Derivatives in India: Frequently Asked Questions

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Chapter 1

Basics

Q1.1: What is a "spot" transaction?

A: In a spot market, transactions are settled "on the spot". Once a trade is agreed upon, the settlement – i.e. the actual exchange of money for goods – takes place with the minimum possible delay. When a person selects a shirt in a shop and agrees on a price, the settlement (exchange of funds for goods) takes place immediately. That is a spot market. ●●

Q1.2: That's okay for shirts - but does it ever happen in finance?

A: There are two real–world implementations of a spot market: rolling settlement and real-time gross settlement (RTGS).

With rolling settlement, trades are netted through one day, and settled x working days later; this is called $T + x$ rolling settlement. For example, with T+5 rolling settlement, trades are netted through Monday, and the net open position as of Monday evening is settled on the coming Monday. Similarly, trades are netted through Tuesday, and settled on the coming Tuesday.

With RTGS, all trades settle in a few seconds with no netting.

Rolling settlement is a close approximation, and RTGS is a true spot market.

The equity market in India today, for the major part, is not a spot market. For example, the bulk of trading on NSE takes place with netting from Wednesday to Tuesday, and then settlement takes place five days later. This is not a spot market. The "international standard" in equity markets is T+3 rolling settlement. ●●

Q1.3: What is a "forward" transaction?

A: In a forward contract, two parties irrevocably agree to *settle a trade at a future date*, for a stated price and quantity. No money changes hands at the time the trade is agreed upon.

Suppose a buyer L and a seller S agree to do a trade in 100 grams of gold on 31 Dec 2001 at Rs.5,000/tola. Here, Rs.5,000/tola is the "forward price of 31 Dec 2001 Gold".

The buyer L is said to be long and the seller S is said to be short.

Once the contract has been entered into, L is obligated to pay S Rs. 500,000 on 31 Dec 2001, and take delivery of 100 tolas of gold. Similarly, S is obligated to be ready to accept Rs.500,000 on 31 Dec 2001, and give 100 tolas of gold in exchange. ●●

Q1.4: What are "derivatives"?

A: A *derivative* is a financial instrument which derives its value from some other financial price. This "other financial price" is called *the underlying*.

A wheat farmer may wish to contract to sell his harvest at a future date to eliminate the risk of a change in prices by that date. The price for such a contract would obviously depend upon the current spot price of wheat. Such a transaction could take place on a wheat forward market. Here, the wheat forward is the "derivative" and wheat on the spot market is "the underlying". The terms "derivative contract", "derivative product", or "derivative" are used interchangeably.

The most important derivatives are futures and options. ●●

Also see: Culp (1995).

Q1.5: What are "exchange–traded derivatives"?

A: Derivatives which trade on an exchange are called "exchange–traded derivatives".

Trades on an exchange generally take place with anonymity. Trades at an exchange generally go through the clearing corporation. ●●

Q1.6: What are "OTC derivatives"?

A: A derivative contract which is privately negotiated is called an OTC derivative. OTC trades have no anonymity, and they generally do not go through a clearing corporation.

Every derivative product can either trade OTC (i.e., through private negotiation), or on an exchange. In one specific case, the jargon demarcates this clearly: OTC futures contracts are called "forwards" (or, exchange–traded forwards are called "futures"). In other cases, there is no such distinguishing notation. There are "exchange–traded options" as opposed to "OTC options"; but they are both called options. ●●

Q1.7: Is "badla" trading like derivatives trading?

A: No. Badla is a mechanism to avoid the discipline of a spot market; to do trades on the spot market but not actually do settlement. The "carryforward" activities are mixed together with the spot market. A well functioning spot market has no possibility of carry-forward.

Derivatives trades take place distinctly from the spot market. The spot price is separately observed from the derivative price. A modern financial system consists of a spot market which is a genuine spot market, and a derivatives market which is separate from the spot market. ●●

Table 1.1 The Global Derivatives Industry: Outstanding Contracts, $ billion

	1986	1990	1993	1994
Exchange Traded	583	2292	7839	8838
Interest rate futures	370	1454	4960	5757
Interest rate options	146	600	2362	2623
Currency futures	10	16	30	33
Currency options	39	56	81	55
Stock Index futures	15	70	119	128
Stock Index options	3	96	286	242
Some of the OTC Industry	500	3450	7777	11200
Interest rate swaps	400	2312	6177	8815
Currency swaps	100	578	900	915
Caps, collars, floors, swaptions	-	561	700	1470
Total	1083	5742	16616	20038

Table 1.2 The Global Derivatives Industry: Chronology of Instruments

1874	Commodity Futures
1972	Foreign currency futures
1973	Equity options
1975	T-bond futures
1981	Currency swaps
1982	Interest rate swaps; T-note futures; Eurodollar futures; Equity index futures; Options on T-bond futures; Exchange–listed currency options
1983	Options on equity index; Options on T-note futures; Options on currency futures; Options on equity index futures; Interest rates caps and floors
1985	Eurodollar options; Swaptions
1987	OTC compound options; OTC average options
1989	Futures on interest rate swaps; Quanto options
1990	Equity index swaps
1991	Differential swaps
1993	Captions; Exchange-listed FLEX options
1994	Credit default options

Q1.8: What are the instruments traded in the derivatives industry, and what are their relative sizes?

A: This information is summarised in Tables 1.1 and 1.2 which are taken from Jorion (1997). ●●

Q1.9: Why is hedging using derivatives termed "risk transfer"?

A: One key motivation for derivatives is to enable the transfer of risk between individuals and firms in the economy. This can be viewed as being like insurance, with the difference that anyone in the economy (and not just insurance companies) would be able to sell insurance. A risk averse person buys insurance; a risk–seeking person sells insurance.

On an options market, an investor who tries to protect himself against a drop in the index buys put options on the index, and a risk-taker sells him these options.

One special motivation which drives some (but not all) trades is *mutual insurance* between two persons, both exposed to the same risk, in an opposite way. In the context of currency fluctuations, exporters face losses if the rupee appreciates and importers face losses if the rupee depreciates. By forward contracting in the dollar-rupee forward market, they supply insurance to each other and reduce risk. This is a situation where both parties in the transaction seek to avoid risk.

In these ways, derivatives supply a method for people to do hedging and reduce their risks. As compared with an economy lacking these facilities, this is a considerable gain. The largest derivatives markets in the world are on government bonds (to help control interest rate risk), the market index (to help control risk that is associated with fluctuations in the stock market) and on exchange rates (to cope with currency risk). ●●

Q1.10: What happens to market quality and price formation on the cash market once derivatives trading commences?

A: The empirical evidence broadly suggests that market efficiency and liquidity on the spot market improve once derivatives trading comes about.

Speculators generally prefer implementing their positions using derivatives rather than using a sequence of trades on the underlying spot market. Hence, access to derivatives increases the rate of return on information gathering, research and forecasting activities, and thus serves to spur investments into information gathering and forecasting. This helps improve market efficiency.

From a market microstructure perspective, derivatives markets may reduce the extent to which informed speculators are found on the spot market, thus reducing the adverse selection on the spot market. Derivatives also help reduce the risks faced by liquidity providers on the spot market, by giving them avenues for hedging. These effects help improve liquidity on the spot market.

A liquid derivatives market tends to become the focus of speculation and price discovery. When news breaks, the derivative market reacts first. The information propagates

down to the cash market a short while later, through the activities of arbitrageurs. ●●

Also see: Narasimhan & Subrahmanyam (1993).

Chapter 2

Forward contracts

Q2.1: Why is forward contracting useful?

A: Forward contracting is valuable in hedging and speculation.

The classic hedging application is that of a wheat farmer forward-selling his harvest, at the time of sowing, in order to eliminate price risk. Conversely, a bread factory could buy wheat forward in order to assist production planning without the risk of price fluctuations.

If a speculator has information or analysis which forecasts an upturn in a price, then she can adopt a buy position (go long) on the *forward* market instead of the cash market. The speculator would wait for the price to rise, and then close out the position on the forward market (by selling off the forward contracts). This is a good alternative to speculation using the *spot market*, which involves buying wheat, storing it for a while, and then selling it off. A speculator prefers transactions involving a forward market because (a) the costs of taking or making delivery of wheat is avoided, and (b) funds are not blocked for the purpose of speculation. ●●

Q2.2: What is "leverage"?

A: Suppose a user of a forward market adopts a position worth Rs.100. As mentioned above, no money changes hands at the time the deal is signed. In practice, a good–faith deposit would be needed. Suppose the user puts up Rs.5 of collateral. Using Rs.5 of capital, a position of Rs.100 is taken. In this case, we say there is "*leverage* of 20 times".

