Contents

Chapter 1

Basics

Q1.1: What are derivatives?

A: Derivatives, such as options or futures, are financial contracts which derive their value off a spot price time-series, which is called "the underlying". For examples, wheat farmers may wish to contract 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 on this market would be driven by the spot market price of wheat which is the "underlying". The terms "contracts" or "products" are often applied to denote the specific traded instrument.

The world over, derivatives are a key part of the financial system. The most important contract-types are futures and options, and the most important underlying markets are equity, treasury bills, commodities, foreign exchange and real estate. ●●

Q1.2: What is a forward contract?

A: In a forward contract, two parties agree to do a trade at some future date, at a stated price and quantity. No money changes hands at the time the deal is signed. ●●

Q1.3: Why is forward contracting useful?

A: Forward contracting is very valuable 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.

If a speculator has information or analysis which forecasts an upturn in a price, then she 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. The use of forward markets here supplies *leverage* to the speculator. ●●

Q1.4: What are the problems of forward markets?

A: Forward markets worldwide are afflicted by several problems: (a) lack of centralisation of trading, (b) illiquidity, and (c) counterparty risk.

In the first two of these, the basic problem 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 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-tradeable. Also the "phone 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. 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.

Even when forward markets trade standardised contracts, and hence avoid the problem of illiquidity, the counterparty risk remains a very real problem. A classic example of this was the famous failure on the Tin forward market at LME. ●●

Q1.5: What is a futures contract?

A: Futures markets were designed to solve all the three problems (a, b and c listed in Question 1.4) of forward markets. Futures markets are exactly

like forward markets in terms of basic economics.

However, contracts are standardised and trading is centralised, so that futures markets are highly liquid. There is no counterparty risk (thanks to the institution of a clearinghouse which becomes counterparty to both sides of each transaction and guarantees the trade). In futures markets, unlike in forward markets, increasing the time to expiration does not increase the counterparty risk. ●●

Also see: ?.

Q1.6: Why is the cash market in India said to have futures-style settlement?

A: In a true cash market, when a trade takes place today, delivery and payment would also take place today (or a short time later). Settlement procedures like T+3 would qualify as "cash markets" in this sense, and of the equity markets in the country, only OTCEI is a cash market by this definition.

For the rest, markets like the BSE or the NSE are classic futures market in operation. NSE's equity market, for example, is a weekly futures market with tuesday expiration. When a person goes long on thursday, he is not obligated to do delivery and payment right away, and this long position can be reversed on friday thus leaving no net obligations with the clearinghouse (this would not be possible in a T+3 market). Like all futures markets, trading at the NSE is centralised, the futures markets are quite liquid, and there is no counterparty risk. ●●

Q1.7: 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.

Options come in two varieties – european vs. 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. ●●

Also see: ?, ?.

Q1.8: What are "exotic" derivatives?

A: Options and futures are the mainstream workhorses of derivatives markets worldwide. However, more complex contracts, often called exotics, are used in more custom situations. For example, a computer hardware company may want a contract that pays them when the rupee has depreciated **or** when computer memory chip prices have risen. Such contracts are "custom-built" for a client by a large financial house in what is known as the "over the counter" derivatives market. These contracts are not exchange-traded. This area is also called the "OTC Derivatives Industry".

An *essential* feature of derivatives *exchanges* is contract standardisation. All kinds of wheat are not tradeable through a futures market, only certain defined grades are. This is a constraint for a farmer who grows a somewhat different grade of wheat. The OTC derivatives industry is an intermediary which sells the farmer insurance which is customised to his needs; the intermediary would in turn use exchange-traded derivatives to strip off as much of his risk as possible. ●●

Q1.9: How are derivatives different from *badla*?

A: Badla is closer to being a facility for borrowing and lending of shares and funds. Borrowing and lending of shares is a functionality which is part of the cash market. The borrower of shares pays a fee for the borrowing. When badla works without a strong marginning system, it generates counterparty risk, the evidence of which is the numerous payments crises which were seen in India.

Options are obviously not at all like badla. Futures, in contrast, may seem to be like badla to some. Some of the key differences may be summarised here. Futures markets avoid variability of badla financing charges. Futures markets trade distinctly from the cash market so that each futures prices and cash prices are different things (in contrast with badla, where the cash market and all futures prices are mixed up in one price). Futures markets lack counterparty risk through the institution of the clearinghouse which guarantees the trade coupled with marginning, and this elimination of risk eliminates the "risk premium" that is embedded inside badla financing charges, thus reducing the financing cost implicit inside a futures price. ●●

Q1.10: Why are derivatives useful?

