contract. For computation of futures prices from the price of the notional bond (spot prices) thus arrived, the rate of interest may be the relevant MIBOR rate or such other rate as may be specified from time to time. Final settlement price for an Interest rate Futures Contract on zero coupon notional bond and coupon bearing bond shall be based on the price of the notional bond determined using the zero coupon yield curve computed as explained above. In respect of notional T-bill it shall be 100 minus the annualised yield for the specified period computed using the zero coupon yield curve.

## *Risk Management for Interest Rate Futures*

Initial margin shall be payable on all open positions of Clearing Members, upto client level, at any point of time, and shall be payable upfront by Clearing Members in accordance with the margin computation mechanism and/or system as may be adopted by Clearing Corporation from time to time. Presently, the initial margins would be based on the zero coupon yield curve computed at the end of the day as explained above with trades of same day settlement (t=0). However, in case of large deviation between the yields generated using only t=0 trades and all trades, initial margins revised accordingly may be computed and collected by the Clearing corporation from the members at its discretion.

Initial Margin shall include SPAN margins and such other additional margins that may be specified by Clearing Corporation from time to time. Clearing Corporation will adopt SPAN (Standard Portfolio Analysis of Risk) system or any other system for the purpose of real time initial margin computation. Initial margin requirements shall be based on 99% value at risk over a one day time horizon. Provided, however, in the case of futures contracts, where it may not be possible to collect mark to market settlement value, before the commencement of trading on the next day, the initial margin may be computed over a two day time horizon, applying the appropriate statistical formula. The methodology for computation of Value at Risk percentage will be as per the recommendations of SEBI from time to time. Initial margin requirement for a member:

a. For client positions - shall be netted at the level of individual client and grossed across all clients, at the Trading/ Clearing Member level, without any setoffs between clients.

b. For proprietary positions - shall be netted at Trading/ Clearing Member level without any set offs between client and proprietary positions.

For this purpose, various parameters shall be as specified hereunder or such other parameters as may be specified by the relevant authority from time to time:

**(a) Price scan range:** In the case of Notional Bond Futures, the price scan range shall be 3.5 Standard Deviation (3.5 sigma) and in no case the initial margin shall be less than 2% of the notional value of the Futures Contracts, which shall be scaled up by look ahead period as may be specified from time to time. For Notional T-Bill Futures, the price scan range shall be 3.5 Standard Deviation (3.5 sigma) and in no case the initial margin shall be less than 0.2% of the notional value of the futures contract, which shall be scaled up by look ahead period as may be specified from time to time.

**(b) Calendar Spread Charge:** The margin on calendar spread shall be calculated at a flat rate of 0.125% per month of spread on the far month contract subject to a minimum margin of 0.25% and a maximum margin of 0.75% on the far side of the spread with legs upto 1 year apart. A Calendar spread positions will be treated as non-spread (naked) positions in the far month contract, 3 trading days prior to expiration of the near month contract.

**(c) Exposure Limits (2nd line of defense):** Clearing Members shall be subject to Exposure limits in addition to initial margins. Exposure Limit shall be 100 times the liquid net worth i.e. 1% of the notional value of the gross open positions in Notional 10 year bond futures (both coupon bearing and zero coupon) and shall be 1000 times the liquid net worth i.e. 0.1% of the gross open positions in notional 91 day T-Bill futures. Exposure limit for calendar spreads: the Calendar spread shall be regarded as an open position of one third of the mark to market value of the far month contract. As the near month contract approaches expiry, the spread shall be treated as a naked position in the far month contract three days prior to the expiry of the near month contract.

**(d) Trading Member wise/Custodial Participant wise Position Limit:** Each Trading Member/Custodial Participant shall ensure that his clients do not exceed the specified position limit. The position limits shall be at the client level and for near month contracts and shall be 15% of the open interest or Rs. 100 crore, whichever is higher. For futures contracts open interest shall be equivalent to the open positions in that futures contract multiplied by its last available closing price.

## *NSE–SPAN*

The objective of NSE–SPAN is to identify overall risk in a portfolio of all futures and options contracts for each member. The system treats futures and options contracts uniformly, while at the same time recognizing the unique exposures associated with options portfolios, like extremely deep out–of–the–money short positions and inter–month risk. Its over–riding objective is to determine the largest loss that a portfolio might reasonably be expected to suffer from one day to the next day based on 99% VaR methodology. SPAN considers uniqueness of option portfolios. The following factors affect the value of an option:

1. Underlying market price
2. Strike price
3. Volatility (variability) of underlying instrument
4. Time to expiration
5. Interest rate

As these factors change, the value of options maintained within a portfolio also changes. Thus, SPAN constructs scenarios of probable changes in underlying prices and volatilities in order to identify the largest loss a portfolio might suffer from one day to the next. It then sets the margin requirement to cover this one–day loss. The complex calculations (e.g. the pricing of options) in SPAN are executed by NSCCL. The results of these calculations are called risk arrays. Risk arrays, and other necessary data inputs for margin calculation are provided to members daily in a file called the SPAN risk parameter file. Members can apply the data contained in the risk parameter files, to their specific portfolios of futures and options contracts, to determine their SPAN margin requirements. Hence, members need not execute complex option pricing calculations, which is performed by NSCCL. SPAN has the ability to estimate risk for combined futures and options portfolios, and also re–value the same under various scenarios of changing market conditions.

## *Margins*

The margining system for F&O segment is explained below:

- Initial Margin: Margin in the F&O segment is computed by NSCCL upto client level for open positions of CMs/TMs. These are required to be paid up-front on gross basis at individual client level for client positions and on net basis for proprietary positions. NSCCL collects initial margin for all the open positions of a CM based on the margins computed by NSE-SPAN. A CM is required to ensure collection of adequate initial margin from his TMs up-front. The TM is required to collect adequate initial margins up-front from his clients.
- Premium Margin: In addition to initial margin, premium margin is charged at client level. This margin is required to be paid by a buyer of an option till the premium settlement is complete.
- Assignment Margin for Options on Securities: Assignment margin is levied in addition to initial margin and premium margin. It is required to be paid on assigned positions of CMs towards interim and final exercise settlement obligations for option contracts on individual securities, till such obligations are fulfilled. The margin is charged on the net exercise settlement value payable by a CM towards interim and final exercise settlement.
- Client Margins: NSCCL intimates all members of the margin liability of each of their client. Additionally members are also required to report details of margins collected from clients to NSCCL, which holds in trust client margin monies to the extent reported by the member as having been collected from their respective clients.

