WORKBOOK ON DERIVATIVES

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Introduction to Derivatives

A derivative is a product whose value is derived from the value of underlying asset, index, or reference rate. The underlying asset can be equity, forex, commodity, or any other asset. For example, wheat farmers may wish to sell their harvest at a future date to eliminate the risk of a change in prices by that date. Such a transaction would take place through a forward or futures market. This market is the "derivative market", and the prices of this market would be driven by the spot market price of wheat which is the "underlying". The terms of "contracts" or "products" are often applied to denote the specific traded instruments.

In recent years, derivatives have become increasingly important in the field of finance. Futures and options are now actively traded on many exchanges. Forward contracts, swaps, and many other derivative instruments are regularly traded both in the exchanges and in the over-the-counter markets.

The development of Exchange - Traded derivatives

Derivatives have probably been around for as long as people have been trading with one another. Forward contracting dates back at least to the 12th century, and may well have been around before then. Merchants entered into contracts with one another for future delivery of specified amount of commodities at specified price. A primary motivation for prearranging a buyer or seller for a stock of commodities in early forward contracts was to lessen the possibility that large price swings would inhibit marketing the commodity after a harvest.

Although early forward contracts in the US addressed merchants' concerns about ensuring that there were buyers and sellers for commodities, "credit risk" remained a serious problem. To deal with this problem, a group of Chicago businessmen formed the **Chicago Board of Trade** (CBOT) in 1848. The primary intention of the CBOT was to

provide a centralised location known in advance for buyers and sellers to negotiate forward contracts. In 1865, the CBOT went one step further and listed the first "exchange traded" derivatives contracts in the US, these contracts were called "futures contracts". In 1919 Chicago Butter and Egg Board, a spin off of CBOT, was reorganised to allow futures trading. Its name was changed to **Chicago Mercantile Exchange** (CME). The CBOT and CME remain the two largest organised futures exchanges-indeed, the two largest "financial" exchanges of any kind – in the world today.

The first stock index futures contract was traded in **Kansas City Board of Trade**. Currently the most popular futures contract in the world is based on **S&P 500** index, traded on Chicago Mercantile Exchange. During the mid eighties the financial futures became the most active derivatives instruments generating volumes many times more than the commodity futures. Index futures, futures on T-Bills and Euro-Dollar futures are the top three most popular futures contracts traded today. Other popular international exchanges that trade derivatives are LIFFE in England, DTB in Germany, SIMEX in Singapore, TIFFE in Japan, MATIF in France, etc.

Forward Contracts

A forward contract is an agreement to buy or sell an asset on a specified date for a specified price. One of the parties to the contract assumes a long position and agrees to buy the underlying asset on a certain specified future date for a certain specified price. The other party assumes a short position and agrees to sell the asset on the same date for the same price. Other contract details like delivery date; price and quantity are negotiated bilaterally by the parties to the contract. The Forwards contracts are normally traded outside the purview of the exchange. Forward contracts are very useful in hedging and speculation.

The classic hedging application would be that of a wheat farmer forward-selling his harvest at a known price in order to eliminate price risk. Conversely, a bread factory may want to buy bread forward in order to assist production planning without the risk of price

fluctuations. Thus forwards provide a useful tool for both the farmer and the bread factory to hedge their risks

If a speculator has information or analysis, which forecasts an upturn in a price, then he can go long on the forward market instead of the cash market. The speculator would go long on the forward, wait for the price to rise, and then take a reversing transaction to book the profits. The use of forward markets here supplies leverage to the speculator.

Limitations of forward markets

Forward markets world-wide are afflicted by several problems:

1. lack of centralisation of trading,
2. illiquidity, and
3. counterparty risk.

In the first two of these, the basic problem is that of too much flexibility and generality. The forward market is like a real estate market in that any two consenting adults can form contracts against each other. This often makes them design terms of the deal, which are very convenient in that specific situation, but makes the contracts non-tradable. Also the "OTC market" here is unlike the centralisation of price discovery that is obtained on an exchange.

Counterparty risk in forward markets is a simple idea: when one of the two sides of the transaction chooses to declare bankruptcy, the other suffers. Therefore larger the time period of the contract, larger the counterparty risk.

Even when forward markets trade standardised contracts, and hence avoid the problem of liquidity, still the counter party risk remains a very large problem.

Introduction to futures

Futures markets were designed to solve the problems that exist in forward markets. A futures contract is an agreement between two parties to buy or sell an asset at a certain time in the futures at a certain price. Unlike forward contracts the futures contracts are standardised and exchange traded contracts. To facilitate liquidity in the futures contracts, the exchange specifies certain standard features of the contract. Therefore, a futures contract is a legally binding agreement between two parties to the contract. It is standardised contract, with standard underlying instrument, a standard quantity and quality of the underlying instrument that can be delivered, (or which can be used for reference purposes in settlement) and a standard timing of such settlement. A futures contract may be offset prior to maturity by entering into an equal and opposite transaction. More than 99% of futures transactions are offset this way.

The exchange-traded futures are a significant improvement over the forward contracts as they eliminate counterparty risk and offer more liquidity.

Index Futures

The index futures are the most popular futures contracts as they can be used in a variety of ways by various participants in the market. They offer different users different opportunities. In the later chapters, we shall see how the index futures can be used to realise those objectives.

Introduction to Options

Options are one of the most popular derivatives. Options derive their value from the underlying capital market or forex or other form of assets. These are highly leveraged instruments. They can be used for hedging, speculating and arbitrage purposes.

Types of options Options are of two types. **Call** and **Put** option. A call option gives a buyer / holder a right but not an obligation to buy the underlying on or before a specified time at a specified price (usually called strike / exercise price) and quantity. Whereas a put option gives a holder of that option a right but not an obligation to sell the underlying on or before a specified time at a specified price and quantity. The buyer / holder of an

option pays an upfront premium to the writer / seller of an option. In other words he pays the price of the option.

A writer / seller of an option undertakes an obligation to buy / sell the underling on or before a specified time at specified price and quantity for a premium. This premium is collected upfront. Thus, the writer of an option has to price his option such a way that it takes all the possible scenarios into consideration and should be close to the fair price of the option.

Exercise Style of Options Options are classified into two kinds depending on the exercise styles. They are 1) **American option** and 2) **European option.** In the American option the holder / buyer of an option is allowed to exercise the option any time during the life of the option. However, in the European option exercise is allowed only at the maturity date of the option.

Strike price of Options World over options are generally traded on different variety of strike prices. These strike prices are determined by the exchange. For example if a call option is traded at a strike price equal to that of the underlying spot price, then the option is called "**At-The–Money**" option, if the strike price is lesser than the underlying spot price, it is called **"In-The-Money"** option and if the strike price is higher than the underlying spot price, it is called as **Out-of-Money** option. In case of put option if the strike price is higher than the underlying spot price it is called **In-The-Money** and when the strike price lower than the underlying spot price, it is called **Out-of-Money** option. At the money option is same for both a call and put on the same underlying and the same strike price.

Option Premium Option premium consists of two parts 1) Intrinsic value and 2) Time value. The intrinsic value of a call option is the difference between the spot price and the strike price, whereas the intrinsic value of a put option is the difference between the strike price and the spot price. In-the-money options have intrinsic value. However, at-the-money and out-of-money options have no intrinsic value. Time value of an option is the

price a holder of an option has to pay to the seller of an option because of the risk the seller of an option takes. This is over and above the intrinsic value that an option holder pays. Typically, the premium charged by the seller of an option is equal to the sum of both intrinsic value and the time value.

NSE is planning to start index options based on S&P CNX NIFTY, which have the American style of exercise. The options will be of one-month, two-month and three-month maturities.

Practice Questions

Q: The first futures market in the world was introduced in the following exchange
1. Chicago Board of Trade
2. Chicago Mercantile Exchange
3. Chicago Board Options Exchange
4. London International Financial Futures and Options Exchange

A: The correct answer is 1.

Q: The underlying asset for a derivative instrument can be
1. Equity
2. Commodities
3. Interest rate instruments
4. All of the above
A: The correct answer is 4.

Q: Spot value of S&P CNX Nifty is 1200. An investor bought a one-month S&P CNX Nifty 1220 call option for a premium of Rs. 10. The options is
1. In-the-money
2. At-the-money
3. Out-of-money

4. None of the above

A: The correct answer is 3

Q: Typically option premium is

1. Less than the sum of intrinsic value and time value

2. Greater than the sum of intrinsic value and time value

3. Equal to the sum of intrinsic value and time value

4. Is independent of intrinsic value and time value.

A: The correct answer is 3.

Pricing of Index futures

Have you ever felt the need to know whether the futures price quoted in the market is the true reflection of the underlying's price? Have you thought of making risk-less profits by arbitraging between the underlying and futures markets? If so, you need to know the cost-of-carry model to understand the dynamics of pricing that constitute the estimation of fair value of futures.

The Cost of Carry Model

We use fair value calculation of futures to decide the no-arbitrage limits on the price of a futures contract. This is the basis for the cost-of-carry model where the price of the contract is defined as

Futures price = Spot price + Holding costs
$$F \quad = \quad S \quad + \quad C$$

If F> S + C or F<S + C, arbitrage opportunities would exist i.e. whenever the futures price moves away from the fair value, there would be chances for arbitrage.

What are the components of holding cost? The components of holding cost vary with contracts on different assets. In some cases, it is even negative.

1. **Commodity Futures**: Holding cost = Cost of financing plus Storage costs plus Insurance purchased, etc.
2. **Equity Futures:** Holding cost = Cost of financing minus Dividend returns.

Example

Futures price of 100 gms of silver one-month down the line i.e. a contract expiring 30th November is computed as follows

1. *What is the spot price of silver?* The spot price of silver, S= Rs. 7000/kg

2. *What is the cost of financing for a month?* rT, cost of financing for a month, 15% annualised $= \ln(1.15)*30/365$

3. *What are the holding costs?* Assume storage cost, $C = 0$

4. The fair value of futures price, $F=S*\exp(rT) + C = 700 * \exp(\ln(1.15)*30/365) =$ Rs. 708

If the contract was for a three-month period i.e. expiring on 30th January, the cost of financing would increase the futures price. Therefore, the futures price would be

$F = 700 * \exp(\ln (1.15)*90/365) =$ Rs. 725

On the other hand, if the one-month contract was for 10,000 kg of silver instead of 100 gms, then the storage cost would be greater than zero, and the price of the futures contract would be Rs. 708 plus the cost of storage.

Futures contracts on equity

The main differences between commodity and equity futures are

1. There is no cost of storage considered in holding paper
2. Equity paper comes with a dividend stream, which is a *negative* cost if you are long the stock, and a *positive* cost if you are short the stock.

    $C =$ financing cost – dividends

Thus, a crucial aspect of dealing with equity futures as opposed to commodity futures is an accurate forecasting of dividends. The better the forecast of dividend offered by a security, the better is the estimate of the futures price.

Index Futures

Two of the most popularly traded futures contracts in the world are based on government debt and the market indices. In India, NSE is planning to introduce index futures contract based on S&P CNX Nifty. These are contracts whose "underlying" is the value of the index at any point in time. At the time of delivery, the trade is settled in cash. The pricing of index futures is also based on the cost-of-carry model, where the carrying cost is the cost of financing the purchase of the portfolio underlying the index, minus the present value of dividends obtained from the stocks in the index portfolio.

Examples

S&P CNX Nifty futures will be traded on NSE as one, two and three-month contracts. What will be the price of a new two-month futures contract on S&P CNX Nifty?

1. Let us assume that Reliance will be declaring a dividend of Rs. 10 per share after 15 days of purchasing the contract
2. Current value of S&P CNX Nifty is 900 and S&P CNX Nifty is traded with a multiplier of 100.
3. Since S&P CNX Nifty is traded in multiples of 100, value of the contract is 100*900 = Rs 90,000
4. If Reliance has a weight of 7% in S&P CNX Nifty, it's value in S&P CNX Nifty is Rs. 6300
5. If the market price of Reliance is Rs 140, then a traded unit of S&P CNX Nifty involves 45 shares of Reliance
6. Thus, futures price, F=900*exp(ln(1.15)*60/365)–45*10*exp(ln(1.15)*45/365)/ 100 = Rs. 916.34

Futures Pricing in case of expected dividend yield

If the dividend flow throughout the year is generally uniform, i.e. if there are few historical cases of clustering of dividends in any particular month, it is useful to calculate the annual dividend yield.

Futures price = S*exp((r-q)*T)

Example

What is the fair value of a two-month S&P CNX Nifty futures contract expiring on April 25?

1. *What is the annual dividend yield on S&P CNX Nifty index?* The dividend yield on S&P CNX Nifty, 2% annualised = ln(1.02)*60/365
2. *What is the spot value of S&P CNX Nifty?* Current value of S&P CNX Nifty is 910
3. *What is the cost of financing for two months?* RT, cost of financing for a month, 15% annualised = ln(1.15)*60/365
4. *What are the holdings costs?* Assume storage cost, C=0
5. The fair value of futures price, F=S*exp(ln(1+r-q))*T + C = 910 * exp(ln(1.13)*60/365) = Rs. 928.47

The cost-of-carry model explicitly defines the relationship between the futures price and the related spot price. The difference between the spot price and the futures price is called *the basis*. In a normal market, the basis is negative.

Nuances

1. As the date of expiration comes near, the basis reduces – there is a *convergence* of the futures price towards the spot price. On the date of expiration, the basis is *zero*. If it is not, then there is an arbitrage opportunity.
2. There is *nothing* but cost-of-carry related arbitrage that drives the behaviour of the futures price.
3. *Transaction costs* are very important in the business of arbitrage.

Practice Questions

Q: Futures price is equal to

1. Spot price plus carry costs plus carry returns
2. Spot price minus carry costs minus carry returns
3. Spot price plus carry costs minus carry returns
4. Spot price minus carry costs plus carry returns

A: The correct answer is 3.

Q: Suppose the index stays constant between day 1 and day 2. Yet, the index futures are more expensive on day 2 than on day 1. Which of these possibilities can make it happen? (Assume that the futures are at their fair prices)

1. The exchange banned program trading on day 2
2. The exchange banned program trading on day 1
3. Interest rates dropped sharply on day 2.
4. Interest rates rose sharply on day 2.