This example involves a forward market. More generally, all derivatives involve leverage. Leverage makes derivatives useful; leverage is also the source of a host of disasters, payments crises, and systemic risk on financial markets. Understanding and controlling leverage is equivalent to understanding and controlling derivatives. ●●

Also see: Chew (1996).

Q2.3: What are the problems of forward markets?

A: Forward markets tend to be afflicted by poor liquidity and from unreliability deriving

from "counterparty risk" (also called "credit risk"). ●●

Q2.4: Why do forward markets have poor liquidity?

A: One basic problem of forward markets is that of too much flexibility and generality. The forward market is like the real estate market in that any two consenting adults can form custom–designed contracts against each other. This often makes them design terms of the deal which are very convenient in that specific situation; this can make the contracts non-tradeable since others might not find those specific terms useful.

In addition, forward markets are like the real estate market in that buyers and sellers find each other using telephones. This is inefficient and time–consuming. Every user faces the risk of not trading at the best price available in the country.

Forward markets often turn into small clubs of dealers who earn elevated intermediation fees. This elevates the fees paid by users, i.e. it makes the forward market illiquid from the user perspective. ●●

Q2.5: Why are forward markets afflicted by counterparty risk?

A: A forward contract is a bilateral relationship between two people. Each requires good behaviour on the part of the other for the contract to perform as promised.

Suppose L agrees to buy gold from S at a future date T at a (forward) price of Rs.5,000/tola. If, on date T, the gold spot price is at Rs.4,000/tola, then L loses Rs.1,000/tola and S gains Rs.1,000/tola by living up to the terms of the contract. When L buys at Rs.5,000/tola by the terms of the contract, he is paying Rs.1,000 more than what could be obtained on the spot market at the same time. Hence, L is tempted to declare bankruptcy and avoid performing as per the contract.

Conversely, if on date T the gold spot price is at Rs.6,000/tola, then L gains and S loses by living up to the terms of the contract. S stands to sell gold at Rs.5,000/tola by the terms of the contract, which is Rs.1,000/tola worse than what could be obtained by selling into the spot market at date T. In this case, S is tempted to declare bankruptcy and avoid performing as per the contract.

In either case, this leads to *counterparty risk*. When one of the two sides of the transaction chooses to declare bankruptcy, the other suffers. Forward markets have one basic property: the larger the time period over which the forward contract is open, the larger are the potential price movements, and hence the larger is the counterparty risk.●●

Q2.6: How does counterparty risk affect liquidity?

A: A market where counterparty risk is present generally collapses into a small club of participants, who have homogeneous credit risk, and who have formed social and cultural methods for handling bankruptcies.

Club markets do not allow for free entry into intermediation. They support elevated intermediation fees for club members, have fewer market participants, and result in reduced liquidity.

Sometimes, regulators who are afraid of payments crises forcibly shut out large numbers of participants from an OTC derivatives market. This automatically generates a club

market, and yields a fraction of the liquidity which could come about if participation could be enlarged. ●●

Chapter 3

Futures

Q3.1: What is “price–time priority”?

A: A market has price–time priority if it gives a guarantee that every order will be matched against the best available price in the country, and that if two orders are equal in price, the one which came first will be matched first.

Forward markets, which involve dealers talking to each other on phone, do not have price–time priority. Floor–based trading with open–outcry does not have price–time priority. Electronic exchanges with order matching, or markets with a monopoly market maker, have price–time priority.

On markets without price–time priority, users suffer greater search costs, and there is a greater risk of fraud. ●●

Q3.2: What is a futures contract?

A: A futures contract is a forward contract which trades on an exchange. ●●

Q3.3: How does the futures market solve the problems of forward markets?

A: Futures markets feature a series of innovations in how trading is organised:

- Futures contracts trade *at an exchange* with price–time priority. All buyers and sellers come to one exchange. This reduces search costs and improves liquidity. This harnesses the gains that are commonly obtained in going from a non–transparent club market (based on telephones) to an anonymous, electronic exchange which is open to participation. The anonymity of the exchange environment largely eliminates cartel formation.

- Futures contracts are *standardised* – all buyers or sellers are constrained to only choose from a small list of tradeable contracts defined by the exchange. This avoids the illiquidity that goes along with the unlimited customisation of forward contracts.

- A new credit enhancement institution, the *clearing corporation*, eliminates counterparty risk on futures markets. The clearing corporation interposes itself into every transaction, buying from the seller and selling to the buyer. This is called *novation*. This insulates each from the credit risk of the other. In futures markets, unlike in forward markets, increasing the time to expiration does not increase the counterparty risk.

  Novation at the clearing corporation makes it possible to have *safe trading between strangers*. This is what enables large–scale participation into the futures market – in contrast with small clubs which trade by telephone – and makes futures markets liquid.

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Also see: Houthakker & Williamson (1996*a*).

Q3.4: What is cash settlement?

A: The forward or futures contracts discussed so far involved physical settlement. On 31 Dec 2001, the seller was supposed to come up with 100 tolas of gold and the buyer was supposed to pay for it.

In practice, settlement involves high transactions costs. This is particularly the case for products such as the equity index, or an inter–bank deposit, where effecting settlement is extremely difficult or impossible.

In these cases, futures markets use "cash settlement". Here, the terminal value of the product is deemed to be equal to the price seen on the spot market. This is used to determine cash transfers from the counterparties of the futures contract. The cash transfer is treated as settlement.

Example. Suppose L has purchased 30 units of Nifty from S at a price of 1500 on 31 Dec 2000. Suppose we come to the expiration date, i.e. 31 Dec 2000, and the Nifty spot is actually at 1600. In this case, L has made a profit of Rs.100 per Nifty and S has made a loss of Rs.100 per Nifty. A profit/loss of Rs.100 per nifty applied to a transaction of 30 nifties translates into a profit/loss of Rs.3,000. Hence, the clearing corporation organises a payment of Rs.3,000 from S and a payment of Rs.3,000 to L. This is called cash settlement.

Cash settlement was an important advance, which extended the reach of derivatives into many products where physical settlement was unviable. ●●

Also see: Garbade & Silber (1983).

Q3.5: What determines the price of a futures product?

A: Supply and demand on the secondary market determines the futures price.

On dates prior to 31 Dec 2000, the "Nifty futures expiring on 31 Dec 2000" trade at a price that purely reflect supply and demand. There is a separate order book for each futures product which generates its own price.

Economic arguments give us a clear idea about what the price of a futures *should* be. If the secondary market prices deviate from these values, it would imply the presence of arbitrage opportunities, which (we might expect) would be swiftly exploited. But there is nothing innate in the market which forces the theoretical prices to come about. ●●

Q3.6: Doesn't the clearing corporation adopt an enormous risk by giving out credit guarantees to all brokerage firms?

A: Yes, it does.

If a brokerage firm goes bankrupt with net obligations of Rs.1 billion, *the clearing corporation has a legal obligation of Rs.1 billion.* The clearing corporation is *legally* obliged to either meet these obligations, or go bankrupt itself. There is no third alternative. There is no committee that meets to decide whether the settlement fund can be utilised; there are no escape clauses.

It is important to emphasise that when L buys from S, at a legal level, L has bought from the clearing corporation and the clearing corporation has bought from S. Whether S lives up to his obligations or not, the clearing corporation *is* the counterparty to L. There is no escape clause which can be invoked by the clearing corporation if S defaults. ●●

Q3.7: How does the clearing corporation assure it does not go bankrupt itself?

A: The futures clearing corporation has to build a sophisticated risk containment system in order to survive.

Two key elements of the risk containment system are the "mark to market margin" and "initial margin". These involve taking collateral from traders in such a way as to greatly diminish the incentives for traders to default.

Electronic trading has generated a need for online, realtime risk monitoring. In India, trading takes place swiftly and funds move through the banking system slowly. Hence the only meaningful notion of initial margin is one that is paid *upfront*. This leads to the notion of brokerage firms placing collateral, and obtaining limits upon the risk of their position as a function of the amount of collateral with the clearing corporation. ●●

Also see: Shah & Thomas (1999*b*).

Q3.8: Can we concretely sketch the operations of one futures market?