### Margin/Position Limit Violations

PRISM generates various alerts whenever a CM exceeds any limits set up by NSCCL. These are detailed below:

- *Initial Margin Violation:* Initial margin limits are set by NSCCL for each CM based on the collateral deposited by the CM in accordance with SEBI recommendations. CMs are provided a F&O clearing member terminal for the purpose of monitoring the open positions of all the TMs and/or CPs clearing and settling through him. A CM may also set initial margin limits for a TM clearing and settling through him. NSCCL assists a CM to monitor the intra-day initial margin limits. Whenever a TM exceeds the limits, his trading facility is withdrawn. Initial margin on positions taken by a CM is computed on

a real time basis, i.e. for each trade. The initial margin amount is reduced from the effective deposits of a CM with NSCCL. As the effective deposit is used up to 70%, 80%, and 90%, the member receives a warning message on his terminal. Once it is used 100%, the clearing facility provided to a CM is automatically withdrawn. The liquid net worth of a CM at any point of time should not be less than Rs.50 lakh. Withdrawal of clearing facility of a CM in case of a violation leads to automatic withdrawal of trading facility for all TMs and/or CPs clearing and settling through such CM. Similarly, the initial margin on positions taken by a TM is also computed on a real time basis and compared with the TM initial margin limits set by his CM. The initial margin amount is reduced from the TM initial margin limit set by a CM. As the TM limit is used up to 70%, 80%, and 90%, the member receives a warning message on his terminal. Once it is used 100%, the trading facility provided to the TM is automatically withdrawn. A member is provided with adequate warnings on the violation before his trading/clearing facility is withdrawn. A CM may appropriately reduce his exposure to contain the violation or alternately bring in additional capital.

- *Member-wise Position Limit Violation*: The member-wise position limit check is carried out by PRISM on open position of a TM. The open position in all index futures and index option contracts of any TM, cannot exceed 15% of the total open interest of the market or Rs. 100 crore, whichever is higher at any time, including during trading hours. The open positions in all the futures and option contracts on the same underlying security of any TM, cannot exceed 7.5% of the total open interest of the market or Rs. 50 crore, whichever is higher, at any time, including during trading hours. For futures contracts, open interest is equivalent to the open positions in the futures contract multiplied by last available traded price or closing price, as the case may be. For option contracts, open interest is equivalent to the notional value which is computed by multiplying the open position in that option contract multiplied with the last available closing price of the underlying.
- *Exposure Limit Violation:* PRISM monitors exposure of members. The exposure for a CM to all futures and option contracts cannot exceed 33.33 times the liquid net worth for index options and index futures contracts, and 20 times the liquid net worth for futures/options contracts on individual securities. This means that 3% of exposure in case of index futures/options and 5% of exposure in case of stock futures/options shall not exceed liquid networth, after adjusting for initial margin.
- *Market-wide Position Limit Violation*: PRISM monitors market wide position limits for futures and option contracts on individual securities. The open position across all members, across all futures and option contracts on an underlying security, conveyed by the number of units of underlying security, cannot exceed lower of the following limits: 30 times the average number of shares traded daily, during the previous calendar month, in the relevant underlying security in the underlying segment of the relevant exchange, or 10% of the number of shares held by non-promoters in the relevant underlying security, i.e. 10% of the free float in terms of the number of shares of a company. When the total open interest in an option contract, across all members, reaches 80% of the market wide position limit for a contract, the price scan range and volatility scan range (for SPAN margin) are doubled. NSCCL specifies the market-wide position limits once every month, at the beginning of the month, which is applicable for the subsequent month.

- *Client–wise Position Limit Violation*: This occurs when the open position of any client exceeds 1% of the free float market capitalization (in terms of number of shares) or 5% of the open interest (in terms of number of shares) whichever is higher, in all the futures and option contracts on the same underlying security. The TM/CM through whom the client trades/clears his deals shall be liable for such violation and penalty may be levied on such TM/CM which he may in turn recover from the client. In the event of such a violation, TM/CM shall immediately ensure, that the client does not take fresh positions and reduces the positions of such clients to be within permissible limits. For futures contracts, open interest is equivalent to the open positions in the futures contract multiplied by last available traded price or closing price, as the case may be. For option contracts, open interest is equivalent to the notional value which is computed by multiplying the open position in that option contract multiplied with the last available closing price of the underlying.
- *Misutilisation of TM/Constituent's Collateral and/or Deposit*: A CM cannot utilize the collateral of one TM and/or constituent towards the exposure and/or obligations of another TM and/or constituent. Where such an act is detected, it is treated as a violation.
- *Violation of Exercised Positions*: NSCCL verifies whether open long positions for such CM/TM and/or constituent exist in relation to option contracts, which are exercised by a CM/TM, before initiating exercise processing. Where contracts are exercised though there are no open positions, such cases are treated as violations.

## Market Outcome

### *Trading Volumes*

As mentioned earlier, the derivatives are traded only on two exchanges. The details of trades on these exchanges during 2002-03 are presented in Table 7-9. The total exchange traded derivatives witnessed a volume of Rs. 4,423,333 million during the current year as against