A: The correct answer is 4.

Trading, Clearing and Settlement

Trading

Initially, NSE would be introducing trading in contracts having one-month, two-month and three-month expiry cycles. As per the proposal of NSE, all contracts would expire on the last Friday of every month. Thus a January expiration contract would expire on the last Friday in January and a February expiry contract would cease trading on the last Friday of February. On the Monday following the last Friday, a new contract having a three-month expiry would be introduced for trading. Thus, at any point in time, three contracts would be available for trading with the first contract expiring on the last Friday of that month. Depending on the time period for which you want to take an exposure in index futures contracts, you can place buy and sell orders in the respective contracts. All index futures contracts on NSE's futures trading system will be coded in the following manner:

Market Type	Instrument Type	Contract Symbol	Expiry Date
N	FUTIDX	NIFTY	31MAR2000

Where the Instrument Type refers to "Futures contract on Index" and Contract Symbol – NIFTY denotes a "Futures contract on S&P CNX NIFTY index" and the Expiry Date represents the last date on which the contract will be available for trading.

Assuming that futures trading starts in March 2000, then the March contract (the near one month contract) will expire on March 31, 2000 which is the last Friday in March, the near two months contracts will expire on the last Friday of April 2000 and the far month contract (three months) contract will expire on last Friday of May 2000.

Each futures contract i.e. FUTIDX NIFTY 31MAR2000, 28APR2000 and 26MAY2000, will have a separate limit order book. All passive orders will be stacked in the system in

terms of Price-time priority and trades will 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 will be for a minimum lot size of 100 units. Thus if the index level is around 1000, then the approximate value of a single index futures contract would be Rs. 1,00,000. The minimum tick size for an index future contract would be 0.05 units. Thus a single move in the index value would imply a resultant gain or loss of Rs. 5.00 (i.e. 0.05 tick * 100 units) on an open position of 100 units.

While entering orders on the trading system, members are required to identify orders as being either proprietary or client orders. Proprietary orders should be identified as ''Pro'' and those of clients should be identified as 'Cli'. Apart from this, in the case of 'Cli' trades, the client account number should also be provided. Client orders should be marked as either:

Figure 1 Contract cycle

| Jan | Feb | Mar | Apr |

Jan 30 contract

Feb 27 contract

Mar 27 contract

Apr 24 contract
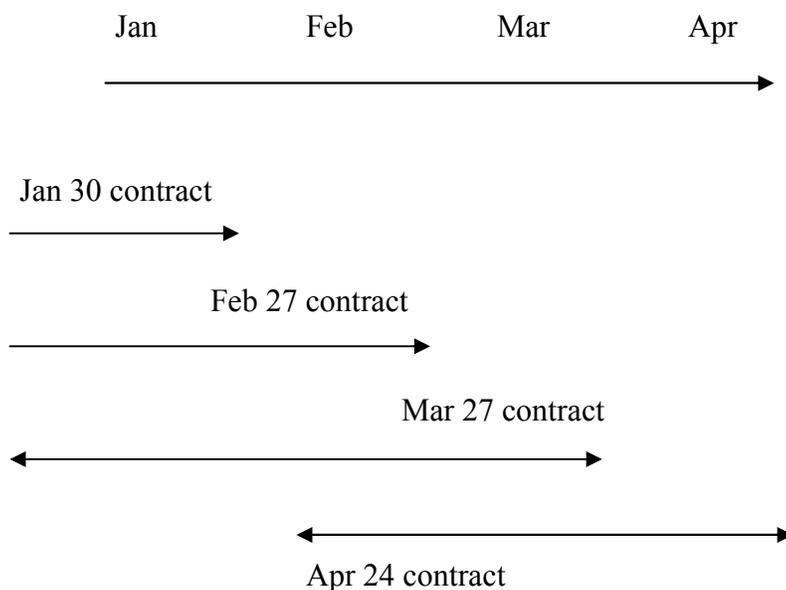
May 29 contract

Jun 26 contract

1. Buy 'Open'
2. Sell 'Open'
3. Buy 'Close'
4. Sell 'Close'

Buy 'Open' Client orders are those wherein the client has first opened a buy position before sell. At the time the client wishes to close out this open position, the respective sell order should be entered as Sell 'Close'. Similarly, when a client sells prior to buying, the sell order should be identified as Sell 'Open' and when the same sell open positions is to be closed out, the respective buy order should be marked as a Buy 'Close' order.

The futures market is a zero sum game i.e. the total number of long in any contract always equals the total number of short in any market. The total number of outstanding contracts (long/short) at any point in time is called the "Open interest". This Open-interest figure is a good indicator of the liquidity in every contract. Based on studies carried out in international exchanges, it is found that open-interest is maximum in near month expiry contracts.

Clearing and Settlement

Clearing Entities and their role Clearing and settlement activities in the derivatives segment will be undertaken by the following entities:

1   Clearing Members and
2   Clearing Bank

Clearing Member Depending on the functions undertaken, Clearing members can be further categorised as:

1. Trading Members-Clearing Members – who can trade and settle only for their own trades
2. Professional Clearing members who can clear and settle their own trades as well as those of other trading members

Clearing Bank Funds settlement will be through clearing banks. Clearing members can have a single bank account with one of the approved clearing banks, which can be common across the Capital Market and Futures and Options Market segment.

Open Position Calculation As index futures contracts are cash settled, obligation calculation in the Futures and Options market would involve the determination of open position in contracts in the following manner:

1. Proprietary position – net basis
2. Client positions – gross basis.

Identification of orders as "Open" or "Close" is used while computing open position of members. Open position is calculated separately for proprietary position and separately for client position. In case of proprietary trades, open position in a given contract is arrived at by reducing the sell quantity from the total of buy quantity i.e. *Buy – Sell quantity*. If the result is positive then it is considered as a long position and if result is negative, then it is short position. As Client trades are subject to gross margining, "Long Open" position for the entire client pool is computed as follows: Buy (*Open*) – Sell (*close*) quantity whereas the "Short Open" position is computed as: Sell (*Open*) – Buy (*Close*) quantity Trading member's open position is the sum of Proprietary open position, client open long position and client open short position. This position will be considered for exposure and daily margin purposed.

Consider the following example

1. Trading member ABC trades in the futures and options segment for himself and two of his clients

Trading Member ABC

	Buy	**Sell**
Proprietary Position	100@ 1000	200@ 1010

Trading Member ABC

	Buy Open	**Sell Close**	**Sell Open**	**Buy Close**
Client Position				
Client A	200 @ 1109	100 @ 1000		
Client B			300 @ 1100	100 @ 1099

The open position for proprietary = Buy – Sell = 100 – 200 = 100 short. The open position for client trades = Buy (O) – Sell (C) = 200 – 100 = 100 long. Sell (O) – Buy (C) = 300 – 100 = 200 short.

2. Day 2 Assume that the above position is carried forward to the next trading day and the following trades are also executed –

Trading Member ABC

	Buy	**Sell**
Proprietary position	100 @ 1000	200@ 1010

Client trades
Trading Member ABC

	Buy Open	**Sell Close**	**Sell Open**	**Buy Close**
Client Position				

Client A	200 @ 1109 100 @ 1000	
Client B		300 @ 1100 200 @ 1099

End of day open position for the previous day (pro) = 100 short. End of day open position for the previous day (client) – open long = 100; open short = 200;

The open position for proprietary = 100 – 300 = 200 short. The open position for client trades = B/f Long + Buy (O) – Sell (C) = 300 – 100 = 200 long. B/f Short + Sell (O) – Buy (C) = 500 – 200 = 300 short.

Mark-to-Market Settlement and Margin Determination

For the purpose of ensuring smooth settlement, all index futures contracts would be subject to margins by the Clearing Corporation viz.

1. Mark-to-market settlement
2. Initial margins

The daily settlement process called "mark-to-market" would provide for collection of losses that have already occurred (historic losses) whereas initial margin would seek to safeguard against potential losses on outstanding positions.

Mark-to-market settlement All open positions in index contracts will be daily settled at the Mark-to-Market settlement price. This process would ensure that the actual daily loss incurred on all open positions are paid up by the losing member and credited to the account of the gaining member on a T+1 (trade day +1) basis. The settlement price would ordinarily be the closing price of the futures contract. However, on expiry, the settlement price would be the spot index value as, on expiry of any futures contract, the spot value and the futures value converge. Mark to market settlement will be in cash.

If a trading member has the following position, then the mark-to-market settlement process would work as follows:

	Trading Member X	
	Buy	Sell
Proprietary position	500 @ 1020	1700 @ 1025
Client Position		
Client A	2000 @ 1015	
Client B	1500 @ 1016	700 @ 1022

Assume that the Settlement price for the day is 1023, then the mark-to-market loss for Trading Member X is

On Buy positions: Profit of Rs. 1,500 (i.e. 3 *500 units) on long position of 500 units Profit of Rs. 16,000 (i.e. 8 * 2000 units) on A's outstanding long position Profit of Rs. 10,500 (i.e. 7 * 1500 units) on B's long position of 1500 units

On Sell positions: Profit of Rs. 3,400 (i.e. 2 * 1700 units) on short position of 1700 units Loss of Rs. 700 (i.e. 1 * 700 units) on B's Short position of 700 units.

Thus, on T+1 day, the losing member's account would be debited to the extent of Rs. 30,700 and Trading member X's account would be credited by Rs. 30,700.

Thus, in effect, the outstanding position of 1,600 units (4,000 – 2,400) of Trading Member X is revalued or Mark-to-market at a price of 1023. This process of marking-to-market would be carried out on a daily basis until the position is squared off or until expiry of that contract.

Initial Margin

The computation of initial margin will be done using the concept of Value-at-Risk (VAR). The initial margin amount will be large enough to cover a one-day loss that can be encountered on 99% of the days. VAR methodology seeks to measure the amount of value that a portfolio may stand to lose within a certain horizon time period (one day for the Clearing Corporation) due to potential changes in the underlying asset market price.

Initial margin amount computed using VAR is collected up-front i.e., based on the available margin with the clearing corporation, members are allowed to take up exposure.

For a trading member, Initial Margin is calculated on the basis of net out standing position of a trading member and gross outstanding position of all clients of the trading member.

For a clearing member, VAR is computed as the total VAR of all trading members clearing and settling through it.

Margin can be paid in terms of cash, bank guarantee or other acceptable collaterals.

Practice Question

Q: In the initial phase, NSE is planning to introduce futures contracts that have expiry period of

1. One month
2. Two months
3. Three months
4. All of the above

A: The correct answer is 4.

Q: Locked market is a market

1. where trading has been halted because trades have reached their limit
2. where trading has been halted because prices have reached their limit
3. not available for trading
4. None of these.

A: The correct answer is 2.

Q: If a new long buys from a new short, open interest;

1. Remains the same
2. Increases
3. Decreases
4. None of the above

A: The correct answer is 2.

Q: In stock index futures trading, profits are received or losses are paid

1. in the delivery month
2. on daily settlement
3. on the day of expiry of the contract
4. on a weekly settlement basis.

A: The correct answer is 2.

Q: A trading member Manojbhai took proprietary positions in a January 1999 expiry contract. He bought 1500 trading units at 1210 and sold 1200 at 1220. The end-of-day settlement price for the January 1999 expiry contract is 1220. If the initial margin per unit for the January 1999 contract is Rs. 100 per unit, then the total initial margin payable by Manojbhai would be

1. Rs. 30,000
2. Rs. 15,000
3. Rs. 1,50,000
4. Rs. 2,70,000

A: The correct answer is 1.

Using Index Futures

There are eight basic modes of trading on the index futures market:

♦ *Hedging*

H1 Long stock, short S&P CNX Nifty futures

H2 Short stock, long S&P CNX Nifty futures

H3 Have portfolio, short S&P CNX Nifty futures

H4 Have funds, long S&P CNX Nifty futures

♦ *Speculation*

S5 Bullish index, long S&P CNX Nifty futures

S6 Bearish index, short S&P CNX Nifty futures

♦ *Arbitrage*

A7 Have funds, lend them to the market

A8 Have securities, lend them to the market

H1: Long stock, short S&P CNX Nifty futures

Have you ever felt that a stock was intrinsically undervalued? That the profits and the quality of the company made it worth a lot more as compared with what the market thinks? Have you ever been a "stockpicker" and carefully purchased a stock based on a sense that it was worth more than the market price?

A person who feels like this takes long position on the cash market. When doing this, he faces two kinds of risks:

1. His understanding can be wrong, and the company is really not worth more than the market price,

   or,

2. The entire market moves against him and generates losses *even though the underlying idea was correct.*

The second outcome happens all the time. A person may buy Reliance at Rs. 190 thinking that Reliance would announce good results and the stock price would rise. A few days later, *S&P CNX Nifty* drops, so he makes losses, even if his intrinsic understanding of Reliance was correct.

There is a peculiar problem here. *Every buy position on a stock is simultaneously a buy position on S&P CNX Nifty.* This is because a LONG RELIANCE position generally gains if S&P CNX Nifty rises and generally loses if S&P CNX Nifty drops. In this sense, a LONG RELIANCE position is not a focussed play on the valuation of Reliance. It carries a LONG S&P CNX NIFTY position along with it, as incidental baggage. The stockpicker may be thinking he wants to be LONG RELIANCE, but a long position on Reliance on the market effectively forces him to be LONG RELIANCE + LONG S&P CNX NIFTY.

Even if you think Infosys is undervalued, the position LONG INFOSYSTCH is not purely about Infosys; it is also partly about S&P CNX Nifty. Every LONG

INFOSYSTCH position is forced to be an index speculator, even though the trader may have no interest in the index. It is useful to ask: does the person feel bullish about Infosys or about the Index?

♦ Those who are bullish about the index should just buy S&P CNX Nifty futures; they need not trade individual stocks

♦ Those who are bullish about the Infosys do wrong by carrying along a long position on S&P CNX Nifty as well.