A: The key motivation for such instruments is that they are useful in reallocating risk either

Badla	Futures
• Expiration date unclear • Spot market and different expiration dates are mixed up	• Expiration date known • Spot market and different expiration dates all trade distinct from each other.
• Identity of counterparty often known • Counterparty risk present	• Clearing corpn. is counterparty • No counterparty risk
• Badla financing is additional source of risk • Badla financing contains default-risk premia • Asymmetry between long and short • Position can breakdown if borrowing/lending proves infeasible	• No additional risk. • Financing cost at close to riskless thanks to counterparty guarantee • Long and short are symmetric • You can hold till expiration date for sure, if you want to

Table 1.1: A Comparison of Futures and Badla

across time or among individuals with different risk-bearing preferences.

One kind of passing-on of risk is mutual insurance between two parties who face the opposite kind of risk. For example, 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 sort of thing also takes place in speculative position taking – the person who thinks the price will go up is long a futures and the person who thinks the price will go down is short the futures.

Another style of functioning works by a risk-averse person buying insurance, and a risk-tolerant person selling insurance. An example of this may be found on the 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. Obviously, people would be very suspicious about entering into such trades without the institution of the clearinghouse which is a legal counterparty to both sides of the trade.

In these ways, derivatives supply a method for people to do hedging and reduce their risks. As compared with an economy lacking these facilities, it is a considerable gain.

The ultimate importance of a derivatives market hence hinges upon the extent to which it helps investors to reduce the risks that they face. Some of the largest derivatives markets in the world are on treasury bills (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).

Derivatives are also very convenient in terms of international investment. For example, Japanese insurance companies fund housing loans in the US by buying into derivatives on real estate in the US. Such funding patterns would be harder without derivatives. ●●

Q1.11: What are the instruments traded in the derivatives industry, and what are their relative sizes?

A: This information is summarised in Tables 1.2 and 1.3 which are drawn from ?. ●●

Q1.12: 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. ●●

Q1.13: At the security level, are futures or options better?

A: The international experience is that at the security level, options markets are almost always more successful than futures markets. ●●

Q1.14: Why have index derivatives proved to be more important than security 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* in the financial area 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 finan-

	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 (Outstanding Contracts, $ billion)

cial economics. *Portfolio* risk is dominated by the market index, regardless of the composition of the portfolio. In other words, all portfolios of around ten stocks or more have a pattern of risk where 80% or more of their volatility is index-related. In such a world, investors would be more interested in using *index*–based derivative products rather than security-based derivative products. The actual experience of derivatives markets worldwide is completely in line with this expectation. ●●

Also see: ?.

Q1.15: Who uses index derivatives to reduce risk?

A: There are two important types of people who may not want to "bear the risk" of index fluctuations:

- *A person who thinks Index fluctuations are peripheral to his activity*

  For example, a person who works in primary market underwriting effectively has index exposure – if the index does badly, then the IPO could fail – but this exposure has nothing to do with his core competence and interests (which are in the IPO market). Such a person would routinely use measure his index exposure on a day-to-day basis, and index derivatives to strip off that risk. If full-fledged bookbuilding becomes important in India, then there is a very important role for index derivatives in the "price stabilisation" that the underwriter does in the bookbuilding process (see ? for an exposition about bookbuilding).

  Similarly, a person who takes positions in individual stocks implicitly suffers index exposure. A person who is long ITC is effectively long ITC *and* long Index. If the index does badly, then his "long ITC" position suffers. A person like this, who is focussed on ITC and is not interested in taking a view on the Index would routinely measure the index exposure that is hidden inside his ITC exposure, and use index derivatives to eliminate this risk. The NYSE specialist is a prime example of intensive use of index derivatives in such an application.

- *A person who thinks Index fluctuations are painful*

  An investor who buys stocks may like the peace of mind of capping his downside loss. Put options on the index are the ideal form of insurance here. Regardless of the composition of a person's portfolio, index put options will protect him from exposure to a fall in the index. To make this concrete, consider a person who has a portfolio worth Rs.1 million, and suppose Nifty is at 1000. Suppose the person decides that he wants to never suffer a loss of worse than 10%. Then he can buy himself Nifty puts worth Rs.1 million with the strike price set to 900. If Nifty drops below 900 then his put options reimburse him for his full loss. In this fashion, "portfolio in-

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

Table 1.3: The Global Derivatives Industry: Chronology of Instruments

surance" through index options will greatly reduce the fear of equity investment in the country.