**Table 7-9: Trade Details of Derivatives Market***

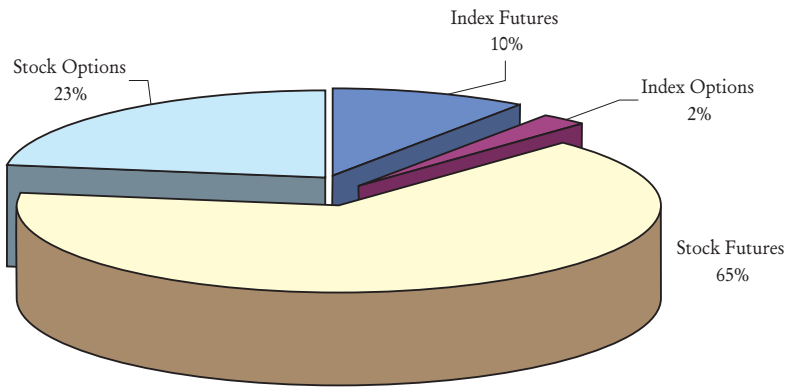
| Month/Year | NSE | | BSE | | TOTAL | |
|---|---|---|---|---|---|---|
| | No. of Contracts Traded | Turnover (Rs. mn.) | No. of Contracts Traded | Turnover (Rs.mn.) | No. of Contracts Traded | Turnover (Rs. mn.) |
| Apr-02 | 804,602 | 216,736 | 1,079 | 238 | 805,681 | 216,974 |
| May-02 | 905,236 | 235,998 | 4,747 | 1150 | 909,983 | 237,148 |
| Jun-02 | 906,464 | 233,320 | 4,554 | 1,031 | 911,018 | 234,351 |
| Jul-02 | 1,155,897 | 304,069 | 3,282 | 787 | 1,159,179 | 304,856 |
| Aug-02 | 1,118,052 | 269,383 | 2,059 | 444 | 1,120,111 | 269,827 |
| Sep-02 | 1,104,804 | 271,404 | 910 | 202 | 1,105,714 | 271,606 |
| Oct-02 | 1,378,088 | 334,413 | 618 | 140 | 1,378,706 | 334,553 |
| Nov-02 | 1,554,551 | 398,360 | 546 | 132 | 1,555,097 | 398,492 |
| Dec-02 | 1,966,839 | 556,201 | 611 | 160 | 1,967,450 | 556,361 |
| Jan-03 | 2,061,155 | 591,400 | 36,470 | 6,471 | 2,097,625 | 597,871 |
| Feb-03 | 1,863,217 | 493,948 | 39,513 | 6,848 | 1,902,730 | 500,796 |
| Mar-03 | 1,950,004 | 493,317 | 43,648 | 7,182 | 1,993,652 | 500,499 |
| **2002-03** | **16,768,909** | **4,398,548** | **138,037** | **24,785** | **16,906,946** | **4,423,333** |

*: Data pertains to Index Futures, Stock Futures, Index Options and Stock Options.
*Source:* NSE and BSE.

Rs. 1,038,480 million during the preceding year. While NSE accounted for about 99.4% of total turnover, BSE accounted for less than even 1%. It is believed that India is the second largest market in the World for stock futures. Since more than 99% of volumes came from NSE, the further detailed analysis is based on NSE data.

The F&O segment of NSE reported a total turnover of Rs. 4,398,548 million during 2002-03 as against Rs. 1,019,254 million during the preceding year. About 168 lakh contracts were traded during the same period. The segment witnessed a record turnover of Rs. 41,720 million on February 28, 2003. The turnover increased from Rs. 216,736 million in April 2002 to Rs. 493,317 million in March 2003. The average daily turnover also increased from Rs. 9,852 million in April 2002 to Rs. 34,770 million in March 2003. The business growth of the F&O segment is presented in Annexure 7-2. The product-wise distribution of turnover in F&O segment for the year 2002-03 is presented in Chart 7-1. It is seen that near month contracts are more popular than not-so-near month contracts; futures are more popular than options; contracts on securities are more popular than those on indices; and call options are more popular than put options.

**Chart 7-1: Product-wise Distribution of Turnover of F&O Segment of NSE, 2002-03**




The F&O Segment provides a nation-wide market. The city-wise distribution of turnover of the F&O segment is presented in Table 7-10. During the year, Mumbai contributed nearly

**Table 7-10: City-wise Distribution of Turnover of F&O Segment of NSE 2002-03**

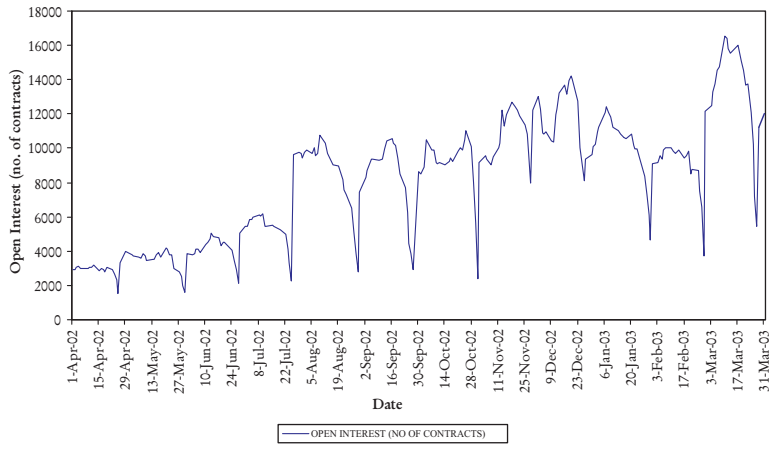
| Sl. No. | Location | Share in Turnover (%) 2001-02 | 2002-03 |
|---|---|---|---|
| 1 | Mumbai | 49.08 | 41.20 |
| 2 | Delhi/Ghaziabad | 24.28 | 20.31 |
| 3 | Calcutta/Howrah | 12.6 | 15.16 |
| 4 | Cochin/Ernakulam/Parur/Kalamserry/Alwaye | 2.44 | 0.63 |
| 5 | Ahmedabad | 2.25 | 2.11 |
| 6 | Chennai | 2.01 | 2.24 |
| 7 | Hyderabad/Secunderabad/Kukatpally | 1.54 | 0.97 |
| 8 | Others | 5.8 | 17.38 |
| | **Total** | **100.00** | **100.00** |

41% of total turnover. The contributions from Delhi and Kolkata were 20.3% and 15.2% respectively.

## *Open Interest*

Open interest is the total number of outstanding contracts that are held by market participants at the end of each day. Putting it simply, open interest is a measure of how much interest is there in a particular option or future. Increasing open interest means that fresh funds are flowing in the market, while declining open interest means that the market is liquidating. The highest open interest in index futures at NSE was recorded at 16,545 contracts on March 27, 2003. The daily open interest for near month index futures at NSE is presented in Chart 7-2.