There is a simple way out. *Every time you adopt a long position on a stock, you should sell some amount of S&P CNX Nifty futures*. This offsets the hidden S&P CNX Nifty exposure that is inside every long-stock position. Once this is done, you will have a position, which is *purely about the performance of the stock*. The position LONG INFOSYSTCH + SHORT S&P CNX NIFTY is a pure play on the value of Infosys, without any extra risk from fluctuations of the market index. When this is done, the stockpicker has "hedged away" his index exposure. The basic point of this hedging strategy is that the stockpicker proceeds with his core skill, i.e. picking stocks, at the cost of lower risk.

Warning: Hedging does not remove losses. The best that can be achieved using hedging is the removal of unwanted exposure, i.e. unnecessary risk. The hedged position will make less profits than the unhedged position, half the time. One should not enter into a hedging strategy hoping to make excess profits for sure; all that can come out of hedging is reduced risk.

How do we actually do this?

1. We need to know the "beta" of the stock, i.e. the average impact of a 1% move in S&P CNX Nifty, upon the stock. If betas are not known, it is generally safe to assume the beta is 1. Suppose we take LUPINLAB, where the beta is 1.2, and suppose we have a LONG LUPINLAB position of Rs. 200,000.

2. The size of the position that we need on the index futures market, to completely remove the hidden S&P CNX Nifty exposure, is 1.2 * 200,000, i.e. Rs. 240,000.

3. Suppose S&P CNX Nifty is at 1200, and the market lot on the futures market is 100. Hence each market lot of S&P CNX Nifty is Rs. 120.000. To sell Rs.240,000 of S&P CNX Nifty we need to sell two market lots.

4. We sell two market lots of S&P CNX Nifty (200 nifties) to get the position:
   LONG LUPINLAB Rs. 200,000
   SHORT S&P CNX NIFTY Rs. 240,000

This position will be essentially immune to fluctuations of S&P CNX Nifty. The profits/losses position will fully reflect price changes intrinsic to LUPINLAB, hence only successful forecasts about LUPINLAB will benefit from this position. Returns on the position will be roughly neutral to movements of S&P CNX Nifty.

Example

1. Shyam adopts a position of Rs. 1 million LONG ITC on date 5th June 1998. He plans to hold the position till Friday the 26th.

2. The beta of ITC happens to be 1.2

3. Hence he needs a short position of Rs. 1.2 million on the index futures market to totally remove his S&P CNX Nifty exposure.

4. On date 5th June 98, S&P CNX Nifty is 980 and the nearest futures contract (with expiration 26th June 98) is trading at about 990. Hence, each market lot of the futures (100 nifties) is worth Rs. 99000. To sell Rs. 1.2 million of S&P CNX Nifty, we need to sell 12 lots (by rounding off to the nearest market lot).

5. He sells 12 market lots of S&P CNX Nifty (1200 nifties) to get the position:
   LONG ITC Rs. 1,000,000
   SHORT S&P CNX NIFTY JUNE FUTURES Rs. 1,188,000

6. 10 days later, S&P CNX Nifty crashed because of the US sanctions.

7. On Friday 26th, Shyam unwound both positions at the settlement price of 882. His position on ITC lost Rs. 120000 since ITC had dropped to 880000. His short position

on S&P CNX NIFTY JUNE FUTURES earned Rs. 129600. Overall, he earned Rs. 9600.

Nuances

1. *How do I find out the beta of a stock?* The betas of major stocks are available in the NSE Newsletter or over the Internet on http://www.nse-india.com

2. *What if I am still stuck without a beta estimate?* If a beta is not known, it is generally useful to guess that the beta of an unknown stock is near 1. In other words, a speculative long position of Rs. 500,000 on any stock should be accompanied by selling Rs. 500,000 of S&P CNX Nifty in order to obtain a complete hedge. This (slightly wrong) hedged position is always much better than a totally unhedged position (i.e. not selling a S&P CNX Nifty). Of course, knowing the true beta gives the most accurate hedge.

3. *Does this only work for index-stocks?* No, this works for any stock in the country. Some index stocks have a weak link to the index, and some non-index stocks have a very tight link with the index.

4. *How much risk reduction do I gain*? It varies from stock to stock. The naked LONG RELIANCE position is around twice the risk of the hedged position LONG RELIANCE + SHORT S&P CNX NIFTY. The risk reduction obtained range of 25% to 60%.
Suppose the daily returns of a stock has a variance of V. Then the variance of the fully hedged position is $V - \sigma^2_n \beta^2$ where σ_n is the standard deviation of daily returns on S&P CNX Nifty. Typically, σ_n is around 1.6 percent/day. For example, if ITC has a variance of 9 and a beta of 1.2, then the fully hedged position has a variance of 5.26. Through this formula, we can precisely quantify the magnitude of the risk reduction that completes hedging delivers.

5. *Will hedging always help if my forecast about the stock is wrong?* It depends. If the forecast about the stock itself is wrong, then hedging is no help. If the forecast goes wrong *because S&P CNX Nifty crashes*, then a complete hedge will reimburse these losses.

6. *S&P CNX Nifty futures with several different expirations are available at the same time: which one should I use?* There are three criteria: liquidity, expiration date, and potential mispricings:

Liquidity Using the most liquid of them (i.e. the one with the tightest bid-ask spread) saves money on impact cost.

Expiration date If the speculative position is a two-week view, then it's convenient if the index futures that is used also has atleast two weeks to go.

Potential mispricings Finally, it never hurts to be clever and sell a futures contract, which is somewhat overpriced. This will not only do the job of hedging, but it is could also yield some profits out of the mispriced futures. Hence it helps to check the market price of all available futures contracts against their fair values, and try to use the most overpriced contract as part of the hedging.

Solved Problems

Q: The beta of ORIENTBANK is 0.8. A person has a long position of Rs. 200,000 of ORIENTBANK. Which of the following gives a complete hedge?

1. SELL 200,000 of S&P CNX Nifty
2. BUY 200,000 of S&P CNX Nifty
3. BUY 160,000 of S&P CNX Nifty
4. SELL 160,000 of S&P CNX Nifty
5. Do nothing

A: A long position in ORIENTBANK of Rs. 200,000 is as vulnerable to the index as a long position of Rs. 160,000 of S&P CNX Nifty. To neutralise this, the hedger would need to sell Rs. 160,000 of S&P CNX Nifty. The correct answer is 4.

Q: The beta of CIPLA is 0.8. A person has a LONG CIPLA position of Rs. 200,000 coupled with a SHORT S&P CNX NIFTY position of Rs. 100,000.   Which of the following is true?

1. He has a partial hedge against fluctuations of S&P CNX Nifty

2. He has a complete hedge against fluctuations of S&P CNX Nifty

3. He is bearish on S&P CNX Nifty as well as on CIPLA.

4. He is bullish on S&P CNX Nifty and bearish on CIPLA

5. This is not a hedge; it is just speculation.

6. He is overhedged

A: A long position in CIPLA of Rs. 200,000 is as vulnerable to the index as a long position of Rs. 160.000 of S&P CNX Nifty. To completely neutralise this, the hedger would need to sell Rs. 160,000 of S&P CNX Nifty. He has actually sold S&P CNX Nifty to the extent of only Rs. 100,000. Hence he is partially hedged. Alternative 1 is correct.

Q: The beta of Reliance is 1.3 and the variance risk of Reliance is 9. The daily σ of S&P CNX Nifty is 1.6. One complete hedging is done, how much risk are we left with?

1. 4.1

2. 4.6

3. 5.1

4. 5.6

5. 6.1

A: A fully hedged position has total risk (variance) of $V-2.6\beta^2$, which evaluates to 4.6. Hence alternative 2 is correct – the risk suffered by the person with a view that Reliance is undervalued drops from 9 to 4.6.

This illustrates the sharp reduction in risk that a stockpicker obtains using the futures. A naked LONG RELIANCE position has a variance of 9. The position LONG RELIANCE + SHORT S&P CNX NIFTY fully captures the extent to which Reliance is undervalued, but suffers a total risk of only 4.6.

Q: Hari buys 1000 shares of Reliance at Rs. 190 and obtains a complete hedge by shorting 300 nifties at Rs. 972 each. He closes out his position at the closing price of the next day; at this point Reliance has dropped 5% and the S&P CNX Nifty futures have dropped 4%. What is the overall profit/loss of this set of transactions?

1. Profit of Rs. 2,164

2. Profit of Rs. 9,500

3. Loss of Rs. 9,500

4. Profit of Rs. 11,664

A: The Reliance position loses Rs. 9,500 and the short position on S&P CNX Nifty earns Rs. 11,664. The net profit on the position is Rs. 2,164. The correct answer is 1.

Practice Questions

Q: A speculator hopes that ITC is going to rise sharply owing to good news about the excise settlement. He has a long position on the cash market of Rs. 1 crore on ITC. The beta of ITC is 1.2. Which of the following positions of the index futures gives him a complete hedge:

1. Long S&P CNX Nifty Rs. 1 crore

2. Short S&P CNX Nifty Rs. 1 crore

3. Long S&P CNX Nifty Rs. 1.2 crore

4. Short S&P CNX Nifty Rs. 1.2 crore

5. Do nothing.

A: The correct answer is 4.

Q: A speculator expects that the rupee will depreciate, and hence profits of INFOSYSTCH will rise. Hence he does LONG INFOSYSTCH to the tune of Rs. 2 lakh. The beta of INFOSYSTCH is 1.03. How can this speculator completely remove his S&P CNX Nifty exposure?

1. Short S&P CNX Nifty Rs. 2.06 lakh

2. Short S&P CNX Nifty Rs. 2 lakh

3. Long S&P CNX Nifty Rs. 2.06 lakh

4. Long S&P CNX Nifty Rs. 2 lakh

5. Do nothing

A: The correct answer is 1.

Q: A speculator expects that the rupee will depreciate, and hence profits of INFOSYSTCH will rise. Hence he does LONG INFOSYSTCH to the tune of Rs. 2

lakh. The beta of INFOSYSTCH is 1.03. In order to remove his S&P CNX Nifty exposure, he does SHORT S&P CNX NIFTY to the tune of Rs. 2.5 lakh. Which is true:

1. He is overhedged
2. He is underhedged
3. He is completely hedged
4. None of the above

A: The correct answer is 1.

Q: The beta of ITC is 1.2 and the total risk (variance) of ITC is 9. The daily σ of S&P CNX Nifty is 1.3. One complete hedging is done, how much risk are we left with?

1. 6.5
2. 6.0
3. 6.2
4. 5.4
5. 5.8

A: The correct answer is 1.

Q: Hari buys 1000 shares of SBIN at Rs. 210 and obtains a complete hedge by shorting 200 nifties at Rs. 1078 each. He closes out his position at the closing price of the next day; at this point SBIN has dropped 2% and the S&P CNX Nifty futures have risen 1%. What is the overall profit/loss of this set of transactions?

1. Profit of Rs. 6,356
2. Loss of Rs. 6,356
3. Profit of Rs. 4,200
4. Profit of Rs. 2,156

A: The correct answer is 2.

H2: Short stock, long S&P CNX Nifty futures

Have you ever felt that a stock was intrinsically overvalued? That the profits and the quality of the company made it worth a lot less as compared with what the market thinks? Have you ever been a "stockpicker" and carefully sold a stock based on a sense that it was worthy less than the market price?

A person who feels like this takes a short position on the cash market. When doing this, he faces two kinds of risks:

1. His understanding can be wrong, and the company is really worth more than the market price,

   or,
2. The entire market moves against him and generates losses *even though the underlying idea was correct.*

The second outcome happens all the time. A person may sell Reliance at Rs. 190 thinking that Reliance would announce poor results and the stock price would fall. A few days later, *S&P CNX Nifty rises*, so he makes losses, even if his intrinsic understanding of Reliance was correct.

There is a peculiar problem here. *Every sell position on a stock is simultaneously* a *sell position on S&P CNX Nifty.* This is because a SHORT RELIANCE position generally gains if S&P CNX Nifty falls and generally loses if S&P CNX Nifty rises. In this sense, a SHORT RELIANCE position is not a focussed play on the valuation of Reliance. It carries a SHORT S&P CNX NIFTY position along with it, as incidental baggage. The stockpicker may be thinking he wants to be SHORT RELIANCE, but a short position on Reliance on the market effectively forces him to be SHORT RELIANCE + SHORT S&P CNX NIFTY.

Even if you think Infosys is overvalued the position SHORT INFOSYSTCH is not purely about Infosys, it is also partly about S&P CNX Nifty. Every SHORT INFOSYSTCH position is forced to be an index speculator, even though the trader may have no interest in the index. It is useful to ask: does the person fell bearish about Infosys or about the index?

♦ Those who are bearish about the index should just sell S&P CNX Nifty futures; they need not trade individual stocks.

♦ Those who are bearish about Infosys do wrong by carrying along a short position on S&P CNX Nifty as well.

There is a simple way out. *Every time you adopt a short position on a stock, you should buy some amount of S&P CNX Nifty futures.* This offsets the hidden S&P CNX Nifty exposure that is inside every short-stock position. Once this is done, you will have a position which is *purely about the performance of the stock.* The position SHORT INFOSYSTCH + LONG S&P CNX NIFTY is a pure play on the value of Infosys, without any extra risk from fluctuations of the market index. When this is done, the stockpicker has "hedged away" his index exposure. The basic point of this hedging strategy is that the stockpicker proceeds with his core skill, i.e. picking stocks, at the cost of lower risk.

Warning: Hedging does not remove losses. The best that can be achieved using hedging is the removal of unwanted exposure, i.e. unnecessary risk. The hedged position will make less profits than the unhedged position, half the time. One should not enter into a hedging strategy hoping to make excess profits for sure; all that can come out of hedging is reduced risk.

How do we actually do this?

1. We need to know the "beta" of the stock, i.e. the average impact of a 1% move in S&P CNX Nifty upon the stock. If betas are not known, it is generally safe to assume the beta is 1. Suppose we take LUPINLAB, where the beta is 1.2, and suppose we have a SHORT LUPINLAB position of Rs. 200,000.

2. The size of the position that we need on the index futures market, to completely remove the hidden S&P CNX Nifty exposure, is 2.1 * 200,000, i.e. Rs. 240,000.