A: On 1 January, an exchange decides to trade three gold futures contracts with expiration 31 Jan, 28 Feb and 31 Mar respectively. The three futures contracts all trade at the same time, with three distinct prices. Traders can buy/sell all three contracts as they please. All through January, no settlement takes place. Positions are netted; i.e. if a person buys 100g of 31 Jan gold and then (a few days later) sells off 100g of 31 Jan gold, his net position drops to 0.

Trading for the January contract stops on 31 Jan. All net open positions on this con-

tract, as of the close of trading of 31 Jan, have to do settlement on 2 February (T+2 settlement). A buy position (as of close of trading on 31 Jan) has to bring money on 2 Feb, and a sell position (as of close of trading on 31 Jan) has to bring gold on 2 Feb.

On 1 Feb, when trading commences, the exchange announces the start of trading on a new contract, one which expires on 30 Apr, thus ensuring that three contracts always trade at any one time.

Similarly, on 28 Feb, trading for the Feb contract stops. On 1 March, a new 31 May contract is born. On 2 March, open positions of the Feb contract are settled. ●●

Q3.9: Why is the equity cash market in India said to have "futures-style settlement"?

A: India's "cash market" for equity is ostensibly a cash market, but it functions like a futures markets in every respect.

NSE's "EQ" market is a weekly futures market with tuesday expiration. The trading modalities on NSE from wednesday to tuesday, in trading ITC, are **exactly** those that would be seen if a futures market was running on ITC with tuesday expiration. On NSE, when a person buys on thursday, he is not obligated to do delivery and payment right away, and this buy position can be reversed on friday thus leaving no net obligations. Equity trading on NSE involves leverage of seven times. Like all futures markets, trading at the NSE is centralised and there is no counterparty risk owing to novation at the clearing corporation (NSCC).

The only difference between ITC trading on NSE, and ITC trading on a true futures market, is that futures contracts with several different expiration dates would all trade at the same time on a true futures market; this is absent on India's "cash market". ●●

Chapter 4

Options

Q4.1: What is an "option"?

A: An option is the right, but not the obligation, to buy or sell something at a stated date at a stated price. A "call option" gives one the right to buy, a "put option" gives one the right to sell.

Consider a typical transaction. On 1 July 2000, S sells a call option to L for a price of Rs.3.25. Now L has the right to come to S on 31 Dec 2000 and buy 1 share of Reliance at Rs.500. Here, Rs.3.25 is the "option price", Rs.500 is the "exercise price" and 31 Dec 2000 is the "expiration date".

L *does not* ***have*** *to* buy 1 share of Reliance on 31 Dec 2000 at Rs.500 from S (unlike a forward/futures contract which is binding on both sides). It is only if Reliance is above Rs.500, on 31 Dec 2000, that L will find it useful to exercise his right. If L chooses to exercise the option, S is obliged to live up to his end of the deal: i.e. S stands ready to sell a share of Reliance to L at Rs.500 on 31 Dec 2000.

Hence, at option expiration, there are two outcomes that are possible: an option could be profitably exercised, or it could be allowed to die unused. If the option lapses unused, then L has lost the original option price (Rs.3.25) and S has gained it.

When L and S enter into a futures contract, there is no payment (other than initial margin). In contrast, the option has a positive price which is paid in full on the date that the option is purchased.

Options come in two varieties – european and american. In a european option, the holder of the option can only exercise his right (if he should so desire) on the expiration date. In an american option, he can exercise this right anytime between purchase date and the expiration date.

The price of an option is determined on the secondary market. An option always has a non-negative value: i.e., the value of an option is never negative. ●●

Q4.2: How would index options work?

A: As with index futures, index options are cash settled.

Table 4.1 Option prices: some illustrative values

	Option strike price				
	1400	1450	1500	1550	1600
Calls					
1 mth	117	79	48	27	13
3 mth	154	119	90	67	48
Puts					
1 mth	8	19	38	66	102
3 mth	25	39	59	84	114

Assumptions: Nifty spot is 1500, Nifty volatility is 25% annualised, interest rate is 10%, Nifty dividend yield is 1.5%.

Suppose Nifty is at 1500 on 1 July 2000. Suppose L buys an option which gives him the right to buy Nifty at 1600 from S on 31 Dec 2000. It turns out that this option is worth roughly Rs.90. So a payment of Rs.90 passes from L to S for having this option.

When 31 Dec 2000 arrives, if Nifty is below 1600, the option is worthless and lapses without exercise. Suppose Nifty is at 1650. Then (in principle) L can exercise the option, buy Nifty using the option at 1600, and sell off this Nifty on the open market at 1650. So L has a profit of Rs.50 and S has a loss of Rs.50. In this case, "cash settlement" consists of NSCC imposing a charge of Rs.50 upon S and paying it to L. ●●

Q4.3: What kinds of Nifty options would trade?

A: The strike prices and expiration dates for traded options are selected by the exchange. For example, NSE may choose to have three expiration months, and five strike prices (1200,1300,1400,1500,1600). There would be two types of options: put and call. This gives a total of 30 distinct traded options ($3 \times 5 \times 2$), with 30 distinct order books and prices.

A typical set of option prices is shown in Table 4.1. It illustrates the intruiging nature of option prices.

When Nifty is at 1500, the right to buy Nifty at 1600 one month away is worth little (Rs.13). The buyer of this option puts down Rs.13 when the option is purchased, and this fee is non–refundable. If Nifty turns out to be above 1600 after a month, this option will prove to be valuable. If Nifty proves to be at 1602 after a month, the option will pay Rs.2.

Conversely when Nifty is at 1500, the right to sell Nifty at 1400 one month away isn't worth much (Rs.8): this is the "insurance premium" for protecting yourself against a fall in Nifty of worse than a hundred points.

However, when we increase the time to expiration of the option, there is a greater chance that prices can move around, and these same options become worth more: e.g. the

right to sell Nifty at 1600 is worth Rs.25 when we consider a three–month horizon (i.e. insurance against a hundred–point drop on a three–month horizon). ●●

Also see: Hull (1996).

Q4.4: When would one use options instead of futures?

A: Options are different from futures in several interesting senses.

At a practical level, the option buyer faces an interesting situation. He pays for the option in full at the time it is purchased. After this, he only has an upside. There is no possibility of the options position generating any further losses to him (other than the funds already paid for the option). This is different from a futures: which is free to enter into, but can generate very large losses. This characteristic makes options attractive to many occasional market participants, who cannot put in the time to closely monitor their futures positions.

Buying put options is buying insurance. To buy a put option on Nifty is to buy insurance which reimburses the full extent to which Nifty drops below the strike price of the put option. This is attractive to many people, and to mutual funds creating "guaranteed return products". The Nifty index fund industry will find it very useful to make a bundle of a Nifty index fund and a Nifty put option to create a new kind of a Nifty index fund, which gives the investor protection against extreme drops in Nifty.

Selling put options is selling insurance, so anyone who feels like earning revenues by selling insurance can set himself up to do so on the index options market.

More generally, options offer "nonlinear payoffs" whereas futures only have "linear payoffs". By combining futures and options, a wide variety of innovative and useful payoff structures can be created. ●●

Also see: Mariathasan (1997).

Q4.5: What are the patterns found, internationally, in options versus futures products on a given underlying?

A: In general, both futures and options trade on all underlyings abroad. Indeed, the international practice is to *launch* futures and options on a new underlying on the same day. ●●

Q4.6: What determines the price of an option?

A: Supply and demand on the secondary market drives the option price.

On dates prior to 31 Dec 2000, the "call option on Nifty expiring on 31 Dec 2000 with a strike of 1500" will trade at a price that purely reflects supply and demand. There is a separate order book for each option which generates its own price.

The values shown in Table 4.1 are derived from a theoretical model. If the secondary market prices deviate from these values, it would imply the presence of arbitrage opportunities, which (we might expect) would be swiftly exploited. But there is nothing innate in the market which forces the prices in the table to come about. ●●

Chapter 5

Indian scenario

Q5.1: What is the status of derivatives in the equity market in India?

A: As mentioned in Question 3.9, trading on the "spot market" for equity has actually always been a futures market with weekly or fortnightly settlement. These futures markets feature the risks and difficulties of futures markets, without the gains in price discovery and hedging services that come with a separation of the spot market from the futures market.

India's primary market has experience with derivatives of two kinds: convertible bonds and warrants (a slight variant of call options). Since these warrants are listed and traded, options markets of a limited sort already exist. However, the trading on these instruments is very limited.

A variety of interesting derivatives markets exist in the informal sector. These markets trade contracts like *bhav-bhav*, *teji-mandi*, etc. For example, the *bhav-bhav* is a bundle of one in-the-money call option and one in-the-money put option. These informal markets stand outside the mainstream institutions of India's financial system and enjoy limited participation.