**Chart 7-2. Daily Open Interest for Near Month Nifty Futures**



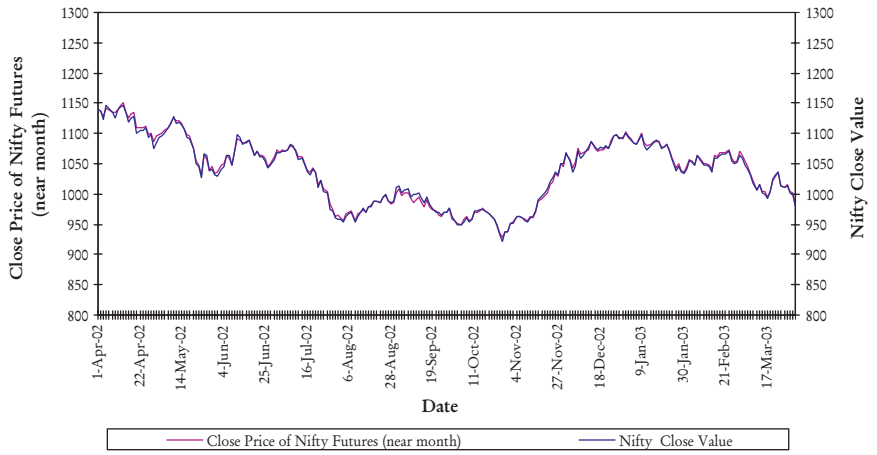

## *Implied Interest Rate*

In the futures market, implied interest rate or cost of carry is often used inter-changeably. Cost of carry is more appropriately used for commodity futures, as by definition it means the total costs required to carry a commodity or any other good forward in time. The costs involved are storage cost, insurance cost, transportation cost, and the financing cost. In case of equity futures, the carry cost is the cost of financing minus the dividend returns. Assuming zero dividend, the only relevant factor is the cost of financing.

One could work out the implied interest rate incorporated in futures prices, which is the percentage difference between the future value of an index and the spot value, annualised on the basis of the number of days before the expiry of the contract. Carry cost or implied interest rate plays an important role in determining the price differential between the spot and the futures market. By comparing the implied interest rate and the existing interest rate level, one can determine the relative cost of futures' market price. Implied interest rate is also a measure of profitability of an arbitrage position. Theoretically, if the futures price is less than the spot price plus cost of carry or if the futures price is greater than the spot price plus cost of carry, arbitrage opportunities exist.

The futures prices are available for different contracts at different points of time. Chart 7-3 presents Nifty futures close prices for the near month contracts, which are most

**Chart 7-3. Nifty Futures and Spot Price**




liquid, and the spot Nifty close values from April 2002 to March 2003. The difference between the future price and the spot price is called *basis*. As the time to expiration of a contract reduces, the basis reduces. Daily implied interest rate for Nifty futures from April 2002 to March 2003 is presented in Chart 7-4. The implied interest rate for near month Nifty futures as on last trading of the month is presented in Table 7-11. It is observed that index futures market suffers from mispricing in the sense that futures trade at discount to underlying. This may be due to restriction on short sales and lack of maturity.

## *Implied Volatility*

Volatility is one of the important factors, which is taken into account while pricing options. It is a measure of the amount and speed of price changes, in either direction. Everybody would like to know what future volatility is going to be. Since it is not possible to know

**Chart 7-4. Implied Interest Rate for Near Month Nifty Futures (April 1, 2002 to March 31, 2003)**

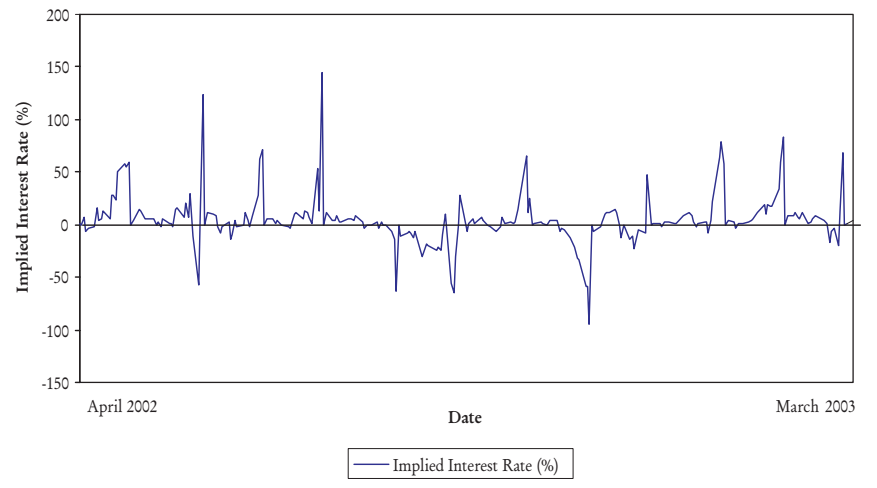


**Table 7-11: Implied Interest Rate for Near Month Nifty Futures (April 2002 - March 2003)**

| Month | Expiry Date of near month Contract | Closing Future Price | Closing Spot Price | Implied Interest Rate (%) |
|---|---|---|---|---|
| Apr-02 | 30-May-02 | 1096.30 | 1084.50 | 13.17 |
| May-02 | 27-Jun-02 | 1037.05 | 1028.80 | 10.80 |
| Jun-02 | 25-Jul-02 | 1062.25 | 1057.80 | 5.68 |
| Jul-02 | 29-Aug-02 | 965.40 | 958.90 | 8.50 |
| Aug-02 | 26-Sep-02 | 1002.15 | 1010.60 | -11.35 |
| Sep-02 | 31-Oct-02 | 957.75 | 963.15 | -6.62 |
| Oct-02 | 31-Oct-02 | 950.90 | 951.40 | 0.00 |
| Nov-02 | 26-Dec-02 | 1045.75 | 1050.15 | -5.68 |
| Dec-02 | 30-Jan-03 | 1092.10 | 1093.50 | -1.56 |
| Jan-03 | 27-Feb-03 | 1045.50 | 1041.85 | 4.73 |
| Feb-03 | 27-Mar-03 | 1070.50 | 1063.40 | 9.00 |
| Mar-03 | 24-Apr-03 | 980.50 | 978.20 | 3.57 |

Note:The implied interest rate is calculated on the last trading day of the month for Near Month Nifty Futures.
*Source:* NSE.

future volatility, one tries to estimate it. One way to do this is to look at historical volatility over a certain period of time and try to predict the future movement of the underlying. Alternatively, one could work out implied volatility by entering all parameters into an option pricing model and then solving for volatility. For example, the Black Scholes model solves for the fair price of the option by using the following parameters–days to expiry, strike price, spot price, volatility of underlying, interest rate, and dividend. This model could be used in reverse to arrive at implied volatility by putting the current price of the option prevailing in the market.