3. Suppose S&P CNX Nifty is at 1200, and the market lot on the futures market is 100. Hence each market lot of S&P CNX Nifty is Rs. 120,000. To long Rs. 240,000 of S&P CNX Nifty we need to buy two market lots.

4. We buy two market lots of S&P CNX Nifty (200 nifties) to get the position:

   SHORT LUPINLAB Rs. 200,000

   LONG S&P CNX NIFTY Rs. 240,000

   This position will be essentially immune to fluctuations of S&P CNX Nifty. The profits/losses position will fully reflect price changes intrinsic to LUPINLAB, hence only successful forecasts about LUPINLAB will benefit from this position. Returns on the position will be roughly neutral to movements of S&P CNX Nifty.

Example

1. Ramesh adopts a position of Rs. 1 million SHORT ITC on date 1st April 1997. He plans to hold the position till Friday the 25.

2. The beta of ITC happens to be 1.2.

3. Hence he needs a long position of Rs. 1.2 millions on the index futures market to totally remove his S&P CNX Nifty exposure.

4. On date 1st April 97, S&P CNX Nifty is 980 and the nearest futures contract (with expiration 25th April) is trading at about 992. Hence, each market lot of the futures (100 nifties) is worth Rs. 992000. To buy Rs. 1.2 million of S&P CNX Nifty, we need to buy 12 lots (by rounding off to the nearest market lot).

5. He buys 12 market lots of S&P CNX Nifty (1200 nifties) to get the position:

   SHORT ITC Rs. 1,000,000

   LONG S&P CNX NIFTY APRIL FUTURES Rs. 1,190400

6. 20 days later, S&P CNX Nifty rised because of stable political outlook.

7. On Friday 26th, Ramesh unwound both positions at the settlement price of 1078. His position on ITC lost Rs. 120,000 since ITC had risen to 1,120,000. His long position on S&P CNX NIFTY APRIL FUTURES earned Rs. 103200. Overall, he lost Rs. 16,800.

8. Thus he could minimise his losses to the extent of Rs. 103,200.

Nuances

1. *How do I find out the beta of a stock?* The betas of major stocks are available in the NSE Newsletter or over the Internet on http://www.nse-india.com

2. *What if I am still stuck without a beta estimate?* If a beta is not known, it is generally useful to guess that the beta of an unknown stock is near 1. In other words, a speculative short position of Rs. 500,000 on any stock should be accompanied by buying Rs. 500,000 of S&P CNX Nifty in order to obtain a complete hedge. This (slightly wrong) hedged position is always much better than a totally unhedged position (i.e. not buying an S&P CNX Nifty). Of course, knowing the true beta gives the most accurate hedge.

3. *Does this only work for index-stocks?* No, this works for any stock in the country. Some index stocks have a weak link to the index, and some non-index stocks have a very tight link with the index.

4. *How much risk reduction do I gain*? It varies from stock to stock. The naked SHORT RELIANCE position is around twice the risk of the hedged position SHORT RELIANCE + LONG S&P CNX NIFTY. The risk reduction obtained range of 25% to 60%.
   Suppose the daily returns of a stock has a variance of V. Then the variance of the fully hedged position is $V - \sigma^2_n \beta^2$ where σ_n is the standard deviation of daily returns on S&P CNX Nifty. Typically, σ_n is around 1.6 percent/day. For example, if ITC has a variance of 9 and a beta of 1.2, then the fully hedged position has a variance of 5.26. Through this formula, we can precisely quantify the magnitude of the risk reduction that complete hedging delivers.

5. *Will hedging always help if my forecast about the stock is wrong?* It depends. If the forecast about the stock itself is wrong, then hedging is no help. If the forecast goes wrong *because S&P CNX Nifty rises*, then a complete hedge will reimburse these losses.

6. *S&P CNX Nifty futures with several different expirations are available at the same time: which one should I use?* There are three criteria: liquidity, expiration date, and potential mispricings:

Liquidity Using the most liquid of them (i.e. the one with the tightest bid-ask spread) saves money on impact cost.

Expiration date If the speculative position is a two-week view, then it's convenient if the index futures that is used also has atleast two weeks to go.

Potential mispricings Finally, it never hurts to be clever and buy a futures contract which is somewhat underpriced. This will not only do the job of hedging, but it could also yield some profits out of the mispriced futures. Hence it helps to check the market price of all available futures contracts against their fair values, and try to use the most underpriced contract as part of the hedging.

Solved Problems

Q: The beta of ITCHOTEL is 0.8. A person has a short position of Rs. 200,000 of ITCHOTEL. Which of the following gives a complete hedge?

1. SELL 200,000 of S&P CNX NIFTY
2. BUY 200,000 of S&P CNX NIFTY
3. BUY 160,000 of S&P CNX NIFTY
4. SELL 160,000 of S&P CNX NIFTY
5. Do nothing

A: A short position in ITCHOTEL of Rs. 200,000 is as vulnerable to the index as a short position of Rs. 160,000 of S&P CNX Nifty. To neutralise this, the hedger would need to buy Rs. 160,000 of S&P CNX Nifty. The correct answer is 3.

Q: The beta of ORIENTBANK is 0.8. A person has a SHORT ORIENTBANK position of Rs. 200,000 coupled with a LONG S&P CNX NIFTY position of Rs. 100,000. Which of the following is true?

1. He has a partial hedge against fluctuations of S&P CNX Nifty
2. He has a complete hedge against fluctuations of S&P CNX Nifty.

3. He is bearish on S&P CNX Nifty as well as on ORIENTBANK

4. He is bullish on S&P CNX Nifty and bearish on ORIENTBANK

5. This is not a hedge, it is just speculation

6. He is overhedged.

A: A short position in ORIENTBANK of Rs. 200,000 is as vulnerable to the index as a short position of Rs. 160,000 of S&P CNX Nifty. To completely neutralise this, the hedger would need to buy Rs. 160,000 of S&P CNX Nifty. He has actually bought S&P CNX Nifty to the Extent of only Rs. 100,000. Hence he is partially hedged. Alternative 1 is correct.

Q: The beta of SBIN is 1.3 and the variance of SBIN is 9. The daily σ of S&P CNX Nifty is 1.6. One complete hedging is done, how much risk are we left with?

1. 4.1

2. 4.6

3. 5.1

4. 5.6

5. 6.1

A: A fully hedged position has total risk (variance) of $V - 2.6\beta^2$, which evaluates to 4.6. Hence alternative 2 is correct – the risk suffered by the person with a view that Reliance is undervalued drops from 9 to 4.6.

This illustrates the sharp reduction in risk that a stockpicker obtains using the futures. A naked SHORT SBIN position has a variance of 9. The position SHORT SBIN + LONG S&P CNX NIFTY fully captures the extent to which SBI is undervalued, but suffers a total risk of only 4.6.

Q: Gopal sells 1000 shares of Reliance at Rs. 190 and obtains a complete hedge by buying 300 nifties at Rs. 972 each. He closes out his position at the closing price of the next day; at this point Reliance has rised 5% and the S&P CNX Nifty futures have rised 4%. What is the overall profit/loss of this set of transactions?

1. Profit of Rs. 2,164

2. Profit of Rs. 9,500
3. Loss of Rs. 9,500
4. Profit of Rs. 11,664

A: The Reliance position loses Rs. 9,500 and the long position on S&P CNX Nifty earns Rs. 11,664. The net profit on the position is Rs. 2,164. The correct answer is 1.

Practice Questions

Q: A speculator hopes that ITC is going to crash sharply owing to bad news about the excise settlement. He has a short position on the cash market of Rs. 1 crore on ITC. The beta of ITC is 1.2. Which of the following positions on the index futures gives him a complete hedge:

1. Long S&P CNX Nifty Rs. 1 crore
2. Short S&P CNX Nifty Rs. 1 crore
3. Long S&P CNX Nifty Rs. 1.2 crore
4. Short S&P CNX Nifty Rs. 1.2 crore
5. Do nothing.

A: The correct answer is 3.

Q: A speculator expects that the rupee will appreciate, and hence profits of INFOSYSTCH will fall. Hence he does SHORT INFOSYSTCH to the tune of Rs. 2 lakh. The beta of INFOSYSTCH is 1.03. How can this speculator completely remove his Nifty exposure?

1. Short Nifty Rs. 2.06 lakh
2. Short Nifty Rs. 2 lakh
3. Long Nifty Rs. 2.06 lakh
4. Long Nifty Rs. 2 lakh
5. Do nothing.

A: The correct answer is 3.

Q: A speculator expects that the rupee will appreciate, and hence profits of INFOSYSTCH will fall. Hence he does SHORT INFOSYSTCH to the tune of Rs. 2

lakh. The beta of INFOSYSTCH is 1.03. In order to remove his S&P CNX Nifty exposure, he does LONG S&P CNX NIFTY to the tune of Rs. 2.5 lakh. Which is true:

1. He is overhedged
2. He is underhedged
3. He is completely hedged
4. None of the above

A: The correct answer is 1.

Q: The beta of ITC is 1.2 and the total risk (variance) of ITC is 9. The daily σ of S&P CNX Nifty is 1.3. One complete hedging is done, how much risk are we left with?

1. 6.5
2. 6.0
3. 6.2
4. 5.4
5. 5.8

A: The correct answer is 1

Q: Hari sells 1000 shares of SBIN at Rs. 210 and obtains a complete hedge by buying 200 nifties at Rs. 1078 each. He closes out his position at the closing price of the next day; at this point SBIN has rised 2% and the S&P CNX Nifty futures have fallen 1%. What is the overall profit/loss of this set of transactions?

1. Profit of Rs. 6,356
2. Loss of Rs. 6,356
3. Profit of Rs. 4,200
4. Profit of Rs. 2,156

A: The correct answer is 2.

H3: Have portfolio, short S&P CNX Nifty futures

Have you ever experienced the feeling of owning an equity portfolio, and then, one-day, becoming uncomfortable about the overall stock market? Sometimes, you may have a view that stock prices will fall in the near future. At other times, you may see that the market is in for a few days or weeks of massive volatility, and you do not have any appetite for this kind of volatility. The Union budget is a common and reliable source of such volatility: market volatility is always enhanced for one week before and two weeks after a budget. Many investors simply do not want the fluctuations of these three weeks.

This is particularly a problem if you expect to sell shares in the near future for example, in order to finance a purchase of a house. This planning can go wrong if by the time you do sell shares, S&P CNX Nifty has dropped sharply.

When you have such anxieties, there are two alternatives that have always been available:

1. Sell shares immediately. This sentiment generates "panic selling" which is rarely optimal for the investor.
2. Do nothing, i.e. suffer the pain of the volatility. This leads to political pressures for government to "do something" when stock prices fall.

In addition, with the index futures market, a third and remarkable alternative becomes available:

3. Remove your exposure to index fluctuations temporarily using index futures. This allows rapid response to market conditions, without "panic selling" of shares. It allows an investor to be in control of his risk, instead of doing nothing and suffering the risk.

The idea here is quite simple. Every portfolio contains a hidden index exposure. This statement is true for all portfolios, whether a portfolio is composed of index stocks or not. In the case of portfolios, most of the portfolio risk is accounted for by index fluctuations (unlike individual stocks, where only 30-60% of the stock risk is accounted for by index fluctuations). Hence a position LONG PORTFOLIO + SHORT S&P CNX NIFTY can often become one-tenth as risky as the LONG PORTFOLIO position!

Suppose we have a portfolio of Rs.1 million which has a beta of 1.25. Then a complete hedge is obtained by selling Rs.1.25 million of S&P CNX Nifty futures.

Warning: Hedging does not always make money. The best that can be achieved using hedging is the removal of unwanted exposure, i.e. unnecessary risk. The hedged position will make less profits than the unhedged position, half the time. One should not enter into a hedging strategy hoping to make excess profits for sure; all that can come out of hedging is reduced risk.

How do we *actually* do this?
1.   We need to know the "beta" of the portfolio, i.e. the average impact of a 1% move in S&P CNX Nifty upon the portfolio. It is easy to calculate the portfolio beta: it is the weighted average of stock betas. Suppose we have a portfolio composed of Rs.1 million of Reliance, which has a beta of 1.4 and Rs.2 million of Hindustan Lever, which has beta of 0.8, then the portfolio beta is (1x1.4+2x0.8)/3 or 1. If the beta of any stock is not known, it is safe to assume that it is 1.
2.   The complete hedge is obtained by adopting a position on the index futures market which completely removes the hidden S&P CNX Nifty exposure equals portfolio value x portfolio beta. In the above case, the portfolio is Rs.3 million with a beta of 1, hence we would need a position of Rs. 3 million on the S&P CNX Nifty futures.

3.   Suppose S&P CNX Nifty is at 1200, and the market lot on the futures market is 100. Each market lot of S&P CNX Nifty costs Rs.1, 20,000. Hence we need to sell 25 market lots, i.e.2500 nifties to get the position:

LONG PORTFOLIO Rs.3, 000,000
SHORT S&P CNX NIFTY Rs.3, 000,000

This position will be essentially immune to fluctuations of S&P CNX Nifty. If S&P CNX Nifty goes up, the portfolio gains and the futures lose. If S&P CNX Nifty goes down, the futures gain and the portfolio loses. In either case, the investor has no risk from market fluctuations when he is completely hedged.

The investor should adopt this strategy for the short periods of time where (a) the market volatility that he anticipates makes him uncomfortable or (b) when his financial planning involves selling shares at a future date and these plans risk being disrupted if S&P CNX Nifty drops. It does not make sense to use this strategy for long periods of time – if a two-year hedging is desired, it is better to sell of the shares, invest the proceeds, and buy back shares after two years. This strategy makes the most sense for rapid adjustments.

Another important choice for the investor is the degree of hedging. Complete hedging eliminates all risk of gain or loss. Sometimes the investor may be willing to tolerate some risk of loss so as to hang on to some risk of gain. In that case, partial hedging is appropriate. The complete hedge may require selling Rs.3 million of the futures, but the investor may choose to only sell Rs. 2 million of the futures. In this case, two-thirds of his portfolio is hedged and one-third of the portfolio is held unhedged. The exact degree of hedging chosen depends upon the appetite for risk that the investor has.