In 1995, NSE asked SEBI whether it could trade index futures. In 2000, SEBI gave permissions to NSE and BSE to trade index futures. In addition, futures and options on Nifty will also trade at the Singapore Monetary Exchange (SIMEX) from end–August 2000. ●●

Q5.2: What derivatives exist in India in the interest-rates area?

A: The RBI has permitted OTC trades in interest rate forwards and swaps. These markets have so far had very little liquidity. ●●

Q5.3: What derivatives exist in India in the foreign exchange area?

A: India has a strong dollar-rupee forward market with contracts being traded for one,

two, .. six month expiration. Daily trading volume on this forward market is around $500 million a day. Indian users of hedging services are also allowed to buy derivatives involving other currencies on foreign markets. Outside India, there is a small market for cash–settled forward contracts on the dollar–rupee exchange rate. ●●

Q5.4: What is the status in India in the area of commodity derivatives?

A: India produces a range of commodities that enjoy a high global rank in production. The weighted rank of India in the global supply function pertinent to these commodities is between two and three. The impact of the commodity sector on the total economy is considerable.

A reforms program towards building commodity futures exchanges is being effected under the aegis of the Forward Markets Commission (FMC), which is constituted under the Ministry of Consumer Affairs and Public Distribution.

Futures contracts in pepper, turmeric, gur (jaggery), hessian (jute fabric), jute sacking, castor seed, potato, coffee, cotton, and soybean and its derivatives are traded in 18 commodity exchanges located in various parts of the country. Futures trading in other edible oils, oilseeds and oil cakes have been permitted. Trading in futures in the new commodities, especially in edible oils, is expected to commence in the near future. The sugar industry is exploring the merits of trading sugar futures contracts.

The policy initiatives and the modernisation programme include extensive training, structuring a reliable clearinghouse, establishment of a system of warehouse receipts, and the thrust towards the establishment of a national commodity exchange. The Government of India has constituted a committee to explore and evaluate issues pertinent to the establishment and funding of the proposed national commodity exchange for the nationwide trading of commodity futures contracts, and the other institutions and institutional processes such as warehousing and clearinghouses.

With commodity futures, delivery is best effected using warehouse receipts (which are like dematerialised securities). Warehousing functions have enabled viable exchanges to augment their strengths in contract design and trading. The viability of the national commodity exchange is predicated on the reliability of the warehousing functions. The programme for establishing a system of warehouse receipts is in progress. The Coffee Futures Exchange India (COFEI) has operated a system of warehouse receipts since 1998.

(This text is by G. Ramachandran, `gramach@satyamonline.com`). ●●

Also see: Balasundaram (1998).

Q5.5: Do Indian derivatives users have access to foreign derivatives markets?

A: The RBI setup a committee, headed by R. V. Gupta, which has established guidelines through which Indian users can obtain hedging services using derivatives exchanges outside India. ●●

Table 5.1 Derivatives in India: A Chronology

14 December 1995	NSE asked SEBI for permission to trade index futures.
18 November 1996	SEBI setup L. C. Gupta Committee to draft a policy framework for index futures.
11 May 1998	L. C. Gupta Committee submitted report.
7 July 1999	RBI gave permission for OTC forward rate agreements (FRAs) and interest rate swaps.
24 May 2000	SIMEX chose Nifty for trading futures and options on an Indian index.
25 May 2000	SEBI gave permission to NSE and BSE to do index futures trading.
9 June 2000	Trading of BSE Sensex futures commenced at BSE.
12 June 2000	Trading of Nifty futures commenced at NSE.
31 August 2000	Trading of futures and options on Nifty to commence at SIMEX.

Q5.6: Why do people talk about "starting derivatives in India" if some derivatives already exist?

A: It is useful to note here that *there are no exchange-traded financial derivatives* in India today. Neither the dollar-rupee forward contract (Question 5.3) nor the option-like contracts (Question 5.1) are exchange-traded. These markets hence lack centralisation of price discovery and can suffer from counterparty risk.

We do have exchanges trading derivatives, in the form of commodity futures exchanges. However, they do not use financials as underlyings.

In this sense, the index futures market will be the first *exchange–traded* derivatives market, which uses a *financial* underlying. ●●

Q5.7: How did we get to where we are in derivatives in India?

A: Table 5.1 offers a chronology of the developments in derivatives in India in the 1990s. ●●

Chapter 6

Equity derivatives

Q6.1: Worldwide, what kinds of derivatives are seen on the equity market?

A: Worldwide, the most successful equity derivatives contracts are index futures, followed by index options, followed by security options. ●●

Also see: Gorham (1994).

Q6.2: At the individual stock level, are futures or options better?

A: Internationally, options on individual stocks are commonplace; futures on individual stocks are rare. This is partly because regulators (e.g. in the US) frown upon the idea of doing futures trading on individual stocks. ●●

Q6.3: Why have index derivatives proved to be more important than individual stock derivatives?

A: Security options are of limited interest because the pool of people who would be interested (say) in options on ACC is limited. In contrast, *every single person* with any involvement in the equity market is affected by index fluctuations. Hence risk-management using index derivatives is of far more importance than risk-management using individual security options.

This goes back to a basic principle of financial economics. *Portfolio* risk is dominated by the market index, regardless of the composition of the portfolio. All portfolios of around ten stocks or more have a pattern of risk where 70% or more of their risk is index-related. Hence investors are more interested in using *index*–based derivative products.

Index derivatives also present fewer regulatory headaches when compared to leveraged trading on individual stocks. Internationally, this has led to regulatory encouragement for index futures and discouragement against futures on individual stocks. ●●

Chapter 7

Index futures

Q7.1: How do futures trade?

A: In the cash market, the basic dynamic is that the issuer puts out paper, and people trade this paper. In contrast, with futures (as with all derivatives), there is no issuer, and hence, there is no fixed issue size. The net supply of all derivatives contracts is 0. For each buyer, there is an equal and opposite seller. A contract is born when a buyer and a seller meet on the market.

The total number of contracts that exist at a point is called *open interest*. ●●

Q7.2: How would a seller "deliver" a market index?

A: On futures markets, open positions as of the expiration date are normally supposed to turn into delivery by the seller and payment by the buyer.

It is not feasible to deliver the market index. Hence open positions are squared off in cash on the expiration date, with respect to the spot Nifty. Specifically, on the expiration date, the last mark to market margin is calculated with respect to the spot Nifty instead of the futures price. ●●

Q7.3: What products will be traded on NSE's market?

A: Three Nifty futures contracts will trade at any point in time, expiring in three near months. The expiration date of each contract will be the last thursday of the month.

For example, in January 1996 we will see three tradeable objects at the same time: a Nifty futures expiring on 25 January, a Nifty futures expiring on 29 February, and a Nifty futures expiring on 28 March.

The three futures trade completely independently of each other. Each has a distinct price and a distinct limit order book.

Hence, once this market trades, there would be *four* distinct prices that can be observed: the Nifty spot, and three Nifty futures prices. ●●

Also see: Chauhan (1998).

Q7.4: What is the market lot?

A: The market lot is 200 nifties. A user will be able to buy 200 or 400 nifties, but not 300 nifties. If Nifty is at 1500, the smallest transaction will have a notional value of Rs.300,000. ●●

Q7.5: What kind of margins do we expect to see?

A: The initial (upfront) margin on trading Nifty is likely to be around 7% to 8%. Thus, a position of Rs.300,000 (around 200 nifties) will require up–front collateral of Rs.21,000 to Rs.24,000.

Nifty futures at SIMEX will probably involve a somewhat lower initial margin as compared with Nifty futures at NSE. Since the BSE Sensex is more volatile than Nifty, a higher initial margin will be required for trading it.

The daily mark–to–market margin will be similar to that presently seen on the cash market, with two key differences:

- As is presently the case, mark-to-market losses will have to be paid in by the trader to NSCC. However, mark-to-market *profits* will be *paid out* to traders by NSCC – this is not presently done on the cash market.

- Hedged futures positions will attract lower margin – if a person has purchased 200 October nifties and sold 200 November nifties, he will attract much less than 7–8% margin. In the present cash market, all positions attract 15% initial (upfront) margin from NSCC, regardless of the extent to which they are hedged.

●●

Q7.6: Isn't this level of leverage much more dangerous than what we presently see on NSE?