Putting it simply, implied volatility is the market's estimate of how volatile the underlying will be from the present until the option's expiration, and is an important input for pricing options - when volatility is high, options premiums are relatively expensive; when volatility is low, options premiums are relatively cheap. However, implied volatility estimate can be biased, especially if they are based upon options that are thinly traded.

Prof J. R. Varma ("Mispricing of Volatility in the India Index Options Market", Working Paper 2002-04-01, April 2002, IIM, Ahmedabad) has estimated the option prices and implied volatility from the Black formula and found that for about 6.5% of all calls and about 7.5% of all puts, implied volatility was undefined because the option traded below its intrinsic value. This is an indication of mispricing of options.

A study conducted under the NSE Research Initiative titled "Futures Trading, Information and Spot Price Volatility of NSE-50 Index Futures Contract", Working Paper No. 18, November 2002 in particular addresses the impact of introduction of futures trading on the volatility of spot market by separating the possible effects of market wide information. A comparison of Nifty volatility as measured by standard deviation shows that the volatility in the post futures period is less than the volatility before the introduction of futures volatility. The change in the volatility of spot price may be due to other factors apart from futures. The study reveals that there is a fall in volatility since the inception of futures trading which may be attributed to increased trading in the cash markets, due to faster dissemination of information, making

cash markets more liquid and therefore less volatile. It could also be due to shift of speculators from cash to futures market due to low transaction costs and high leveraging in the futures market. This shift can be attributed to low margins, low transaction costs and standardized contracts and trading conditions prevalent in the futures market (Butterworth, Antoniou et. al., (1995)).

## *Volatility Smile*

The volatility smile is the relation between the implied volatility and the strike price of the same maturity. Normally the smiles for equity options is more like a sneer - a downward sloping curve when plotted against the strike price and the volatility smiles for both put and call should look alike. However, Prof. Varma ("Mispricing of Volatility in the India Index Options Market", Working Paper 2002-04-01, April 2002, IIM, Ahmedabad) found V shaped smiles and the smiles are markedly different for puts and calls. He estimated volatility smiles separately for put and call options and established by statistical significance tests that the smiles are sharply different for calls and puts while put call parity requires that the smiles be the same. The implied probability distribution is more highly peaked and has (except for deep-in-the-money calls) thinner tails than the normal distribution or the historical distribution. The market thus appears to be underestimating the probability of market movements in either direction. Prof. Varma also noticed some overpricing of deep-in-the-money calls and some inconclusive evidence of violation of put-call parity. However, he found that the observed prices are rather close to the average of the intrinsic value of the option and its Black-Scholes value disregarding the smiles.

## *Trading Volume and Open Interest*

Another study conducted under the NSE Research Initiative titled "Informational Content of Trading Volume and Open Interest-An empirical study of Stock Option Market in India" examines the role of certain non-price variables, namely open interest and trading volume, from the stock option market in determining the price of underlying shares in cash market. The study reveals that the net open interest of stock option is one of the significant variables in determination of the future spot price of underlying share. The results clearly indicate that open interest based predictors are statistically more significant than volume based predictors in Indian context too. The results in this study show that option markets, more specifically the net open interest, are likely to be informative about the future movement of stock prices. Investors who do not possess the specific information about the future price movement can use these predictors for deciding upon their trading strategies. The study also reveals difference in results arrived in US context and India may be because, firstly, the exchange traded stock derivative market in India is of recent origin and it takes time for the investors to realize the true potential of these instruments. Secondly, the participation of institutional investors in Indian stock derivative market is extremely limited. It can be attributed to the regulatory restrictions wherein such investors are allowed to use derivative securities for hedging purposes only. The story of mutual funds is not significantly different from this. Therefore, the investors who have better access to information and can be classified in the category of informed investors are constrained to deal in the derivative securities. Though there are some positive developments taking place in this direction, these securities are yet to gain significance in the portfolio of institutional investors in India.

### *Settlement*

All derivative contracts are currently cash settled. During 2002-03, such cash settlement amounted to Rs. 23,109 million. The settlement of futures and of options involved Rs. 17,836.6 million and Rs. 5,270.9 million respectively. The details of settlement on the F&O segment is presented in Table 7-12. The Settlement Guarantee Fund of the F&O Segment had a balance of Rs. 19,703 million at the end of July 2003.

**Table 7-12: Settlement Statistics in F&O Segment**

(In Rs. mn.)

| Month/Year | Index/Stock Futures | | Index/Stock Options | | Total |
|---|---|---|---|---|---|
| | MTM Settlement | Final Settlement | Premium Settlement | Exercise Settlement | |
| **2000-01** | **840.84** | **19.29** | **–** | **–** | **860.13** |
| Apr-01 | 80.43 | 0.88 | – | – | 81.31 |
| May-01 | 37.76 | 1.13 | – | – | 38.88 |
| Jun-01 | 48.52 | 0.10 | 14.69 | 2.75 | 66.07 |
| Jul-01 | 66.95 | 1.35 | 58.76 | 14.28 | 141.35 |
| Aug-01 | 45.94 | 1.36 | 98.31 | 50.62 | 196.22 |
| Sep-01 | 336.87 | 5.00 | 156.22 | 139.09 | 637.18 |
| Oct-01 | 112.69 | 1.01 | 179.61 | 114.22 | 407.53 |
| Nov-01 | 283.75 | 7.09 | 245.55 | 202.14 | 738.52 |
| Dec-01 | 789.41 | 37.62 | 174.67 | 82.14 | 1,083.84 |
| Jan-02 | 1,125.28 | 21.69 | 305.71 | 177.55 | 1,630.22 |
| Feb-02 | 1,088.70 | 122.14 | 244.00 | 88.57 | 1,543.42 |
| Mar-02 | 1,036.18 | 19.88 | 170.08 | 68.10 | 1,294.25 |
| **2001-02** | **5,052.49** | **219.25** | **1,647.58** | **939.46** | **7,858.79** |
| Apr-02 | 1,065.60 | 41.50 | 173.00 | 86.50 | 1,366.60 |
| May-02 | 1,665.40 | 18.40 | 215.30 | 143.50 | 2,042.60 |
| Jun-02 | 1,240.50 | 34.40 | 197.00 | 103.50 | 1,575.40 |
| Jul-02 | 1,608.80 | 17.00 | 236.00 | 106.70 | 1,968.50 |
| Aug-02 | 1,021.00 | 28.80 | 204.60 | 138.90 | 1,393.30 |
| Sep-02 | 1,198.30 | 14.40 | 233.10 | 134.60 | 1,580.40 |
| Oct-02 | 1,282.40 | 77.90 | 258.00 | 166.40 | 1,784.70 |
| Nov-02 | 1,109.30 | 86.80 | 337.10 | 353.40 | 1,886.60 |
| Dec-02 | 1,640.40 | 53.30 | 446.40 | 168.20 | 2,308.30 |
| Jan-03 | 2,184.19 | 29.92 | 383.92 | 229.38 | 2,827.41 |
| Feb-03 | 1,484.20 | 16.80 | 289.30 | 131.40 | 1,922.70 |
| Mar-03 | 1,878.93 | 38.38 | 338.39 | 196.35 | 2,452.05 |
| **2002-03** | **17,379.02** | **457.60** | **3,312.11** | **1,958.83** | **23,108.56** |