 Example
On 25 May 1998, Shyam has a portfolio composed of five securities: ITCHOTEL (100 shares, value Rs.112.00), ORIENTBANK (200 shares, value Rs.68.25), CIPLA (100 shares, value Rs.857.65), LUPINLAB (200 shares, value Rs.149.85), SIEMENS (200 shares, value Rs.237.50). The total portfolio value is 187,085 and the five stocks have

weights (5.98%, 7.29%, 45.31%, 16.02%, 25.40%). Shyam wants to simply not care about budget-related fluctuations from 26 May 1998 till 10 June 1998.

The five stocks have the following betas: ITCHOTEL (beta 0.59), ORIENTBANK (beta 0.90), CIPLA (beta0.75), LUPINLAB (beta 1.13), SIEMENS (beta 1.10). Hence the Portfolio beta works out to (0.0598*0.59 + 0.0729*0.90 + 0.4531*0.75 + 0.1602*1.13 + 0.254*1.10) or 0.901.

Table 1 Example of hedging a portfolio.

Illustration of hedging a portfolio. The example deliberately uses a small portfolio of small stocks (each of the stock in this example has a market capitalisation of below Rs. 200 crore) in practice, the effectiveness of hedging would be greater with larger portfolios of larger stocks.

The hedging strategy is designed to dodge budget-related volatility for the budget announcement of 1 June 1998. The hedging strategy is initiated on 25 May 1998 and ended on 10 June 1998. Over this period, the portfolio loses Rs. 32990 or 17.63%.

Security	25 May 1998	10 June 1998	Profit/Loss
ITCHOTEL	112.00	95.30	
OREINTBANK	68.25	46.10	
CIPLA	847.65	720.85	
LUPINLAB	149.85	113.65	
SIEMENS	237.50	202.65	
Portfolio (17.63%)	187,085.00	154095.00	32990
S&P CNX Nifty (14.25%)	1122.95	962.90	160.05
S&P CNX Nifty June Futures (14.93%)	1141.00	970.65	170.35

3. For complete hedging we need to sell 0.901 * 187,085 of the futures, i.e. Rs. 168590. On 25 May 1998, S&P CNX Nifty is at 1122.95 and S&P CNX Nifty June futures are trading at 1141. So we will sell 200 (1.5 market lots rounded off to 2 market lots) nifties.

4. Hence Shyam supplements his portfolio with a short position on the S&P CNX Nifty futures with expiry on 26th JUNE worth 228200.

5. On 10 June S&P CNX Nifty is trading at 962.9 and S&P CNX Nifty futures are at 970.63. He buys back his futures at 970.63 thus ending his hedging (see Table 1). His profits on the futures hedging was 34086 and his losses on the portfolio were 32990. Thus the net profit is Rs. 1096. If he had not hedged, he would have lost 32990.

In this example, the budget announcement of 1 June 1998 led to a drop in S&P CNX Nifty, so the short position on the futures market generated profits. If the budget announcement had led to a rise in S&P CNX Nifty, then the investor would have gained money on his stock portfolio, and lost money on the futures position. In either event, he would be hedged; i.e. he would neither gain nor lose from index fluctuations.

Nuances

1. *How do I find out stock betas?* The betas of major stocks are available in the NSE Newsletter or over the Internet on http://www.nse-india.com

2. *What if I am still stuck without a beta estimate?* If betas are not known, it is generally useful to guess that the beta of an unknown portfolio is near 1. In other words, a portfolio worth Rs. 500,000 should be accompanied by selling Rs. 500,000 of S&P CNX Nifty in order to obtain a complete hedge. This (slightly wrong) hedged position is always much better than a totally unhedged position (i.e. not selling any S&P CNX Nifty). Of course, knowing the true beta gives the most accurate hedge.

3. *Does this only work for index-stocks or index-fund portfolios?* No, this works for any portfolio composed of any stocks. Table 1, for example, is a portfolio of only five companies, each of which has a market capitalisation below Rs. 200 crore.

4. *How much risk reduction do I gain?* For portfolios, the risk reduction is remarkable. For most portfolios larger than 10 stocks composed of the larger stocks of the country, more than 75% of the portfolio risk is merely index-related, and hence can be eliminated. In other words, a complete hedge yields a position with less than one-fourth the risk of the unhedged position.

5. *S&P CNX Nifty futures with several different expirations are available at the same time: which one should I use?* There are three criteria: liquidity, expiration date, and potential mispricings:

   Liquidity Using the most liquid of them (i.e. the one with the tightest bid-ask spread) saves money on impact cost.

   Expiration date If the speculative position is a two-week view, then it's convenient if the index futures that is used also has atleast two weeks to go.

   Potential mispricings Finally, it never hurts to be clever and sell a futures contract which is somewhat overpriced. This will not only do the job of hedging, but it could also yield some profits out of the mispriced futures. Hence it helps to check the market price of all available futures contracts against their fair values, and try to use the most overpriced contract as part of the hedging.

   Solved Problems

   Q: A portfolio is composed of Rs 1000 invested in a stock with beta 0.8 and Rs. 2000 invested in a stock with beta 1.1. What is the portfolio beta?

   1. 0.8
   2. 0.9
   3. 1.0
   4. 1.1
   5. 1.2

A: Portfolio beta is (1000*0.8 + 2000*1.1)/3000 or 1. The correct answer is 3.

Q: On 1 Jan 1998, an investor has a portfolio worth Rs. 1 million which has a beta of 1.3. There is a marriage in the family in middle March 1998 so he wants to totally remove his equity market risk. What is the correct hedging strategy?

1. Short futures Rs. 1 million, February expiration
2. Short futures Rs. 1.3 million, March expiration
3. Buy futures Rs. 1 million, February expiration
4. Buy futures Rs. 1.3 million, March expiration

A: To obtain a market-neutral position requires selling 1.3 * Rs. 1 million or Rs. 1.3 million of the S&P CNX Nifty futures. Since the planned expenditures will take place in late February and early March, it would make sense to use the late March contract in hedging. The correct answer is 2.

Q: On 1 Jan 1998, an investor has a portfolio worth Rs. 1 million which has a beta of 1.3. There is a marriage in the family in middle March 1998 so he wants to totally remove his equity market risk. The investor wants to be over-cautious so he sells Rs. 2 million of the S&P CNX Nifty futures. What has he achieved?

1. He is partially hedged
2. He is completely hedged
3. He is overhedged (he has effectively become a speculator betting that S&P CNX Nifty will drop).

A: To obtain a market-neutral position requires selling 1.3* Rs. 1 million or Rs. 1.3 million of the S&P CNX Nifty futures. Over and above this, the remaining Rs. 0.7 million is a bet that S&P CNX Nifty will drop. Even the most over-cautious hedger does not benefit by a larger sell position on the index futures market than the formula specifies – he just becomes a speculator. (Conversely, if a short position smaller than Rs. 1.3 million is taken on the index futures market, the investor is speculating that S&P CNX Nifty will rise). The only way to not speculate is to completely hedge. Thus the correct answer is 3.

Q: When the nuclear bombs go off, an investor with $ 1 billion invested in India becomes fundamentally gloomy about India and wants to embark a hedging program for the next three years. He will sell $1 billion of S&P CNX Nifty futures now and constantly initiate new futures positions as old ones expire. What is the major problem with this strategy?

1. He suffers from "rollover risk" of getting into new positions on the futures positions.
2. He will have to recalculate his beta from time to time when adopting new futures positions.
3. He will suffer market impact cost selling $1 billion of the S&P CNX Nifty futures.
4. He would just be better off liquidating his portfolio, staying out for 3 years, and then getting back into equity.

A: All the alternatives have a grain of truth in them. But the most powerful criticism is number 4. It is cheaper to implement long-duration changes of position by trading the equity cash market. The index futures is best-suited for rapid, short-term changes in position.

Practice Questions

Q: A portfolio is composed of Rs. 1000 invested in a stock with beta 1.1 and Rs. 1000 invested in a stock with beta 0.8. What is the portfolio beta?

1. 0.8
2. 0.85
3. 0.90
4. 0.95
5. 1.0

A: The correct answer is 4

Q: On 1 Jan 1998, an investor has a portfolio worth Rs. 2 million which has a beta of 0.5. There is a marriage in the family in middle Feb 1998 so he wants to totally remove his equity market risk. What is the correct hedging strategy?

1. Short futures Rs. 1 million, February expiration
2. Short futures Rs. 1.3 million, March expiration
3. Buy futures Rs. 1 million, February expiration
4. Buy futures Rs. 1.3 million, March expiration.

A: The correct answer is 1.

Q: Ravi heads a mutual fund which has obtained superlative performance till 14 March. The funds has a corpus of Rs. 300 crore and he comes up for a bonus based on his performance till 31 March. He just does not want to take the risk that the next 17 days will ruin his performance. What should he do?

1. Work 14 hours a day to do research and forecast price movements to be sure that nothing goes wrong.
2. Do nothing and hope for the best.
3. Short sell Rs. 300 crore of March-end S&P CNX Nifty futures and thus remove his index exposure, i.e. lock into his portfolio value of 14 March.
4. Buy Rs. 300 crore of March-end S&P CNX Nifty futures to benefit from a rise in S&P CNX Nifty in the last 17 days.

A: The correct answer is 3.

H4: Have funds, buy S&P CNX Nifty futures

Have you ever been in a situation where you had funds which needed to get invested in equity? Or of *expecting* to obtain funds in the future which will get invested in equity. Some common occurrences of this include:

♦ A closed-end fund which just finished its initial public offering has cash which is not yet invested.

♦ Suppose a person plans to sell land and buy shares. The land deal is slow and takes weeks to complete. It takes several weeks from the date that it becomes sure that the funds will come to the date that the funds actually are in hand.

♦ An open-ended fund has just sold fresh units and has received funds.

Getting invested in equity ought to be easy but there are three problems:

1. A person may need time to research stocks, and carefully pick stocks that are expected to do well. This process takes time. For that time, the investor has partly invested in cash and partly invested in stocks. During this time, he is exposed to the risk of missing out if the overall market index goes up.

2. A person may have made up his mind on what portfolio he seeks to buy, but going to the market and placing market orders would generate large "impact costs". The execution would be improved substantially if he could instead place limit orders and gradually accumulated the portfolio at favourable prices. This takes time, and during this time, he is exposed to the risk of missing out if the S&P CNX Nifty goes up.

3. In some cases, such as the land sales above, the person may simply not have cash to immediately buy shares; hence he is forced to wait even if he feels that S&P CNX Nifty is unusually cheap. He is exposed to the risk of missing out if S&P CNX Nifty rises.

So far, in India, we have had exactly two alternative strategies which an investor can adopt: to buy liquid stocks (like ITC and Reliance) in a hurry, or to suffer the risk of staying in cash. With S&P CNX Nifty futures, a third alternative becomes available:

1. The investor would obtain the desired equity exposure by buying index futures, immediately. A person who expects to obtain Rs. 5 million by selling land would immediately enter into a position LONG S&P CNX NIFTY worth Rs. 5 million. The index futures market is likely to be more liquid than ITC and Reliance so it is possible to take extremely large positions at a low impact cost.

2. Later, the investor can gradually acquire stocks (either based on detailed research and / or based on aggressive limit orders). As and when shares are obtained, he would scale down his LONG S&P CNX NIFTY position correspondingly.

   No matter how slowly stocks are purchased, this strategy would fully capture a rise in S&P CNX Nifty, so there is no risk of missing out on a broad rise in the stock market while this process is taking place. Hence, this strategy *allows the investor to take more care and spend more time in choosing stocks and placing aggressive limit orders.*

Table 2 Gradual acquisition of stocks, hedged

On 17 Feb, Iqbal purchased 5000 nifties to obtain a position of Rs. 5 million. From 18 Feb onwards, on each day, Iqbal purchased one security worth Rs. 357,000 (at Feb 17 prices) and sold off a similar value of futures thus shrinking his futures position. For this example, we deliberately use non-index small stocks, like SAIL etc, hedging using index futures works for all portfolios regardless of what stocks go into them. S&P CNX Nifty rose sharply on 27 Feb and 28 Feb, so his outstanding futures position generated an infusion of cash for him on these days. This inflow paid for the higher stock prices that he suffered.

Date	Futures position	Stock purchase	Futures	sold	off
	Futures MTM profit / loss				
17 Feb	+5,000,000				

Date					
18 Feb	4597074 -17042		2700 shares of ASIANHOTL	400	
19 Feb	4190807 38430		2800 shares of BATAINDIA	400	
20 Feb	3786330 18801		5400 shares of BOMDYEING		400
23 Feb	3375976 55828		55500 shares of SAIL	400	
24 Feb	2964000 13795		6050 shares of ESCORTS	400	
25 Feb	2648488 65300		1600 shares of DABUR	300	
26 Feb	2330165 25290		500 shares of CIPLA	300	
27 Feb	2007454 35112		1150 shares of CADBURY	300	
02 Mar	1673850 76248		4700 shares of APOLLOTYRE		300
03 Mar	1350948 -64214		5100 shares of FEDERALBNK		300
04 Mar	1019453 42968		2150 shares of ITCHOTEL	300	
05 Mar	690853 -11582		2100 shares of LAKME	300	
06 Mar	362993 -2220		700 shares of PFIZER	300	
09 Mar	29828	6300 shares of TITAN		300	10611
Total	4982538				249724

It is common for people to think that the owner of shares needs index futures to hedge against a drop in S&P CNX Nifty. Holding money in hand, when you want it to be

invested in shares, is a risk because S&P CNX Nifty may rise. Hence it is equally important for the owner of money to use index futures to hedge *against a rise in S&P CNX NIFTY!*

Warning: Hedging does not always make money. The best that can be achieved using hedging is the removal of unwanted risk. The hedged position will make less profits than the unhedged position, half the time. One should not enter into a hedging strategy hoping to make excess profits for sure; all that can come out of hedging is reduced risk.

How do we *actually* do this?

Examples

1. Iqbal obtained Rs. 5 million on 17 Feb 1998. He made a list of 14 stocks to buy, at 17 Feb prices, totalling approximately Rs. 5 million.

2. At that time S&P CNX Nifty was at 991.70. He entered into a LONG S&P CNX NIFTY MARCH FUTURES position for 5000 nifties, i.e. his long position was worth 5,053,600.