A: Individual stocks are more volatile, and more vulnerable to manipulative episodes such as short squeezes. Hence, highly leveraged trading on individual stocks is fraught with problems. In contrast, the index futures/options are cash settled, and are based on an underlying (the index) which is hard to manipulate. ●●

Q7.7: Who are the users of index futures?

A: As with all derivatives, there are (a) speculators, (b) hedgers and (c) arbitrageurs.

Speculators would make forecasts about movements in Nifty or movements in futures prices.

Hedgers would take buy or sell positions on Nifty futures in offsetting equity exposure that they have, which they consider undesirable.

Arbitrageurs lend or borrow money from the market, depending on whether rates of return are attractive. ●●

Q7.8: What kind of liquidity is expected on index derivatives markets?

A: Impact cost on index derivatives markets is likely to be much smaller than that seen on the spot index. One thumb rule which is commonly used internationally is that transactions costs on trading index futures are around one–tenth the cost of trading the spot index. When this level of liquidity is attained, we will be able to trade Rs.1 million of Nifty futures in a market impact cost of 0.01%.

High liquidity is the essential appeal of index derivatives. If trading on the spot market were cheap, then many portfolio modifications would get done there itself. However, because transactions costs on the cash market are high, using derivatives is an appealing alternative. ●●

Chapter 8

Futures pricing

Q8.1: What determines the fair price of a derivative?

A: The fair price of a derivative is the price at which profitable arbitrage is infeasible. In this sense, arbitrage (and arbitrage alone) determines the fair price of a derivative: this is the price at which there are no profitable arbitrage opportunities. ●●

Q8.2: What determines the fair price of an index futures product?

A: The pricing of index futures depends upon the spot index, the cost of carry, and expected dividends. For simplicity, suppose no dividends are expected, suppose the spot Nifty is at 1000 and suppose the one–month interest rate is 1.5%. Then the fair price of an index futures contract that expires in a month is 1015. ●●

Q8.3: What is 'basis'?

A: The difference between the spot and the futures price is called the *basis*. When a Nifty futures trades at 1015 and the spot Nifty is at 1000, "the basis" is said to be Rs.15 or 1.5%. ●●

Q8.4: What is "basis risk"?

A: Basis risk is the risk that users of the futures market suffer, owing to unwanted fluctuations of the basis. In the ideal futures market, the basis should reflect interest rates, and interest rates alone. In reality, the basis fluctuates within a band. These fluctuations reduce the usefulness of the futures market for hedgers and speculators. ●●

Q8.5: What happens if the futures are trading at Rs.1025 instead of Rs.1015?

A: This is an error in the futures price of Rs.10.

An arbitrageur can, in principle, capture the mispricing of Rs.10 using a series of

transactions. He would (a) buy the spot Nifty, (b) sell the futures, and (c) hold till expiration. This strategy is equivalent to risklessly lending money to the market at 2.5% per month. As long as a person can borrow at 1.5%/month, he would be turning a profit of 1% per month by doing this arbitrage, without bearing any risk. ●●

Q8.6: What happens if the futures are trading at Rs.1005 instead of Rs.1015?

A: This is an error in the futures price of Rs.10.

An arbitrageur can, in principle, capture the mispricing of Rs.10 using a series of transactions. He would (a) sell the spot Nifty, (b) buy the futures, and (c) hold till expiration. This is equivalent to borrowing money from the market, using (Nifty) shares as collateral, at 0.5% per month. As long as a person can lend at 1.5%/month, he would be turning a profit of 1% per month by doing this arbitrage, without bearing any risk. ●●

Q8.7: Are these pricing errors really captured by arbitrageurs?

A: In practice, arbitrageurs will suffer transactions costs in doing Nifty program trades. The arbitrageur suffers one market impact cost in entering into a position on the Nifty spot, and another market impact cost when exiting. As a thumb rule, transactions of a million rupees suffer a one–way market impact cost of 0.1%, so the arbitrageur suffers a cost of 0.2% or so on the roundtrip. Hence, the actual return is lower than the apparent return by a factor of 0.2 percentage points or so. ●●

Q8.8: What kinds of arbitrage opportunities will be found in this fashion?

A: The international experience is that in the first six months of a new index futures market, there are greater arbitrage opportunities that lie unexploited for relatively longer. After that, the increasing size and sophistication of the arbitrageurs ensures that arbitrage opportunities vanish very quickly. However, the international experience is that the glaring arbitrage opportunities only go away when extremely large amounts of capital are deployed into index arbitrage. See Peters (1985), Figlewski (1984), and Brenner, Subrahmanyam & Uno (1990). ●●

Q8.9: What kinds of interest–rates are likely to show up on the index futures market – will they be like badla financing rates?

A: Arbitrage in the index futures market involves having the clearing corporation (NSCC) as the legal counterparty on both legs of the transaction. Hence the credit risk involved here will be *equal to the credit risk of NSCC*. This is in contrast with the risks of badla financing. ●●

Chapter 9

Program trading

Q9.1: You say “buying Nifty”. How do you buy a market index?

A: A market index is just a portfolio of all the stocks in the index, where the weightage given to each stock is proportional to its market capitalisation. Hence “buying Nifty” is equivalent to buying all 50 stocks, in their correct proportions.

To take one example, suppose Reliance has a 7.14% weight in Nifty, suppose the price of Reliance is Rs.108 and we are buying Rs.1 million of Nifty. This means that we need to buy 661 shares of Reliance. ●●

Q9.2: Won’t that be a lot of time–consuming typing, placing 50 orders by hand?

A: These orders should not be placed “by hand”. In the time that it would take to place 50 orders, market prices would move, generating execution risk.

A rapid placement of a batch of orders is called *program trading*. NSE’s NEAT software (which is used for trading on the cash market) supports this capability. However, even though NSE is a fully electronic market, the time taken in doing program trades is quite high (around two to three minutes to do a Nifty program trade). This compares poorly against stock exchanges elsewhere in the world. ●●

Also see: Canina & Figlewski (1995).

Q9.3: Isn’t program trading dangerous or somehow unhealthy?

A: Program trading replaces the tedium, errors, and delays of placing 50 orders “by hand”. If program trading didn’t exist, these orders would be placed manually. It’s hard to see how this automation can be dangerous. ●●

Also see: Kleidon & Whaley (1992).

Chapter 10

Choice of index

Q10.1: What makes a good stock market index for use in an index futures and index options market?

A: Several issues play a role in terms of the choice of index.

Diversification A stock market index should be well–diversified, thus ensuring that hedgers or speculators are not vulnerable to individual company– or industry–risk. This diversification is reflected in the Sharpe's Ratio of the index.

Liquidity of the index The index should be easy to trade on the cash market. This is partly related to the choice of stocks in the index. High liquidity of index components implies that the *information* in the index is less noisy.

Liquidity of the market Index traders have a strong incentive to trade on the market which supplies the prices used in index calculations. This market should feature high liquidity and be well designed in the sense of supplying operational conveniences suited to the needs of index traders.

Operational issues The index should be regularly maintained, with a steady evolution of securities in the index to keep pace with changes in the economy. The calculations involved in the index should be accurate and reliable. When a stock trades at multiple venues, index computation should be done using prices from the most liquid market.

●●

Q10.2: How do we compare Nifty and the BSE Sensex from this perspective?

A: Nifty has a higher Sharpe's ratio. Nifty is a more liquid index. Nifty is calculated using prices from the most liquid market (NSE). NSE has designed features of the trading

system to suit the needs of index traders. Nifty is better maintained. Nifty is used by three index funds while the BSE Sensex is used by one. ●●

Q10.3: Why does liquidity matter for a market index?

A: At one level a market index is used as a pure economic time-series. Liquidity affects this application via the problem of non-trading. If some securities in an index fail to trade today, then the level of the market index obtained reflects the valuation of the macroeconomy today (via securities which traded today), but is contaminated with the valuation of the macroeconomy yesterday (via securities which traded yesterday). This is the problem of *stale prices*. By this reasoning, securities with a high trading intensity are best-suited for inclusion into a market index.

As we go closer to applications of market indexes in the indexation industry (such as index funds, or sector-level active management, or index derivatives), the market index is not just an economic time-series, but a portfolio which is traded. The key difficulty faced here is again liquidity, or the transactions costs faced in buying or selling the entire index as a portfolio. ●●

Also see: Shah & Thomas (1998).

Q10.4: What transactions costs do we see in trading Nifty?