## Policy Debates

Derivatives have been around for about two years. The trading volumes in the derivatives have, however, been quite modest in the first year (2000-01). It picked up substantially during 2001-02 with the introduction of stock futures. However, the full potential is yet to be realized. As of now, very few members have been permitted by SEBI to trade in the derivatives. Some participants like, FIIs and MFs, have been permitted to have limited participation. It has been made mandatory by SEBI that at two dealers of the brokerage firm should have passed SEBI-approved certification test for derivatives. The process of attaining certification has been rather slow. There is lack of clarity on taxation and accounting aspects pertaining to derivatives market. The stock futures/options are currently cash settled and hence the derivatives market

is really delinked from the cash market. A few policy debates having bearing on volumes are discussed in this section.

## *Taxability of Income arising from Derivative Contracts*

The Income-tax Act does not have any specific provision regarding taxability of income from derivatives. Only provisions, which have an indirect bearing on derivative transactions, are sections 73(1) and 43(5). Section 73(1) provides that any loss, computed in respect of a speculative business carried on by the assessee, shall not be set off except against profits and gains, if any, of any speculative business. Section 43(5) of the Act defines a speculative transaction as a transaction in which a contract for purchase or sale of any commodity, including stocks and shares, is periodically or ultimately settled otherwise than by actual delivery or transfer of the commodity or scrips. It excludes the following types of transactions from the ambit of speculative transactions:

1. A contract in respect of stocks and shares entered into by a dealer or investor therein to guard against loss in his holding of stocks and shares through price fluctuations;
2. A contract entered into by a member of a forward market or a stock exchange in the course of any transaction in the nature of jobbing or arbitrage to guard against loss, which may arise in ordinary course of business as such member.

A transaction is thus considered speculative if (i) it is in commodities, shares, stock or scrips, (ii) it is settled otherwise than by actual delivery (iii) it is not for jobbing/arbitrage, and (iv) the participant has no underlying position.

In the absence of a specific provision, it is apprehended that the derivative contracts, particularly the index futures/options which are essentially cash-settled, may be construed as speculative transactions. Therefore, the losses, if any, will not be eligible for set off against other incomes of the assessee and will be carried forward and set off against speculative income only up to a maximum of eight years. The fact, however, is that derivative contracts are not for purchase/sale of any commodity, stock, share or scrip. Derivatives are a special class of securities under the Securities Contracts (Regulation) Act, 1956 and do not any way resemble any other type of securities like shares, stocks or scrips. Derivative contracts are cash-settled, as these can not be settled otherwise. Derivative contracts are entered into by the hedgers, speculators and arbitrageurs. A derivatives contract has any of these two parties and hence some of the derivative contracts, (not all), have an element of speculation. At least one of the parties is a hedger or an arbitrageur. It would, therefore, be unfair to treat derivative transactions as speculative. Otherwise it would be a penalty on hedging which the Securities Laws (Amendment) Act, 1999 seeks to promote. In view of these difficulties in applying the existing provisions, it is desirable to clarify or make special provision for derivatives of securities. Every derivative contract has two parties, generally a hedger and a speculator. All types of participants need to be provided level playing field so that the market is competitive and efficient. As regards taxability, the law should not treat income of the hedgers, speculators and arbitrageurs differently. Income of all the participants from derivatives need to be treated uniformly. This is all the more necessary as it is well neigh impossible to ascertain if a participant is trading for speculation, hedging or arbitrage.

A transaction is thus considered speculative, if a participant enters into a hedging transaction in scrips outside his holdings. It is possible that an investor does not have all the 30 or 50 stocks represented by the index. As a result an investor's losses or profits out of

derivatives transactions, even though they are of hedging nature in real sense, it is apprehended, may be treated as speculative. This is contrary to capital asset pricing model, which states that portfolios in any economy move in sympathy with the index although the portfolios do not necessarily contain any security in the index. The index derivatives are, therefore, used even for hedging the portfolio risk of non-index stocks. An investor who does not have the index stocks can also use the index derivatives to hedge against the market risk as all the portfolios have a correlation with the overall movement of the market (i.e. index).

In view of (i) practical difficulties in administration of tax for different purposes of the same transaction, (ii) inherent nature of a derivative contract requiring its settlement otherwise than by actual delivery, (iii) need to provide level playing field to all the parties to derivatives contracts, and (iv) need to promote derivatives markets, the exchange-traded derivatives contracts need to be exempted from the purview of speculative transactions. These must, however, be taxed as normal business income.