3. From 18 Feb 1998 to 09 Mar 1998 he gradually acquired the stocks (see Table 2). On each day, he purchased one stock and sold off a corresponding amount of futures.
   On each day, the stocks purchased were at a changed price (as compared with the price prevalent on 17 Feb). On each day, he obtained or paid the 'mark-to-market margin' on his outstanding futures position, thus capturing the gains on the index.

4. By 09 Mar 1998 he had fully invested in all the shares that he wanted (as of 17 Feb) and had no futures position left.

5. The same sequencing of purchases, without the umbrella of protection of the LONG S&P CNX NIFTY MARCH FUTURES position, would have cost Rs. 249,724 more.

Nuances

1. *Why is this called "hedging"?* A person who needs to invest in stocks is exactly as vulnerable to a rise in S&P CNX Nifty as a person who has stocks is vulnerable to a drop in S&P CNX Nifty. Hence the natural hedging strategy is to buy S&P CNX

Nifty on he futures market, and reach the desired equity exposure. Later, the composition of stocks can always be adjusted over time.

2. *Don't betas enter this picture?* If the investor has not decided what stocks to buy, it is safe to think that the beta will be about 1. This is the stance we have taken in this discussion.

   If the investor accurately knows what portfolio will be purchased, it is obviously better to use this information in choosing a futures position. If shares worth Rs. 5 lakh will be purchase and the desired portfolio has a beta of 1.5 then a long position of Rs. 7.5 lakh on S&P CNX Nifty futures will be required.

3. *Do you imply that every "IPO" of a closed-end equity growth fund should immediately invest the entire proceeds into the S&P CNX Nifty futures market?* Yes. The typical closed-end fund IPO has money trickling in over a week. Every day, at 3:15 PM, the funds obtained that day should he "invested" into a long position on the S&P CNX Nifty futures.

   After this, time is available for (a) stock selection and (b) aggressive limit orders. Gradually, as the limit orders get executed, the futures position can be unwound.

Solved Problems

Q: Mythili has fixed up to sell some land and expect to raise Rs. 5 lakh from this. The money will appear in her hands within two/three weeks. She plans to invest it into shares and is worried that the stock market might rise in the next few days. She should:

1. Study the stock market closely and accurately forecast prices.
2. Hedge herself by shorting Rs. 5 lakh of S&P CNX Nifty.
3. Hedge herself by building a LONG S&P CNX NIFTY position of Rs. 5 lakh.
4. Immediately go to the market and buy stocks.

A: The first alternative does not help if prices do rise. The second alternative is a hedging strategy for someone with a portfolio who is afraid that S&P CNX Nifty might

drop. The third is the correct answer. The fourth is not feasible since she won't have Rs. 5 lakh when the time comes to take delivery of the shares.

Q: Mythili will get Rs. 5 lakh in the next two/three weeks which she plans to buy shares with. She adopts a long position on the S&P CNX Nifty futures market. Now broad market prices rise. Which of the following happens:

1. The shares she wants to buy get costlier and S&P CNX Nifty gets cheaper.
2. The shares she wants to buy get cheaper even though S&P CNX Nifty rises.
3. The shares she wants to buy get costlier but her long S&P CNX Nifty futures position pays her daily MTM profits to compensate for that.
4. The shares she wants to buy get cheaper but her S&P CNX Nifty futures position requires payment of daily MTM losses to compensate for that.

A: When broad market prices rise, the shares she wants to buy and S&P CNX Nifty both rises. In this case, her long position on the futures market earns profits, which are paid to her as MTM margin. This finances her (larger) outgo in buying shares. She is hedged. Correct answer is 3.

Practice Questions

Q: Mythili will get Rs. 5 lakh in the next two/three weeks which she plans to buy shares with. She adopts a long position on the S&P CNX Nifty futures market. Now broad market prices crash. Which of the following happens:

1. The shares she wants to buy get costlier and S&P CNX Nifty gets cheaper.
2. The shares she wants to buy get cheaper even though S&P CNX Nifty rises.
3. The shares she wants to buy get costlier but her long S&P CNX Nifty futures position pays her daily MTM profits to compensate for that.
4. The shares she wants to buy get cheaper but her S&P CNX Nifty futures position requires payment of daily MTM losses to compensate for that.

A: The correct answer is 4.

S5: Bullish index, long S&P CNX Nifty futures

Do you sometimes think that the market index is going to rise? That you could make a profit by adopting a position on the index? After a good budget, or good corporate results, or the onset of a stable government, many people feel that the index would go up. How does one implement a trading strategy to benefit from an upward movement in the index? Today, you have two choices:

1.   Buy selected liquid securities which move with the index, and sell them at a later date,

        or,

2.   Buy the entire index portfolio and them sell it at a later date.

The first alternative is widely used – a lot of the trading volume on stocks like ITC is based on using ITC as an index proxy (ITC has the highest correlation with S&P CNX Nifty amongst all the stocks in India.) However, these positions run the risk of making losses owing to ITC-specific news; they are not purely focussed upon the index.

The second alternative is hard to implement. An investor needs atleast Rs. 35 lakh to meaningfully buy all the stocks in S&P CNX Nifty in their correct proportions. Most retail investors do not have such large portfolios. This strategy is also cumbersome and expensive in terms of transactions costs.

Taking a position on the index is effortless using the index futures market. Using index futures, an investor can "buy" or "sell" the entire index by trading on one single security. Once a person is LONG S&P CNX NIFTY using the futures market, he gains if the index rises and loses if the index falls.

How do we *actually* do this?

When you think the index will go up, buy the S&P CNX Nifty futures.

The minimum market lot is 100 nifties. Hence, if S&P CNX Nifty is at 1200, the investment is done in units of Rs. 120,000. When the trade takes place, the investor is

only required to pay up the initial margin, which is something like Rs. 10,000. Hence, by paying an initial margin of Rs. 10,000 the investor get a claim on the index worth Rs. 120,000. Similarly, by paying up Rs. 100,000, the investor gets a claim on S&P CNX Nifty worth Rs. 1.2 million.

Futures are available at several different expirations. The investor can choose any of them to implement this position. The choice is basically about the horizon of the investor. Longer dated futures go well with long-term forecasts about the movement of the index. Shorter dated futures tend to be more liquid.

Example

1. On 1 July 1998, Milan feels the index will rise.
2. He buys 100 nifties with expiration date on 31st July 1998.
3. At this time, the S&P CNX NIFTY July futures contract costs Rs. 960 so his position is worth Rs. 96000.
4. On 14 July 1998, S&P CNX Nifty has risen to 967.35. The S&P CNX NIFTY July futures contract has risen to Rs. 975.6.
5. Milan sells off his position at Rs. 975.6 to pocket a profit of Rs. 1560.

Nuances

1. *S&P CNX Nifty futures with several different expirations are available at the same time: which one should I use?* There are three criteria: Liquidity, expiration date and potential mispricings:

   Liquidity Using the most liquid of them (i.e. the one with the tightest bid-ask spread) saves money on impact cost.

   Expiration date If the speculative position is a two-week view, then it's convenient if the index futures that is used also has atleast two weeks to go.

   Potential mispricings Finally, it never hurts to be clever and buy a futures contract which is somewhat underpriced. This will not only do the job of speculating on the index, but it could also yield some extra profits out of the mispriced futures. Hence it

helps to check the market price of all available futures contracts against their fair values, and try to use the most underpriced contract.

Solved Problems

Q: You are a speculator. You predict the market will go up in the near future and want to take advantage of it. You would:

1. Buy S&P CNX Nifty futures
2. Sell S&P CNX Nifty futures
3. Sell securities in the cash market
4. None of the above

A: If you think the market will go up, then the futures will seem underpriced compared to what it will be in the future. So you should buy S&P CNX Nifty futures now and sell them later to make a profit. The correct answer is number 1.

Q: A long position of 10 market lots of S&P CNX Nifty Sep futures is purchased at 1100 and held till expiry when the S&P CNX Nifty closes at expiry in September at 1124. What would be the profit on this position?

1. 1,100,000
2. 1,124,000
3. 240
4. 24,000

A: Ten market lots of S&P CNX Nifty futures translates to Rs. 1,100,000 (10 market lots * 100 nifties per market lot * Rs. 1100, the price of the September futures). The price of unwind of Rs. 1124 per S&P CNX Nifty, the profit is Rs. 24,000 (Rs. 1,124,000 – Rs. 1,100,000). The correct answer is number 4.

Practice Questions

Q: Babbanseth expects a bumper agricultural harvest. He is highly optimistic about the performance of the economy. He hopes the market will go up and buys 10 market lots of the S&P CNX Nifty Dec futures. S&P CNX Nifty is at 1150 currently. His forecasts

come true and he closes his position at maturity at 1174. How much profit does he make?

1. 1,150,000
2. 1,174,000
3. 24,000
4. 240,000

A: The answer is number 3.

S5: Bearish index, short S&P CNX Nifty futures

Do you sometimes think that the market index is going to fall? That you could make a profit by adopting a position on the index? After a bad budget, or bad corporate results, or the onset of a coalition government, many people feel that the index would go down. How does one implement a trading strategy to benefit from a downward movement in the index? Today, you have two choices:

1. Sell selected liquid securities which move with the index, and buy them at a later date,

   or,

2. Sell the entire index portfolio and then buy it at a later date.

The first alternative is widely used – a lot of the trading volume on stocks like ITC is based on using ITC as an index proxy (ITC has the highest correlation with S&P CNX Nifty amongst all the stocks in India). However, these position run the risk of making losses owing to ITC-specific news; they are not purely focussed upon the index.

The second alternative is hard to implement. This strategy is also cumbersome and expensive in terms of transaction costs.

Taking a position on the index is effortless using the index futures market. Using index futures, an investor can "buy" or "sell" the entire index by trading on one single security. Once a person is SHORT S&P CNX NIFTY using the futures market, he gains if the index falls and loses if the index rises.

How do we *actually* do this?

When you think the index will go down, sell the S&P CNX Nifty futures.

The minimum market lot is 100 nifties. Hence, if S&P CNX Nifty is at 1200, the investment is done in units of Rs. 120,000. When the trade takes place, the investor is only required to pay up the initial margin, which is something like Rs. 10,000. Hence, by paying an initial margin of Rs. 10,000 the investor gets a claim on the index worth Rs. 120,000. Similarly, by paying up Rs. 100,000, the investor gets a claim on the index worth Rs. 1.2 million.

Futures are available at several different expirations. The investor can choose any of them to implement this position. This choice is basically about the horizon of the investor. Longer dated futures go will with long-term forecasts about the movement of the index. Shorter dated futures tend to be more liquid.

Example

1. On 1 June 1998, Milan feels the index will fall.
2. He sells 100 nifties with expiration date on 26th June 1998.
3. At this time, the S&P CNX NIFTY June futures contract costs Rs. 1060 so his short position is worth Rs. 106000.
4. On 10 June 1998, S&P CNX Nifty has fallen to 962.90. The S&P CNX NIFTY June futures contract has fallen to Rs. 970.63
5. Milan squares off his position at Rs. 970.63 to pocket a profit of Rs. 8937.

Nuances

1. *S&P CNX Nifty futures with several different expiration are available at the same time: which one should I use?* There are three criteria: liquidity, expiration date, and potential mispricings:

   Liquidity Using the most liquid of them (i.e. the one with the tightest bid-ask spread) saves money on impact cost.

   Expiration date If the speculative position is a two-week view, then it's convenient if the index futures that is used also has atleast two weeks to go.

   Potential mispricings Finally, it never hurts to be clever and sell a futures contract which is somewhat over priced. This will not only do the job of speculating on the index, but it could also yield some extra profits out of the mispriced futures. Hence it helps to check the market price of all available futures contracts against their fair values, and try to use the most overpriced contract.

Solved Problems

Q: You are a speculator. You predict the market will go down in the near future and want to take advantage of it. You would:

1. Buy S&P CNX Nifty futures
2. Sell S&P CNX Nifty futures
3. Sell securities in the cash market
4. None of the above.

A: If you think the market will go down, then the futures will seem overpriced compared to what it will be in the future. So you should sell S&P CNX Nifty futures now and buy them later to make to profit. The correct answer is number 2.

Q: A short position of 10 market lots of S&P CNX Nifty Sep futures is purchased at 1100 and held till expiry when the S&P CNX Nifty closes at expiry in September at 1076. What would be the profit on this position?

1. 1,100,000
2. 1,124,000

3. 240

4. 24,000

A: Ten market lots of S&P CNX Nifty futures translates to Rs. 1,100,000 (10 market lots * 100 nifties per market lot * Rs. 1100, the price of the September futures). At the price of unwind of Rs. 1076 per S&P CNX Nifty, the profit is Rs. 24,000 (Rs. 1,100,000 – 1,076,000). The correct answer is 4.

Practice Questions

Q: Ravi expects a sluggish Industrial growth. He is pessimistic about the performance of the economy. He hopes the market will go down and sells 10 market lots of the S&P CNX Nifty Dec futures. S&P CNX Nifty is at 1150 currently. His forecasts come true and he closes his position at maturity at 1126. How much profit does he make?

1. 1,150,000

2. 1,174,000

3. 24,000

4. 240,000

A: The correct answer is 3.

A7: Have funds, lend them to the market

Would you like to lend funds into the stock market, without suffering the slightest risk?

Traditional methods of loaning money into the stock market suffer from (a) price risk of shares and (b) credit risk, of default of the counterparty. What is new about the index futures market is that supplies a technology to lend money into the market without suffering any exposure to S&P CNX Nifty and without bearing any credit risk.

The basic idea is simple. The lender buys all 50 stocks of S&P CNX Nifty on the cash market, and simultaneously sells them at a future date on the futures market. It is like a repo. There is no price risk since the position is perfectly hedged. There is no credit risk since the counter party on both legs is the National Securities Clearing Corporation (NSCC) which supplies clearing services on NSE. It is an ideal lending vehicle for

entities which are shy of price risk and credit risk, such as traditional banks and the most conservative corporate treasuries.

How do we *actually* do this?