A: It turns out that it is efficient for arbitrageurs to trade Nifty in transaction sizes of Rs.1 million. At a transaction size of Rs.1 million, the one–way market impact cost in doing trades on Nifty is generally around 0.1%. This means that when Nifty is at 1000, the buyer ends up paying 1001 and the seller gets 999. ●●

Q10.5: Apart from Nifty, what other indexes are candidates for index funds, index futures and index options?

A: Dollar Nifty (Nifty re–expressed in dollars) is an interesting index, one that reflects the combination of movements of Nifty and fluctuations of the exchange rate.

Nifty Junior is the second–tier of fifty large, liquid, stocks; they are the best stocks in terms of liquidity and market capitalisation which did not make it into Nifty. The construction of Nifty and Nifty junior is done in such a way that no stock will ever figure in both indexes. ●●

Chapter 11

Hedging

Q11.1: Who needs hedging using index futures?

A: The general principle is: you need hedging using index futures when your exposure to movements of Nifty is not what you would like it to be. If your index exposure is lower than what you like, you should buy index futures. If your index exposure is higher than what you like, you should sell index futures. ●●

Q11.2: When might I find that my index exposure is not what it should be?

A: A few situations are:

- You are a speculator about an individual stock or an industry.
- You have an equity portfolio and become uncomfortable about equity market risk for the near future.
- You expect to obtain funds at a known future date, but you would like to lock in on equity investments right now at present prices.
- You have underwritten an IPO and are vulnerable to losses if the market crashes and the IPO devolves on you.
- You are uncomfortable with the vulnerabilities of your business, where cashflows swing dramatically with movements of Nifty.

●●

Q11.3: I am a speculator about an individual stock. What is my unwanted index exposure?

A: Suppose you have a forecast that the price of INFOSYSTCH will rise. As a speculator on an individual stock, you have purchased INFOSYSTCH.

This position can go wrong for two reasons:

Core risk You were wrong in your understanding of INFOSYSTCH, and the price fails to rise.

Extraneous risk Nifty falls owing to some macroeconomic development.

Every stock speculator suffers from the extraneous risk of movements in Nifty. A buy position on INFOSYSTCH tends to goes wrong when Nifty drops. A sell position on INFOSYSTCH tends to goes wrong when Nifty rises. This vulnerability to Nifty has nothing to do with the core interest of a stock speculator, which is valuation and forecasting of individual stocks.

The position BUY INFOSYSTCH contains an unwanted index exposure embedded inside it. Every speculator who has purchased INFOSYSTCH is actually BUY INFOSYSTCH + BUY NIFTY whereas what he really wants is to only be BUY INFOSYSTCH. ●●

Q11.4: What does a speculator on an individual stock do?

A: A person who has forecasted INFOSYSTCH is not interested in being a speculator on Nifty. He should remove this risk. This is done by selling Nifty futures. The position BUY INFOSYSTCH + SELL NIFTY FUTURES is a focussed position which is only about INFOSYSTCH.

This is easily done in practice. Every speculative buy position should be coupled with an equal sell position on Nifty. Every speculative sell position should be coupled with an equal buy position on Nifty.

Suppose you are long 100 shares of INFOSYSTCH and the share price is Rs.9,000, when the nearest Nifty futures is at Rs.1500. The position is worth Rs.900,000. Hedging away the Nifty exposure in this requires selling Rs.900,000 of Nifty. Translating this into a position on the index futures market, we have 900000/1500 = 600 nifties. So you would couple your position of "buy 100 shares of Infosys" with a hedging position: "sell 600 nifties".

This hedging reduces the risk involved in stock speculation. It is good for the stock speculator (who faces less risk), for the brokerage firm (which faces a lesser risk of default by the client), for the clearing corporation (which faces less vulnerable brokerage firms) and for the economy (the systemic risk in the capital markets comes down, and level of resources deployed into analysing and forecasting stocks goes up). ●●

Q11.5: There are several index futures trading at the same time – which one should I use?

A: Sometimes, the forecast horizon generates constraints. If you have a two–month view, then a futures contract that has only a few weeks of life left might be inconvenient.

Another major issue is liquidity. Other things being equal, it is always better to use the contract with the tightest bid–ask spread. ●●

Q11.6: I have an equity portfolio and am uncomfortable about equity market fluctuations for the near future. What can I do?

A: You can sell Nifty futures.

The Nifty futures earn a profit if Nifty drops, which offsets the losses you make on your core equity portfolio. Conversely, if Nifty rises, your core equity portflio does well but the futures suffer a loss.

When you have a equity portfolio and you sell Nifty futures, *you are hedged*: whether Nifty goes up or down, you become neutral to it.

This is not a recipe for making money; it is a recipe for eliminating exposure (risk). ●●

Q11.7: I expect to obtain funds at a known future date, but I would like to lock in on equity investments right now at present prices. What can I do?

A: You can buy Nifty futures today.

This ensures that you get a lock–in on current share prices.

When you get funds, and start getting invested in the equity market, you would close-out your futures position at the same time. ●●

Q11.8: I am uncomfortable with the vulnerability of my business, where cashflows swing dramatically with movements of Nifty. What can I do?

A: You can sell Nifty to reduce your vulnerability to Nifty.

Suppose your wealth normally drops by Rs.100,000 for each percentage point fall in Nifty. A sell position for Rs.10,000,000 in Nifty futures stands to gain Rs.100,000 for each percentage point fall in Nifty. This gives you a hedge against your core business exposure.

A similar strategy works for an IPO underwriter who stands to lose if Nifty crashes and the IPO devolves on him. ●●

Q11.9: How can these calculations about index exposure be done more accurately?

A: Every stock or portfolio or position has a number called “beta”. Beta measures the vulnerability to the index.

ITC has a beta of 1.2. This means that, on average, when Nifty rises by 1%, ITC rises by 1.2%. In this case, a stock speculator with a position of Rs.1 million on ITC requires a hedge of Rs.1.2 million (not just Rs.1 million) of Nifty in order to eliminate his Nifty risk.

Hindustan Lever has a beta of 0.8. This means that a stock speculator who has a sell on Rs.1 million on HLL requires to buy Rs.0.8 million of Nifty (not Rs.1 million).

If you know nothing about a stock or a portfolio, it is safe to guess that the beta is 1. The average beta of all stocks or all portfolios is 1. If beta can be observed or measured, then this hedging becomes more accurate; however, this is not easy since accurate beta calculations are fairly difficult, especially for illiquid stocks. Tables of betas of all

stocks in Nifty and Nifty Junior are available from NSE and from `http://www.nse-india.com` ●●

Q11.10: How can Nifty futures be used for interest rate trading?

A: The basis between the spot Nifty and the 1 month Nifty futures reflects the interest rate over the coming month. If interest rates go up, the basis will widen. A buy position on the futures and a sell on the spot Nifty stands to gain if interest rates go up, while being immune to movements in Nifty. Similar positions can be used against the two–month and three–month futures to take views on other spot interest rates on the yield curve.

Similar strategies can be applied for trading in *forward interest rates*, using the basis between the one–month and two–month futures, the one–month and three–month futures, etc. ●●

Q11.11: When does hedging go wrong?

A: Hedgers fear basis risk. Basis risk is about Nifty futures prices moving in a way which is not linked to the Nifty spot.

An unhedged position suffers from price risk; the hedged position suffers from basis risk. Of course, basis risk is generally much smaller than price risk, so that it is better to hedge than not to hedge. However basis risk does detract from the usefulness of hedging using derivatives. ●●

Q11.12: What influences basis risk?

A: A well designed index, and a well–designed cash market for equities, serve to minimise basis risk. See Question 10.1. ●●

Q11.13: What do we know about Nifty and the BSE Sensex in their usefulness on hedging?

A: Nifty has higher hedging effectiveness for typical portfolios of all sizes. Nifty also requires lower initial margin (since it is less volatile) and is likely to enjoy lower basis risk (owing to the ease of arbitrage). ●●

Chapter 12

Arbitrage

Q12.1: How do I lend money into the futures market?

A:

- Buy a million rupees of Nifty on the spot market. Pay for them, and take delivery. When you make the payment, you are "giving a loan".
- Simultaneously, sell off a million rupees of Nifty futures.
- Hold these positions till the futures expiration date.
- On the futures expiration date, sell off the Nifty shares on the spot market. When you get paid for these, you are "getting your loan repaid".

●●

Q12.2: When is this attractive?

A: This is worth doing when the interest rate obtained by lending into the futures market is higher than that which can be obtained through alternative riskless lending avenues.●●

Q12.3: How do I borrow money from the futures market, using shares as collateral?