## *Cross Margining*

Cross-margining takes into account a member/client's combined position across products/ market segments (like, cash and derivatives markets) and across all exchanges. This means that member's margin with an exchange for one market can be used against margin requirements of another market. Cross-margining thus results in reduction in total margin payable by a member/client trading in related products and in more than one market. For example, a clearing corporation can compute and levy a single net margin amount based upon offsetting positions in different products/markets/exchanges. In fact, the L. C. Gupta Committee which had framed regulatory framework for derivatives, had recommended that cross margining (between spot and derivatives market) should be allowed eventually, as this would optimally use resources. Since this offers several benefits like, reduced collateral requirement, increased liquidity, improved collateral management and lower operational costs, the regulatory authorities should weigh the possibility of introducing cross-margining system.

## *Further Products*

The derivatives trading in India has so far been introduced in a fairly limited range of products. Index futures and options are available only on two indices, viz. S&P CNX Nifty and BSE Sensex. Options and futures on individual stocks are available only on select 49 securities. However, there is no limit to the range of derivative products, which are available internationally. After the market gains more familiarity with derivative products, one will have to consider introducing new derivative products based on various other instruments available in financial markets. For example, the index futures/options could be extended to some other popular indices, like Nifty Junior and Defty. The stock futures/options could be extended to all active securities. The possibility of introducing derivatives with exchange rate, interest rate and gold as the underlying could also be explored. Other possible options are derivatives on MIBID/ MIBOR and on key overseas stock indices, like Nasdaq 100 and Nikkie 200. These would provide wider option to market participants.

## Annexure 1: Contract Specification for F&O

| Particulars | Index Futures | Stock Futures | Index Options | Stock Options | Interest Rate Futures |
|---|---|---|---|---|---|
| Security Description | N FUTIDX NIFTY | N FUTSTK ---- | N OPTIDX NIFTY | N OPTSTK --- | N FUTINT |
| Underlying | S&P CNX Nifty Index | Individual Securities | S&P CNX Nifty Index | Individual Securities | Notional 10 year bond (6% coupon), Notional 10 year zero coupon bond and Notional 91 day T-Bill |
| Style of Option | NA | NA | European | American | NA |
| Contract Size | 200 or multiples therof (minimum value of Rs. 2 lakh) | Multiples of 100, as may be specified by NSE | 200 or multiples therof (minimum value of Rs. 2 lakh) | Multiples of 100, as may be specified by NSE | Permitted lot size is 2000 |
| Price Steps | ---------- Rs. 0.05 ---------- | | | | Rs. 0.01 |
| Expiration Months | ---------- 3 near months ---------- | | | | One year |
| Trading Cycle | A maximum of three month trading cycle - the near month (one), the next month (two) and the far month (three). New contract is introduced on the next trading day following the expiry of near month contract | | | | The contracts shall be for a period of a maturity of one year with three months continuous contracts for the first three months and fixed quarterly contracts for the entire year |
| Last Trading/Expiration Day | Last Thursday of the expiry month or the preceding trading day, if last Thursday is a trading holiday | | | | Last Thursday of the expiry month. If last Thursday is a trading holiday, the contractshall expire on previous trading day. Further, where the last Thursday falls on the annual or half yearly closing dates of the bank, the contract shall expire on previous trading day. |
| Price Bands | ---------- NA ---------- | | | | |
| No. of Strike Prices | NA | NA | Minimum of 5 (two 'in the money', one 'at the money' and two 'out of the money') for every option type (i.e. call and put) | Minimum of 5 (two 'in the money', one 'at the money' and two 'out of the money') for every option type (i.e. call and put) | NA |
| Strike Price Interval (in Rs.) | NA | NA | 10 | Between 2.5 and 50 depending on the price of underlying | NA |
| Settlement | In cash on T+1 basis | In cash on T+1 basis | In cash on T+1 basis | Daily settlement on T+1 basis and final settlement on T+2 basis | Daily Mark-to-Market settlement and Final Settlement will be on T+1 basis |
| Daily Settlement Price | Closing price of futures contract on the trading day | Closing price of futures contract on the trading day | Premium Value (net) | Premium Value (net) | As may be stipulated by NSCCL in this regard from time to time |
| Final Settlement Price | Closing value underlying index /securityon the last trading day of the futures contract. | Closing value underlying index/ securityon the last trading day of the futures contract. | Closing value of such underlying security (index) on the last trading day of the options contract. | Closing value of such underlying security (index) on the last trading day of the options contract. | As may be stipulated by NSCCL in this regard from time to time. |
| Settlement Day | ---------- Last trading day ---------- | | | | Last Trading day |
| Margins | ---------- Up-front initial margin on daily basis ---------- | | | | |