To buy all 50 stocks in S&P CNX Nifty on the cash market requires a significant amount of money because of the minimum market lot. In practice, the smallest sum that can be used is Rs. 3 million or so.

1. Calculate a portfolio which buys all the 50 stocks in S&P CNX Nifty in correct proportion, i.e. where the money invested in each stock is proportional to its market capitalisation.
2. Round off the number of shares in each stock to the nearest market lot.
3. Using the NEAT software, a single keystroke (offline order entry) can fire off these 50 orders in rapid succession into the NSE trading system. This gives you the buy position.
4. A moment later, sell S&P CNX Nifty futures of equal value. Now you are completely hedged, so fluctuations in S&P CNX Nifty do not affect you.
5. A few days later, you will have to take delivery of the 50 stocks and pay for them. This is the point at which you are "loaning money to the market".
6. Some days later (anything you want), you will unwind the entire transaction.
7. At this point, use NEAT to send 50 sell orders in rapid succession to sell off all the 50 stocks.
8. A moment later, reverse the future position. Now your position is down to 0.
9. A few days later, you will have to make delivery of the 50 stocks and receive money for them. This is the point at which "your money is repaid to you".

What is the interest rate that you will receive? We will use one specific case, where you will unwind the transaction on the expiration date of the futures. In this case, the difference between the futures price and the cash S&P CNX Nifty is the return to the moneylender, with two complications: the moneylender additionally earns any dividends that the 50 shares pay while he has held them, and the moneylender suffers transactions

costs (impact cost, brokerage) in doing these trades. On 1 July 1998, if the S&P CNX Nifty spot is 942.25 and the S&P CNX NIFTY July 1998 futures are at 956.5 then the difference (1.5 % for 30 days) is the return that the moneylender obtains.

Example

On 1 August, S&P CNX Nifty is at 1200. A futures contract is trading with 27 August expiration for 1230. Ashish wants to earn this return (30/1200 for 27 days).

1. He buys Rs. 3 million of S&P CNX Nifty on the spot market. In doing this, he places 50 market orders and ends up paying slightly more. His average cost of purchase is 0.3% higher, i.e. he has obtained the S&P CNX Nifty spot for 1204.

2. He sells Rs. 3 million of the futures at 1230. The futures market is extremely liquid so the market order for Rs. 3million goes through at near-zero impact cost.

3. He takes delivery of the shares and waits.

4. While waiting; a few dividends come into his hands. The dividends work out to Rs. 7,000.

5. On 27 August, at 3:15, Ashish puts in market orders to sell off his S&P CNX Nifty portfolio, putting 50 market orders to sell off all the shares. S&P CNX Nifty happens to have closed at 1210 and his sell orders (which suffer impact cost) goes through at 1207.

6. The futures position spontaneously expires on 27 August at 1210 (the value of the futures on the last day is always equal to the S&P CNX Nifty spot).

7. Ashish has gained Rs. 3 (0.255) on the spot S&P CNX Nifty and Rs. 20 (1.63%) on the futures for a return of near 1.88%. In addition, he has gained Rs. 7,000 or 0.23% owing to the dividends for a total return of 2.11% for 27 days, risk free.

It is easier to make a rough calculation of the return. To do this, we ignore the gain from dividends and we assume that transactions costs account for 0.4%. In the above case, the return is roughly 1230/1200 or 2.5% for 27 days, and we subtract 0.4% for transactions costs giving 2.1% for 27 days. This is very close to the actual number.

Nuances

1. *What if the return is something low, like 1% for a month, hence uncompetitive?* A return of 1% per month, i.e. 12.7% per year without bearing any risk is an excellent return in India. It is competitive.

2. *Okay, what if the return works, out to something uncompetitive, like 0.5% for a month?* Then it is not worth lending into the index futures market.

3. *Is it possible to somehow do this in quantities smaller than Rs. 3 million?* Portfolio of shares smaller than Rs. 3 million do not exactly replicate S&P CNX Nifty hence it is simplest and completely riskless to do this in portfolio of Rs. 3 million or more.

4. *This sounds great – what are the catches?* There are two major catches: (a) some of the 50 stocks might be stuck at price limits when you are getting in or getting out, and (b) some of the stocks where you take delivery might generate delays owing to physical certificates. The second problem is rapidly fading away, given the high pace of adoption of NSDL. The first problem remains the only real risk of loaning money into the stock market.

   Of course, it could always be the case that the spot-futures basis is too low, so the interest rate in lending is unattractive. In that case it is not worth doing anyway.

5. *Does one have to hold till the futures expiration date or can one "square off" earlier?* Many times the market presents suitable opportunities to square off early and make a tidy profit. Suppose we entered with the S&P CNX Nifty spot at 1200 and the futures at 1230. Suppose, two hours later, the S&P CNX Nifty spot is running at 1205 and the futures are at 1225. Then one can square off and make a profit of (roughly) 10/1200 or 0.8% on the same day itself. This is called "early unwind". Internationally, early unwind is extremely common.

Solved Problems

Q: Suppose the S&P CNX Nifty spot is at 1000 and the two-month futures are at 1040. Suppose the transactions costs involved are 0.4% per month and dividends over the two months are 0. Then what is the rate of return in loaning money to the market?

1. 1.5% per month.

2. 1.25% per month

3. 1.75% per month

4. 1% per month

5. 2% per month

A: 1040/1000 over two months is near 1.9% per month. Subtract out 0.4% to get 1.5% per month. The correct answer is 1.

Practice Questions

Q: Suppose the S&P CNX Nifty spot is at 1000 and the two-month futures are at 1040. Suppose the transactions costs involved are 0.4% per month and dividends per month are 0.25%. Then what is the rate of return in loaning money to the market?

1. 1.5% per month

2. 1.25% per month

3. 1.75% per month

4. 1% per month

5. 2% per month

A: The correct answer is 3.

A8: Have securities, lend them to the market

Do you have a portfolio of shares which is earning you nothing? Would you like to juice up your returns by earning revenues from stocklending?

Most owners of shares answer in the affirmative to these questions. Yet, stocklending schemes that are widely accessible do not exist in India.

The index futures market offers a riskless mechanism for (effectively) loaning out certificates and earning a positive return for them. It is like a repo; you would sell off your certificates and contract to buy them back in the future at a fixed price. There is no price risk (since you are perfectly hedged) and there is no credit risk (since your counterparty on both legs of the transaction is the National Securities Clearing Corporation).

The basic idea is quite simple. You would sell all 50 stocks in S&P CNX Nifty and buy them back at a future date using the index futures. You would soon receive money for the shares you have sold. You can deploy this money as you like until futures expiration. On this date, you would buy back your shares, and pay for them.

How do we *actually* do this?

Suppose you have Rs. 5 million of the S&P CNX Nifty portfolio (in their correct proportion, with each share being present in the portfolio with a weight that is proportional to its market capitalisation).

1. Sell off all 50 shares on the cash market. This can be done using a single keystroke (offline order entry) using the NEAT software.
2. Buy index futures of an equal value.
3. A few days later, you will receive money and have to make delivery of the 50 shares.
4. Deploy this money at the riskless interest rate.
5. On the date that the futures expire, at 3:15 PM, put in 50 orders (using NEAT again) to buy the entire S&P CNX Nifty portfolio.
6. A few days later, you will need to pay in the money and get back your shares.

When is this worthwhile? When the spot-futures basis (the difference between spot S&P CNX Nifty and the futures S&P CNX Nifty) is smaller than the riskless interest rate that you can find in the economy. If the spot-futures basis is 2.5% per month and you are loaning out the money at 1.5% per month, it is not profitable. Conversely, if the spot-futures basis is 1% per month and you are loaning out money at 1.2% per month, this stocklending could be profitable.

It is easy to approximate the return obtained in stocklending. To do this, we assume that transactions cost account for 0.4%. Suppose the spot-futures basis is x% and suppose the rate at which funds can be invested is y%. Then the total return is $y - x - 0.4\%$, over the time that the position is held.

This can also be interpreted as a mechanism to obtain a cash loan using your portfolio of S&P CNX Nifty shares as collateral. In this case, it may be worth doing even if the spot-futures basis is somewhat wider.

Example

Assume the S&P CNX Nifty spot is 1100 and the two-month futures are trading at 1110. The spot-futures basis (1110/1100) is 0.9%. Suppose cash can be risklessly invested at 1% per month, over two months, funds invested at 1% per month yield 2.01%. Hence the total return that can be obtained in stocklending in 2.01% - 0.9% -0.4% or 0.71%, over the two-month period.

Let us make this concrete using a specific sequence of trades. Suppose Akash has Rs. 4 million of the S&P CNX Nifty portfolio which he would like to lend to the market.

1. Akash puts in sell orders for Rs. 4 million of S&P CNX Nifty using the feature in NEAT to rapidly place 50 market orders, in quick succession. The seller always suffers impact cost; suppose he contains an actual execution at 1098.
2. A moment later, Akash puts in a market order to buy Rs. 4 million of the S&P CNX Nifty futures. The order executes at 1110. At this point, he is completely hedged.
3. A few days later, Akash makes delivery of shares and receives Rs. 3.99 million (assuming an impact cost of 2/1100)
4. Suppose Akash lends this out at 1% per month for two months.

5. At the end of two months, the money comes back to him as Rs. 4,072,981. Translated in terms of S&P CNX Nifty, this is $1098 * 1.01^2$ or 1120.

6. On the expiration date of the futures, he puts in 50 orders, using NEAT, placing market orders to buy back his S&P CNX Nifty portfolio. Suppose S&P CNX Nifty has moved up to 1150 by this time. This makes shares costlier in buying back, but the difference is exactly offset by profits on the futures contract.

   When the market order is placed, suppose he ends up paying 1153 and not 1150, owing to impact cost. He has funds in hands of 1120, and the futures contract pays 40 (1150-1110) so he ends up with a clean profit, on the entire transaction, of 1120+40-1153 = 7. On a base of Rs. 4 million, this is Rs. 25,400.

Nuances

1. *What if the shares that I own are not exactly the S&P CNX Nifty portfolio?* This only works exactly for more than Rs. 3. Million of the S&P CNX Nifty portfolio. You can always reshuffle your portfolio to have atleast Rs. 3 million of S&P CNX Nifty. Any large investor can plan in advance and have a sub-component of his portfolio which looks exactly like S&P CNX Nifty; the only constraint is that this sub-component has to be larger than Rs. 3 million. Once this preparation is done, it can be used for stocklending anytime the terms look attractive.

2. *How does a stocklending scheme fit into this?* Suppose you do *not* have the exact S&P CNX Nifty portfolio worth Rs. 3 million or more. In that case, some or all the components which are missing can be borrowed if a stocklending scheme is working. Of course, the rate of return in stock lending through the index futures market would have to be high enough to compensate for the cost of borrowing stock through the stocklending scheme.

3. *This sounds great – What is the catch?* There are two major catches: (a) some of the 50 stocks might be stuck at price limits when you are getting in or getting out, and (b) some of the stocks where you take delivery might generate delays owing to physical certificates. The second problem is rapidly fading away, given the high pace of adoption of NSDL. The first problem remains the only real risk of loaning money into the stock market.

Of course, it could always be the case that the spot-futures basis is too high, so the stocklending is unattractive. In that case it is not worth doing anyway.

4. *What is the relationship between moneylending and stocklending into the index futures market?* When the spot-futures basis is "too wide", lending money to the market is attractive. When the spot-futures basis is "too low", borrowing money from the market (i.e. stocklending) is attractive. If one is highly attractive, the other will be highly unattractive. Both cannot be attractive at the same time.

The market will bounce around: sometimes the basis will be too thin and sometimes the basis will be too wide. Alert traders will spot these opportunities and connect them up with either stocklending or moneylending, depending upon the situation.

Solved Problems

Q: Suppose the S&P CNX Nifty spot is 1000 and the two month futures are at 1010. Suppose cash can be risklessly invested at 1% per month and the transaction costs involved are o.4%. Then the total return that can be obtained in stocklending is

1. 0.61% over two months
2. 1.01% over two months

A: 1% invested over two months earns 2.01%. Subtract from the interest earned spot-futures basis 1010/1000, that is, 1% and 0.4% transaction costs to get 0.61% over two months. The correct answer is 1.

Practice Questions

Q: Suppose the S&P CNX Nifty spot is at 1100 and the two-month futures are at 1120. Suppose cash can be risklessly invested at 1.5% per month and there are no transaction costs. Then the total return that can be obtained in stocklending is

1. 1.20% over two months
2. 1% over two months

A: 1.5% invested over two months earns 3,02%. Subtract from the interest earned spot-futures basis 1120/1100, that is, 1.82% to get 1.2%. The correct answer is 1.

Regulatory Framework

The regulatory framework for the derivatives market is laid out in the report of the SEBI Committee on Policy for Derivatives, headed by L.C. Gupta. An important associated document is the model bye-laws for a derivatives market released by this committee.

Derivatives are proposed to be defined as security under the Section 2(h) of SC(R)A, 1956. Present definition of securities includes shares, scrips, stocks, bonds, debentures, debenture stock or other marketable securities in or of any incorporated company or other body corporate Government securities Rights or interests in securities, such other instruments as may be declared by the central government to be securities.

Section 20 of SC(R)A, 1956 prohibiting options in securities has been omitted by Securities Laws (Amendment) Act, 1995. Hence options in securities are now legal.

Securities & Exchange Board of India (SEBI) the oversight regulator for the securities market appointed a Committee on derivatives under the chairmanship of Dr. L. C. Gupta on 18, November 1996 to develop appropriate regulatory framework for Derivatives trading in India. The L.C. Gupta Committee recommended phased introduction of derivatives trading in India, starting with stock index futures.