A:

- Sell a million rupees of Nifty on the spot market. Make delivery, and get paid. This is your "borrowed funds".
- Simultaneously, buy a million rupees of Nifty futures.
- Hold these positions till the futures expiration date.
- On the futures expiration date, buy back the Nifty shares on the spot market. When you pay for them, you are "repaying your loan".

●●

Q12.4: When is this attractive?

A: This is worth doing when the interest rate obtained by borrowing from the futures market is lower than that which can be obtained through alternative fully collateralised borrowing avenues. ●●

Q12.5: Is there a compact thumb–rule through which I can visualise the interest rates actually available in lending to the index futures market?

A: Suppose Nifty is at 1500 and a futures product which expires within 30 days is trading at 1520. At first, this looks like a return of Rs.20 on a base of Rs.1500 for a one–month holding period. However, you should subtract out the transactions costs that you will suffer on doing two trades on the Nifty spot. Suppose we assume a transaction size of Rs.1 million. In this case, it's safe to assume transactions costs of roughly 0.1% (or Rs.1.5) each.

Hence, you will actually get only 20 - 1.5 - 1.5 or Rs.17 on a base of Rs.1500. This is a return of 1.13% for a one–month holding period, or 14.48% annualised. Thinking in terms of the actual transaction, you would lend Rs.1,000,000 into the market, and get back Rs.1,011,333 after a month.

This thumb–rule ignores the dividends obtained on the shares you hold for the month. Dividend payments in India are highly bunched towards the year–end. At other times of the year, it's safe to ignore dividends in a thumb–rule. ●●

Q12.6: *Exactly* what is the time–period for which we calculate the interest cost?

A: Suppose we are on 12 June 2000 (a Monday) and we have purchased the spot, and sold the near futures (which expires on 29 June 2000). We will only need to put up funds on Tuesday, 20 June 2000. The shares are sold on the spot market on 29 June 2000 (Thursday). These turn into funds on 11 July 2000 (Tuesday). Hence, the overall period for which funds are invested is from 20 June to 11 July, i.e. a holding period of 22 days. Hence, the cost of carry should be applied for a 22 day holding period. ●●

Q12.7: Can it happen that a Nifty futures is cheaper than the Nifty spot?

A: Suppose the Nifty spot is the same as the price of the three month futures, i.e. that the basis is zero. This means that the futures market is willing to give you a loan (against a Nifty portfolio as collateral) for a three–month period at an interest rate of zero.

If the Nifty futures is *cheaper* than the Nifty spot, it means that the futures market is willing to pay you if you borrow money.

Many people in India would be very happy to borrow (against a Nifty portfolio as collateral) at a zero or negative interest rate. When they step into futures market to do so,

they will buy the futures and sell the spot. That will push futures prices away from these weird states.

Nothing forbids these weird states (negative or zero basis). It's just that they are extremely attractive arbitrage opportunities and are unlikely to lie around for long. ●●

Q12.8: These transactions look exactly like a "stock repo" to me.

A: Index arbitrage is indeed an "index repo", with one key difference. Repos normally involve counterparty risk. In index arbitrage, you face near–zero risk with NSCC as the counterparty. ●●

Q12.9: Why are these borrowing/lending activities called "arbitrage"?

A: They involve a sequence of trades on the spot and on the index futures market. Yet, they are completely riskless. The trader is simultaneously buying at the present and selling off in the future, or vice versa. Regardless of what happens to Nifty, the returns on arbitrage are the same. Since there is no risk involved, it is called arbitrage. ●●

Q12.10: Are these transactions really riskless?

A: These transactions *are* riskless insofar as the fluctuations of Nifty are concerned: no matter whether Nifty goes up or down, they will yield the identical and predictable rate of return. The rate of return you calculate at the outset is exactly what will come out at the end.

However, they involve the credit risk of the clearing corporation. When you do arbitrage on NSE, you are exposed to the risk that the National Securities Clearing Corporation (NSCC) – which is the legal counterparty to all your trades – might be unable to meet its obligations.

The required rate of return in lending to NSCC is the interest rate from the Government of India yield curve, with a credit risk premium for NSCC added into it. If the 90–day interest rate on the GOI yield curve is 7%, and if you believe that NSCC requires a credit risk premium of one percentage point, then the three–month futures should involve an interest rate of 8%. ●●

Q12.11: What's the probability that NSCC will default?

A: Internationally, clearing corporations calibrate their risk containment system so that failures are expected to take place roughly once or twice in each fifty years.

The track record of futures clearing corporations internationally is impressive. In the 20th century, we have seen just a handful of failures (e.g. Hong Kong in 1987).

NSCC has a short track record: it has been doing novation on the "equity spot market" (which is actually a futures market) from 1996 onwards. In these five years, the equity market has experienced high volatility, a high incidence of bankruptcies by NSE brokerage firms, payments problems on other exchanges, etc. NSCC has successfully

shouldered the task of doing novation on India's largest financial market (NSE). While this suggests that NSCC may have fairly sound risk containment systems, we should be cautious since it only has a track record of five years of doing novation. ●●

Also see: Gemmill (1994).

Q12.12: What do we know about the risks of BSE's clearing-house?

A: BSE has no experience with novation. Today, equity trading at BSE takes place without novation. BSE has experienced payments problems fairly recently. ●●

Q12.13: What do we know about Nifty and the BSE Sensex on the question of arbitrage?

A: The market impact cost in trading the BSE Sensex is higher, for two reasons: index construction and trading venue. Even if BSE Sensex trades were done on NSE, the impact cost faced in trading the BSE Sensex is higher than that of Nifty. In addition, arbitrageurs working on the BSE Sensex would be forced to trade at the less liquid market, the BSE.

The BSE lacks a credit enhancement institution of the credibility of NSCC.

These problems imply that arbitrageurs working on the BSE Sensex will demand a higher credit risk premium, and require larger pricing errors in order to compensate for the larger transactions costs. Hence, the BSE Sensex futures are expected to show lower market efficiency and greater basis risk. ●●

Chapter 13

Speculation

Q13.1: How does one speculate using index futures?

A: There are several kinds of speculation that are possible – forecasting movements of Nifty, forecasting movements in Nifty futures prices, and forecasting interest rates. ●●

Q13.2: What is involved in forecasting Nifty?

A: Nifty is a well–diversified portfolio of companies that make up 54% of the market capitalisation of India. The diversification inside Nifty serves to "cancel out" influences of individual companies or industries.

Hence Nifty, as a whole, reflects the overall prospects of India's corporate sector and India's economy. Nifty moves with events that impact India's economy. These include politics, macroeconomic policy announcements, interest rates, money supply and budgets, shocks from overseas, etc. Shah & Thomas (1999*c*) offer some time–series econometrics applied to Nifty. ●●

Q13.3: I have a forecast about Nifty. What can I do?

A: If you have a forecast that Nifty will go up, buy Nifty futures. If you have a forecast that Nifty will go down, sell Nifty futures. ●●

Q13.4: There are several index futures trading at the same time – which one should I use?

A: Sometimes, the forecast horizon generates constraints. If you have a two–month view, then a futures contract that has only a few weeks of life left might be inconvenient.

Another major issue is liquidity. Other things being equal, it is always better to use the contract with the tightest bid–ask spread. ●●

Q13.5: I have a forecast that Nifty will rise, and I buy Nifty futures. What can go wrong now?

A: Two scenarios are unfriendly to the speculator. The obvious problem is where Nifty fails to rise as forecasted. But sometimes, even if Nifty rises, the futures price may not move in sympathy.

A speculator may make a loss, owing to a slight fall in the futures price, even though there was a slight rise in Nifty. This problem is called *basis risk*.

Sometimes, the speculator may be right in essence – and good news about the macroeconomy does appear – but may lose money in practice because the index is badly constructed and does not reflect shocks to the macroeconomy. ●●

Q13.6: How can these risks be minimised?

A: Basis risk is minimised by having a well–designed index where the index is highly liquid and the underlying spot market is well thought out and highly liquid. The index accurately tracks the macroeconomy when it is as large as possible while avoiding illiquid stocks, it is regularly maintained, and accurate in terms of data reliability. See Question 10.1. ●●

Q13.7: I have a forecast about a change in a Nifty futures price. What can I do?

A: If you think the futures price will go up, buy the futures. If you think the futures price will go down, sell the futures. ●●

Q13.8: How does one forecast the *Nifty futures price*, as distinct from forecasting Nifty?

A: The speculator who works on movements of the *futures price* makes calculations for the fair value of the futures, after carefully accounting for interest rates, initial margin requirements and transactions costs faced by arbitrageurs, and dividend forecasts.