*NA:* Not applicable

## Annexure 7-2: Business Growth of Derivatives Segment

| Month/ Year | Index Futures | | Stock Futures | | Index Options | | | | Stock Option | | | | Total | | Average Daily Turnover (Rs. mn.) | Open Interest at the end of | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Call | | Put | | Call | | Put | | | | | | |
| | No. of Contracts Traded | Turnover (Rs.mn.) | No. of Contracts Traded | Turnover (Rs. mn.) | No. of Contracts Traded | Notional Turnover (Rs. mn.) | No. of Contracts Traded | Notional Turnover (Rs. mn.) | No. of Contracts Traded | Notional Turnover (Rs. mn.) | No. of Contracts Traded | Notional Turnover (Rs. mn.) | No. of Contracts Traded | Turnover (Rs. mn.) | | No. of Contracts | Turnover (Rs. mn.) |
| **Jun-00 to Mar-01** | **90,580** | **23,650** | – | – | – | – | – | – | – | – | – | – | **90,580** | **23,650** | **116** | | |
| Apr-01 | 13,274 | 2,917 | – | – | – | – | – | – | – | – | – | – | 13,274 | 2,917 | 154 | 1,430 | 319 |
| May-01 | 10,048 | 2,305 | – | – | – | – | – | – | – | – | – | – | 10,048 | 2,305 | 105 | 2,033 | 471 |
| Jun-01 | 26,805 | 5,902 | – | – | 5,232 | 1,185 | 3,429 | 766 | – | – | – | – | 35,466 | 7,854 | 374 | 4,071 | 904 |
| Jul-01 | 60,644 | 13,086 | – | – | 8,613 | 1,908 | 6,221 | 1,352 | 13,082 | 2,902 | 4,746 | 1,057 | 93,306 | 20,306 | 967 | 14,040 | 2,948 |
| Aug-01 | 60,979 | 13,046 | – | – | 7,598 | 1,653 | 5,533 | 1,193 | 38,971 | 8,437 | 12,508 | 2,633 | 125,589 | 26,962 | 1,284 | 19,096 | 3,961 |
| Sep-01 | 154,298 | 28,571 | – | – | 12,188 | 2,432 | 8,262 | 1,687 | 64,344 | 13,221 | 33,480 | 6,900 | 272,572 | 52,810 | 2,640 | 16,204 | 2,780 |
| Oct-01 | 131,467 | 24,848 | – | – | 16,787 | 3,263 | 12,324 | 2,329 | 85,844 | 16,319 | 43,787 | 8,015 | 290,209 | 54,775 | 2,608 | 25,051 | 4,628 |
| Nov-01 | 121,697 | 24,835 | 125,946 | 28,114 | 14,994 | 3,099 | 7,189 | 1,453 | 112,499 | 23,722 | 31,484 | 6,379 | 413,809 | 87,601 | 4,380 | 60,414 | 13,291 |
| Dec-01 | 109,303 | 23,393 | 309,755 | 75,147 | 12,890 | 2,866 | 5,513 | 1,184 | 84,134 | 19,859 | 28,425 | 6,740 | 550,020 | 129,187 | 6,799 | 37,891 | 8,024 |
| Jan-02 | 122,182 | 26,598 | 489,793 | 132,610 | 11,285 | 2,528 | 3,933 | 853 | 133,947 | 38,361 | 44,498 | 12,529 | 805,638 | 213,479 | 9,282 | 78,384 | 17,753 |
| Feb-02 | 120,662 | 27,472 | 528,947 | 139,395 | 13,941 | 3,235 | 4,749 | 1,068 | 133,630 | 36,347 | 33,055 | 8,643 | 834,984 | 216,159 | 10,808 | 89,560 | 20,104 |
| Mar-02 | 94,229 | 21,846 | 503,415 | 139,890 | 10,446 | 2,487 | 4,773 | 1,113 | 101,708 | 28,628 | 37,387 | 10,936 | 751,958 | 204,899 | 10,784 | 93,917 | 21,499 |
| **2001-02** | **1,025,588** | **214,819** | **1,957,856** | **515,155** | **113,974** | **24,657** | **61,926** | **12,998** | **768,159** | **187,795** | **269,370** | **63,830** | **4,196,873** | **1,019,254** | **4,127** | **93,917** | **21,499** |
| Apr-02 | 73,635 | 16,562 | 552,727 | 150,651 | 11,183 | 2,600 | 5,389 | 1,215 | 121,225 | 34,004 | 40,443 | 11,704 | 804,602 | 216,736 | 9,852 | 66,922 | 15,540 |
| May-02 | 94,312 | 20,223 | 605,284 | 159,810 | 13,070 | 2,945 | 7,719 | 1,687 | 126,867 | 34,901 | 57,984 | 16,432 | 905,236 | 235,998 | 10,727 | 55,839 | 12,053 |
| Jun-02 | 99,514 | 21,228 | 616,461 | 161,783 | 10,272 | 2,229 | 7,805 | 1,662 | 123,493 | 33,246 | 48,919 | 13,173 | 906,464 | 233,320 | 11,666 | 65,834 | 15,315 |
| Jul-02 | 122,663 | 25,133 | 789,290 | 212,047 | 16,637 | 3,498 | 7,688 | 1,616 | 154,089 | 43,406 | 65,530 | 18,369 | 1,155,897 | 304,069 | 13,220 | 85,369 | 17,997 |
| Aug-02 | 152,375 | 29,778 | 726,310 | 178,806 | 15,967 | 3,178 | 10,124 | 2,000 | 147,646 | 38,367 | 65,630 | 17,255 | 1,118,052 | 269,383 | 12,828 | 71,655 | 16,602 |
| Sep-02 | 144,303 | 28,357 | 700,051 | 175,011 | 16,578 | 3,318 | 12,543 | 2,507 | 151,291 | 40,160 | 80,038 | 22,051 | 1,104,804 | 271,404 | 13,570 | 67,261 | 13,858 |
| Oct-02 | 164,934 | 31,448 | 856,930 | 212,134 | 23,628 | 4,594 | 13,910 | 2,671 | 214,027 | 55,953 | 104,659 | 27,612 | 1,378,088 | 334,413 | 15,924 | 135,239 | 30,228 |
| Nov-02 | 175,567 | 35,000 | 970,251 | 254,630 | 25,413 | 5,090 | 17,191 | 3,360 | 261,600 | 71,060 | 104,529 | 29,220 | 1,554,551 | 398,360 | 20,966 | 94,615 | 22,134 |
| Dec-02 | 277,403 | 59,580 | 1,217,873 | 355,316 | 30,261 | 6,601 | 19,973 | 4,274 | 309,573 | 95,524 | 111,756 | 34,907 | 1,966,839 | 556,201 | 26,486 | 110,431 | 28,933 |
| Jan-03 | 258,955 | 55,567 | 1,304,122 | 382,988 | 26,376 | 5,769 | 16,805 | 3,635 | 322,876 | 101,743 | 132,021 | 41,790 | 2,061,155 | 591,400 | 25,717 | 100,764 | 23,888 |
| Feb-03 | 237,803 | 50,403 | 1,198,564 | 324,448 | 26,501 | 5,711 | 17,681 | 3,749 | 268,156 | 76,444 | 114,512 | 33,192 | 1,863,217 | 493,948 | 25,997 | 109,192 | 27,378 |
| Mar-03 | 325,299 | 66,237 | 1,138,980 | 297,698 | 53,788 | 11,165 | 35,739 | 7,397 | 255,658 | 71,634 | 140,540 | 39,186 | 1,950,004 | 493,317 | 24,666 | 97,025 | 21,943 |
| **2002-03** | **2,126,763** | **439,516** | **10,676,843** | **2,865,321** | **269,674** | **56,698** | **172,567** | **35,772** | **2,456,501** | **696,441** | **1,066,561** | **304,891** | **16,768,909** | **4,398,548** | **17,524** | **97,025** | **21,943** |

Note:

1. Notional Turnover = (Strike Price + Premium) × Quantity.
2. Index Futures, Index Options, Stock Options and Stock Futures were introduced in June 2000, June 2001, July 2001 and November 2001, respectively.