The recommendations of the L.C.Gupta Committee were made with relation to Exchange operations, membership, products, participants, trading and clearing regulations.

a) The main recommendations relating to a derivatives Exchange are as follows:

1. The Derivatives Exchange should have online screen based trading system with online surveillance capabilities.

2. Existing Stock Exchanges can carry out derivatives trading as a separate segment.

3. The Derivatives Exchange shall disseminate information in real-time through atleast two information vendors.

4. The Derivatives Exchange should inspect every broker/member annually.

5. SEBI to approve Rules, Bye-Laws and Regulations of the Derivatives Exchange before commencement of trading

6. The Derivatives Exchange should have investor grievance and redressal mechanism operative from all four regions of the country

b) Main recommendations relating to membership of a derivatives exchange are as follows:

1. The Derivatives Exchange should have atleast 50 trading members to start Derivatives trading.

2. Existing members cannot automatically become derivatives members

3. Membership norms include certain networth criterion passing SEBI approved certification

4. Membership shall be two-tier with Trading member being a member of the Exchange and Clearing member being a member of a Clearing Corporation.

5. Clearing members should have minimum networth of Rs. 300 lakhs and make a deposit of Rs. 50 lakhs with Clearing Corporation

c) Recommendations relating to introduction and trading of derivatives product are as follows:

1. Sebi shall approve any new derivative product if it serves an economic function.

2. The Exchange may suspend any derivatives contract due to suspension of Trading in underlying securities, for protection of Interests of Investors and for the purpose of maintaining a fair and orderly market.

d) Recommendations relating to participants in the Derivatives market are as follows:

1. Restriction on Investment Institutions on usage of Derivatives should be removed

2. Corporates and Mutual Funds allowed to trade in Derivatives to the extent authorised by Board of Directors or Trustees as the case may be.

3. Margin collection will be mandatory from all clients including Institutions

4. Employees of broker / members should be adequately qualified and trained (Certified)

5. Transactions entered into by Director / employee of Member firm will be treated as "Client"

e) Recommendations relating to Trading regulations are as follows:

1. Investors should read the Risk Disclosure document made available to him by the broker / member and sign the Client Registration form.

2. Contract Note that must be time stamped with time of order-receipt and order execution (trade).

f) Recommendations relating to Clearing regulations are as follows:

1. Exposure limits of Clearing member linked to deposits maintained with Clearing Corporation

2. Level of Initial Margin will be calculated using "Value at Risk" Concept and will be large enough to cover one-day loss 99% of days.

3. Every Trading / Clearing member shall keep Books of Accounts to distinguish monies received and paid to each client, monies received and paid on own account and maintain separate and distinct accounts

4. Clearing member may be declared defaulter if he is unable to fulfil Obligations, he fails to pay within specified time, damages and money differences due to compulsory close-out and fails to abide by arbitration proceedings

SEBI board has accepted the LC Gupta report's recommendations and further prescribed that all derivatives contract should have a minimum contract size of Rs. 1 lakh.

Practice Questions

Q: The SEBI Committee on derivatives has recommended that to start derivatives trading an Exchange should have atleast – members.

1. 30
2. 50
3. 75
4. 100

A: The correct answer is 2

Q: The SEBI Committee on derivatives has recommended that – can be derivatives brokers / members

1. All existing Capital markets stock brokers/ members
2. Members having prescribed networth and certified brokers/ dealers
3. Only Institutions

4. No recommendation in this regard has been made.

A: The correct answer is 2.

Q: The SEBI Committee on Derivatives has recommended that equity derivatives in India should start with

1. Stock futures
2. Stock options
3. Stock index futures
4. Stock index options

A: The correct answer is 3.

Initial margin requirements

Risk Management

Risk Management in F&O will be very sophisticated and stringent. Clearing Corporation will perform monitoring and surveillance on a real-time basis and adopt numerous financial safeguards to ensure market integrity. The clearing corporation will become the counter-party to all obligations in the F&O market by guaranteeing settlement of all trades and thus absorbing all counter-party risk in the market. In order, to do this, the clearing corporation has designed a series of defences to manage settlement risks in F&O segment.

The first level of safeguard, will be day-to-day risk management activity of the clearing corporation including collection of **margins** to cover the market/price risk arising from price fluctuations on positions assumed by members. In F&O segment, Clearing Corporation will collect initial margin on an upfront basis to cover for the price fluctuation upto the settlement and perform daily mark-to-market settlement to cover historical price movements. The initial margin level will be based on the Value at Risk (VAR) methodology at 99% confidence level as prescribed in the LC Gupta report.

The second level of safeguard, will be the **deposits** kept with the exchange / clearing corporation by the members. As index futures contracts offer leverage which increases the risk to a participant taking naked positions, the structure of the market itself has been designed to manage the risk in the derivatives market. For this purpose, a two-tier membership structure has been adopted viz. Clearing Members and Trading Members. Trading members will be members of the exchange and will enjoy trading privileges. Clearing Members will be members of the clearing corporation and will perform all clearing and settlement functions. All trading members can themselves become clearing members or make arrangements with other clearing members in order to commence trading. The minimum CM networth norms and deposit requirements have been specified by the L C Gupta committee report, while the Trading Member norms have been left to the exchange.

The minimum deposits and networth requirement for members of F&O segment of NSE (exchange) and NSCC (clearing corporation) are as follows:

Trading Membership of NSE- F&O segment - Index Futures sub-segment

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Networth (both corporates and non-corporates)	Rs. 1 crore
Interest-free security deposit with the Exchange	Rs. 8 lakhs
Annual subscription fees to the Exchange	Rs. 2 lakh

Clearing Membership of NSCCL - F&O segment - Index Futures sub-segment

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Networth (both corporates and non-corporates)	Rs. 3 crores
Interest-free security deposit with NSCCL	Rs. 25 lakhs
Collateral security deposit with NSCCL	Rs. 25 lakhs
(By way of cash, bank guarantees, fixed deposits and select dematerialised securities with appropriate haircuts)	
Collateral security deposit with NSCCL	Rs. 10 lakhs
(By way of cash, bank guarantees, fixed deposits and select dematerialised securities with appropriate haircuts)	(per trading member)

J R Verma Group Report

The SEBI board while accepting the LC Gupta committee recommendations for introducing index futures trading mandated the setting up of a group to recommend measures for **risk containment** in the derivatives market in India. To this effect, SEBI constituted a group on "Risk Containment Measures" under the aegis of Prof. J.R Verma and comprising representatives from RBI, various stock exchanges and FII's in June 1998, which submitted its report on "Risk Containment Measures in the Indian Stock

Index Futures Market" (hereinafter referred as JR Verma Group report - JRVG) in October 1998.

The JRVG covers the operational details of the margining system and methodology for charging initial margins as recommended in the LC Gupta committee report (LCGC), broker networth and deposit (liquid assets) requirement and real-time monitoring requirements including intra-day violations etc. to be followed by all exchanges/clearing corporation which allow stock index futures trading. A brief discussion on the functionalities recommended in the JRVG are discussed below.

1. Open Positions

The open position should be segregated on account types viz. proprietary account and client account. The open position for the proprietary trades will be on a net basis, whereas the computation of open position for client trades should be carried out on a gross basis i.e. long and short separately.

The open position (net) for the proprietary account will be taken as the net cumulative outstanding purchases of member's positions as on a particular day. Whereas for client trades the long open position will be computed as client buy open quantity - client sell close quantity and the short quantity will be determined as client sell open quantity - client buy close quantity. The total open position of a trading member will be calculated as the total of the proprietary net positions and the client long and short positions.

2. Calendar Spreads and Margins to be levied on them

A calendar spread is a position wherein the position of a member in one contract (one maturity), is hedged, by an offsetting (opposite) position in another contract (different maturity) for the same underlying asset. The calendar spreads can be either long spread or short spread depending on the side of the position (long / short) of the far month (maximum expiry month of the two contract which is involved in the spread)

contract involved in the Calendar Spread. These spread positions will be valued at the price of the far month contract.

The margins that have been proposed by the JRVG for the calendar spreads is a margin % of 0.5% for each month of difference between the contracts involved in the spread combination subject to a minimum of 1%. So, if the difference between the spreading contracts is two months, spread margin will be 1.0% and so on.

3. Non Spread Positions and Margins to be levied on them

The balance positions which are not identified as spread positions are termed as non-spread positions. As the LCGC recommended that margins in the derivatives market would be based on 99% Value at Risk (VAR) approach. The group has recommended that the initial margin level will be computed daily in the following steps :

Step 1 - Computation of Volatility : Variance $(\sigma_t)^2$

$(\sigma_t)^2 = \lambda (\sigma_{t-1})^2 + (1-\lambda)r_t^2$

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where,

σ_t^2 Volatility estimate of the index futures of the day 't'

λ (lambda)   Parameter which determines how rapidly volatility estimates change (0.94 will be value as per JRVG)

$(\sigma_{t-1})^2$ (Historical Variance of daily closing prices on a one year Variance) moving average basis

            (Note: For the first 6 months, the value of the underlying cash index values will be used (until the futures market stabilises to a reasonable level of trading)

r_t   Logarithmic returns from daily closing prices of the index futures contract (I_t) and computed as:

$$\ln (I_t / I_{t-1})$$

(Note: For the first 6 months, the higher of the logarithmic returns of the index futures contract or the cash index will be taken.)

Step 2 - Initial Margin Percentage (IM %)

The margins for 99 % VAR would be based on 3 sigma levels

$$IM\% = 3 (\sigma_t)$$

Long Position Margin %age $= 100 (1 - \exp(-3\sigma_t))$
Short Position Margin %age $= 100 (\exp(3\sigma_t) - 1)$

(Note: Minimum Initial Margin for first 6 months will be 5%.)

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4. Clearing Member Initial Margin

The initial margin for a clearing member will be calculated as the total initial margin due for all the trading members clearing through that clearing member.

5. Clearing Member Net Worth and Deposits

SEBI has defined the trading member and clearing member networth and deposits distinctly. The networth [1] requirements of a Clearing Member as defined by SEBI is 3 crores and a minimum deposit of 50 lakhs.

[1] Networth is defined as follows as per SEBI circular - FITTC/DC/CIR-1/98 - Capital + Free Reserves - Non allowable assets (Fixed assets, pledged securities, member's card, non-allowable securities, bad deliveries, doubtful debts and advances, prepaid expenses and losses, intangible assets, 30% of marketable securities)

The clearing member will have to bring in capital in the form of bank guarantees, cash, security deposits and any other deposits as accepted by the clearing corporation. These will be termed as cash and non-cash equivalents as defined by the clearing corporation. The total of the cash and non-cash equivalents in the proportion as defined by NSCCL will be termed as effective deposits. Apart from the deposits the JRVG has defined the **liquid net worth** which will be arrived at after deducting the initial margin due from the effective deposits. This is the total amount against which the limits will be compared.

6. Intra-day Monitoring Limits

To maintain market integrity, risk management in index futures market will be done on a real-time basis (after each trade) by NSCCL as specified by JRVG. Each member's open position will be computed to measure his exposure and monitored to check for the following violations as recommended by the JRVG -

a) Initial Margin Violation - Clearing Member :

The liquid networth (LNW) is calculated as the deposits that the member has with the clearing corporation less the initial margin due at any point of time. However, the clearing member has to maintain a minimum amount of deposit called minimum liquid networth of Rs. 50 lakhs which is required to meet his mandatory requirements to continue his membership as a Clearing Member with the Clearing Corporation. Whenever the liquid networth goes below the minimum liquid networth of Rs. 50 lakhs, it is considered a violation.

b) Mark to Market Value violation - Clearing Member :

The mark to market value of a CM across contracts is also monitored intra-day. The JRVG has recommended that at no point of time should the mark to market value of all open positions of a clearing member be greater than the Liquid Net Worth * 33 1/3 times Mark to Market Value else it will be considered a violation and the member will be disabled.

c) Contract Position Limit violation - Trading Member :

The trading member's open position in the near month contract for each underlying asset will also be monitored intra-day. The JRVG has put a limit to a trading member's open position to be the higher of 100 crores or 15% of the Open Interest in the nearest month expiry contract i.e. if the member open position in the near month contract exceeds the higher of 100 crores or 15% of open interest then it will be considered a violation.

7. End of Day Initial Margins

The total open positions are calculated at the end of the day on the same basis as above i.e. net at proprietary level and gross at client level. These positions are further bifurcated as spread positions and non-spread positions. The initial margins are calculated at the end of the day based on their spread and non-spread positions. If the initial margin exceeds the upfront margin maintained by the member then the same will be collected on a T+1 basis i.e. on the next working day.

Practice Questions

Q: Initial Margin percentage on stock index futures contract for the first six months as per JR Verma group report will be:

1. 5%

2. 3 times volatility estimate of the stock index futures contract

3. a or b whichever is higher

4. None of the above

A: The correct answer is 3.

Q: A member is short 400 March futures contracts and long 100 April futures contracts. A calendar spread in this case will be

1. Long 100 futures contracts

2. Short 100 futures contracts

3. Long 400 futures contracts

4. Short 400 futures contracts

A: The correct answer is 1.

Q: The effective deposits of a clearing member is Rs. 69,00,000. Initial margin due is Rs. 4,50,000. The minimum base deposit of the clearing member is Rs. 50,00,000. Hence a violation will occur when:

1. The initial margin due is below Rs. 50,00,000

2. The liquid net worth goes below Rs. 50,00,000

3. The initial margin due reaches Rs. 19,00,000 or more

4. Either B or C or both

A: The correct answer is 4.

Glossary

basis The difference between the cash price and the futures price. If the spot S&P CNX Nifty is 1000 and the one-month futures price is 1020 then we say that the basis is 20 or 2%.

beta The sensitivity of a stock or a portfolio to fluctuations of S&P CNX Nifty. A stock with beta of 1.2 moves by 1.2%, on average, when S&P CNX Nifty move by 1%. A portfolio with a beta of 0.8% moves by 0.8%, on average, when S&P CNX Nifty moves by 1%. Note that these are averages – on any one day the reality can be different.

hedge ratio The size of a hedging futures position divided by the size of the underlying exposure. If a person with a portfolio worth Rs. 1 lakh short sells S&P CNX Nifty futures worth Rs. 1.2 lakh, his hedge ratio is 1.2

standard deviation The square root of variance. See variance.

Spot-futures basis See basis.

Variance The average of the squared deviation from the mean. If we observe n values x1.....xn where the average is $\chi = \Sigma x_i / n$ variance is $\Sigma(x_i - x)^2/n$. If σ is the standard deviation, σ^2 is the variance. It is common to view the variance of daily returns on a stock as a measure of the total risk of the stock.