If, based on this analysis, the speculator feels that arbitrageurs are going to lend money to the market (i.e. buy the spot Nifty and sell the futures), then he has a forecast that the futures price will drop.

Such a speculator is front–runing against the arbitrageurs by selling Nifty futures before they do so. ●●

Q13.9: I have a forecast that interest rates will rise. What can I do with the Nifty futures market?

A: The basis between (say) the spot Nifty and the 1 month Nifty futures reflects the interest rate over the coming month. If interest rates go up, the basis will widen. A buy position on the futures coupled with a sell on the spot Nifty represents a view that the basis will widen.

The difference between the two month and three month futures reflects the forward interest rate for 30 days, two months from now. Interest rate views can be expressed using this also. ●●

Chapter 14

Intermediation

Q14.1: What kinds of intermediaries are found on the index futures market?

A: There are two kinds of brokerage firms on the index futures market: trading members (TMs) and clearing members (CMs). NSCC only deals with clearing members: NSCC bears the full risk of default by a clearing members. Trading members obtain the right to trade through a clearing member; the CM adopts the full credit risk of the TM. If a TM fails, NSCC holds the relevant CM responsible.

CMs don't need to be brokerage firms; entities such as banks or SHCIL are CMs. ●●

Q14.2: How is derivatives intermediation different from that on the equity spot market?

A: There are a few key differences between intermediation on the equity spot market as compared with the derivatives market:

- Certification of employees is mandatory on the derivatives market from the outset. In contrast, certification requirements on the equity spot market are only gradually being phased in. Anyone who actually obtains a password from NSE and trades on the futures market has to have obtained a score of above 60 on the "NCFM F&O" certification examination.

- The equity spot market is primarily focused upon execution. Users of the market generally know what shares they want to buy/sell, and they only look to the broker to do the low–skill job of trade execution. In contrast, for the forseeable future, users in the index futures and options market will turn to the brokerage firm for advice and analytical support in the context of their derivatives trading. It will be typical to see a user who has a buy on HINDLEVER hedging away his Nifty exposure, *upon the advice of the stock broker*.

- On NSE's equity market, the broker is both trading member and clearing member. On the futures market, we will see a clear specialisation coming about, where firms

with a focus upon customers will become "trading members", and get their clearing and settlement services from clearing members. Banks will be important in being clearing members.

- On the equity market, the settlement process using physical shares and (to a much lesser extent) using the depository implies that the typical brokerage firm has a large staff which processes settlement activities. Index futures and options are cash settled, so the staffing patterns in the brokerage firm will be quite different.

●●

Q14.3: What's the role for mutual funds in the index futures and index options market?

A: There are numerous areas where mutual funds benefit from index futures and index options:

- Index funds can directly use index futures in implementing index funds. When funds come in, the index fund can just buy index futures, and gradually unwind the futures position as the spot market trading is done.
- All mutual funds can excel in reverse-cash-and-carry arbitrage, where full Nifty baskets are sold off on the spot market and bought back at future dates.
- Mutual funds can hedge when their index views are adverse. If a fund feels that Nifty will fare poorly, it can sell Nifty futures and reduce its index exposure. Conversely, it can increase its index exposure when it feels that Nifty will do well.
- Income funds and money market funds can invest money into the Nifty futures market.
- Once index options come about, mutual funds can offer "guaranteed return products", by bundling a Nifty index fund with a Nifty put option. Conversely, funds can be designed by bundling a core investment in government securities with an investment in a Nifty call option: these funds would have a pure upside if equities do well.

See Nayak (1998), Thomas (1997), Mason, Merton, Perold & Tufano (1995). ●●

Chapter 15

Policy issues

Q15.1: Are many developing countries developing derivatives exchanges?

A: There are many attempts at starting derivatives exchanges. As with spot exchanges, there have been relatively few successes in terms of obtaining highly liquid markets. See Tsetsekos & Varangis (1997) and van der Bijl (1996). ●●

Q15.2: Does derivatives trading throw up new threats to the financial system?

A: Derivatives trading does bring a whole new class of leveraged positions in the economy. From a systemic risk standpoint, however, there are no externalities or contagion when we consider exchange–traded derivatives with novation at the clearing corporation.

In fact, to the extent that equity derivatives make it easier for policy makers to eliminate leverage on India's equity *spot* market, it will help reduce the vulnerability of India's equity market.

It is with OTC derivatives that there are more serious policy concerns, about the extent to which a few large failures can destabilise the financial system. This is because OTC derivatives innately involve credit risk, and there is a clear channel for contagion – where the failure of one firm impacts upon its counterparties. ●●

Also see: Steinherr (1998).

Q15.3: What about market manipulation on derivatives markets?

A: Futures or options based on physical delivery (as opposed to cash settlement) are vulnerable to "short squeezes" and other manipulative schemes. For example, there was a famous effort to corner the world market for silver, partly using the silver futures market (Houthakker & Williamson 1996*b*). These dangers require a strong supervisory mecha-

nism to deal with market manipulation. ●●

Also see: Williams (1995).

Q15.4: What is the direction for policy in regard of the equity derivatives and spot markets?

A: We can expect the equity spot market to move towards rolling settlement (i.e. to become closer to a spot market). We can expect a regulatory prohibition of *badla*, as part of the migration into a genuine spot market. In the area of exchange–traded derivatives, index options are the logical next stepping stone for India's markets. ●●

Also see: Shah & Thomas (1999*a*).

Q15.5: What is the progress in terms of exchange–traded currency and interest–rate derivatives?

A: None. ●●

Q15.6: Are derivatives on Indian assets traded outside India?

A: In Hong Kong and Singapore, there are cash–settled forwards on the dollar–rupee exchange rate, called "non–deliverable forwards".

The Singapore Monetary Exchange (SIMEX) has chosen Nifty in order to trade products based on an Indian index. This is a significant development, considering the success at SIMEX in competing against the home–country index futures market in Japan and Taiwan. ●●

Q15.7: What is the implication of Nifty futures and options trading at SIMEX for India?

A: From an Indian perspective, it helps FDI and FII inflows into India, since investors would have an additional avenue through which "India risk" can be hedged. Trades on SIMEX would be convenient and hassle–free for the international investor, when compared with the operational frictions involved in doing trades in India.

From an NSE perspective, SIMEX represents competition. If SIMEX offers a superior market design, more efficient transacting, and a less onerous regulatory structure, it will take order flow away from NSE.

SIMEX will also impose stress upon India's regulatory apparatus. For example, SIMEX will trade Nifty futures and options from the outset, while India's regulators have not yet permitted options trading. Similarly, if India's regulators are confused on questions such as margin setting, then many users will have the choice of walking away from NSE to SIMEX. ●●

Q15.8: How will the two markets interact?

A: There be arbitrage opportunities between the two markets. A large buy order going to SIMEX will push up the price of Nifty futures at SIMEX. Then arbitrageurs will step

in, selling Nifty futures at SIMEX and buying Nifty futures at NSE. This could, in turn, propagate back to the NSE cash market through normal spot–futures arbitrage in India.

Arbitrage involving options at SIMEX be done in two ways. An arbitrageur could choose to do trades between Nifty options (SIMEX) and Nifty futures (SIMEX). Alternatively, if Nifty futures are much more liquid, then the arbitrageur could choose to do trades between Nifty options (SIMEX) directly to Nifty futures (NSE). ●●

Also see: Stoll & Whaley (1990).

Q15.9: Is SIMEX a serious threat to NSE?

A: If we consider the pure merits of the market, then the great mass of retail traders in India is likely to generate liquidity at NSE in a way that SIMEX cannot access. The international experience is that in countries which have a strong tradition of retail trading on financial markets, offshore trading does not present a major threat to the local market, which dominates price discovery. NSE is dominated by retail trading, and has had peak stock market trading of $2 billion, which is enormous by world standards.

The major question mark is about margins and regulation. It took NSE five years to get permissions to do index futures trading. The delay in obtaining permissions for index options has yet to be seen; SIMEX will have a head start on Nifty options. The regulatory posture in India could turn off users, and drive them off to Singapore. This is not just an idle possibility; it was the case with the Japanese Nikkei 225 futures, where stifling regulation in Japan led to a flowering of futures liquidity in Singapore.

In summary, as with the Nikkei 225, the success of SIMEX will depend upon a combination of Indian retail dynamism, and the ability of regulators in India to comprehend derivatives and come up with a fair regulatory structure. ●●

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