More generally, anytime an investor or a fund manager becomes uncomfortable, and does not want to bear index fluctuations in the coming weeks, he can use index futures or index options to reduce (or even eliminate) his index exposure. This is far more convenient than distress selling of the underlying equity in the portfolio. Conversely, anytime investors or fund managers become optimistic about the index, or feel more comfortable and are willing to bear index fluctuations, they can increase their equity exposure using index derivatives. This is simpler and cheaper than buying underlying equity. In these ways, the underlying equity portfolio can be something that is "slowly traded", and index derivatives are used to implement day-to-day changes in equity exposure.

●●

Q1.16: How will retail investors benefit from index derivatives?

A: The answer to this fits under "People who find Index fluctuations painful" category in Question 1.15. Every retail investor in the economy who is in pain owing to a downturn in the market index is potentially a happy user of index derivatives.

One key requirement from the viewpoint of the retail user is contract size. If the minimum investible lot on the index derivatives market is Rs.1 million or so, then it will not be useful for retail investors. ●●

Q1.17: What derivatives exist in India (today) in the interest-rates area?

A: There are no derivatives based on interest rates in India today. ●●

Q1.18: What derivatives exist in India (today) 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. ●●

Q1.19: What is the status in India in the area of commodity derivatives?

A: Futures markets exist on six commodities (castor seed, hessian, gur, potatoes, turmeric and pepper). The pepper exchange, which is at Cochin, is being upgraded to the status of an "international pepper futures market", which will accept orders from all over the world. The Forward Markets Commission (FMC) oversees these markets.

A high level of interest exists on futures markets for other commodities. In September 1994, the Kabra Committee recommended that futures trading should additionally be permitted

in 17 commodities. These are (a) basmati rice, (b) cotton, (c) kapas, (d) raw jute and jute goods, (e) groundnut, its oil and cake, (f) rapeseed/mustardseed, its oil and cake, (g) cotton seed, its oil and cake, (h) sesame seed, its oil and cake (i) sunflower, its oil and cake, (j) safflower, its oil and cake, (k) copra, coconut oil and its oilcake, (l) soyabean, its oil and cake, (m) ricebran oil, (n) castor oil and its oilcake, (o) linseed, (p) silver, and (q) onions. On 4 December 1996, the Coffee Board decided to recommend that a domestic futures market for coffee should be setup.

On 28 February 1997, the finance minister announced that futures markets would be setup in cotton and jute, and that an international futures market would be created in castorseed and castor oil. ●●

Q1.20: What is the present status of derivatives in the equity market?

A: As mentioned in Question 1.6, trading on the "spot market" for equity has actually always been a futures market with weekly or fortnightly settlement (this is true of every market in the country other than OTCEI). 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. The recent ICICI bond issue bundles a twelve-year expiration BSE Sensex warrant with the bond. If this warrant is detached and traded, it would be an exchange-traded index derivative.

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. ●●

Q1.21: 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 1.18) nor the option-like contracts (Question 1.20) are exchange-traded. These markets hence lack centralisation of price discovery and can suffer from counterparty risk. The next step in these areas is institutionalisation, and a broad-basing of access. ●●

Q1.22: What should the time to expiration of these contracts be?

A: The time to expiration of these contracts "should" be whatever the market wants it to be – if four-year contracts attract high trading volume, then four-year contracts should exist. The international experience is that most of the trading volume in index futures is concentrated in contracts which expire one, two, three and four quarters away. Limited interest is seen in contracts which go upto two and three years out.

There is a widespread intuition in India, shaped by decades of experience with clearinghouses that do not guarantee trades, that longer time to expiration is associated with higher counterparty risk. However, when daily mark-to-market margins are applied, *the link between length of contract life and counterparty risk is broken.* A brand-new position today is no different from an old position (regardless of the history) as long as the person has paid up his loss in full as of today. This is exactly what the mark-to-market margin does. ●●

Chapter 2

Market Microstructure

Q2.1: How do derivatives trade?

A: In the cash market, the basic dynamic is that the issuer puts out paper, and people trade this paper. In contrast, in derivatives, there is no issuer. The net supply of all derivatives contracts is 0. For each long, there is an equal and opposite short. A contract is born when a long and a short meet on the market.

There would be a clear "contract cycle" which the exchange defines. For example, using quarterly contracts, we would have something like this: On Jan 1, four contracts start trading. The nearest contract expires on 31 Mar. On 31 Mar, this first contract ceases to exist, and the next (30 June) contract starts trading.

In the case of options, the exchange additionally defines the strike prices of the options which are allowed to trade. ●●

Q2.2: If a contract is just a relationship between long and short, how do we ensure "contract performance"?

A: The key innovation of derivatives markets is the notion of the clearinghouse that guarantees the trade. Here, when A buys from B, (at a legal level) the clearinghouse buys from B and sells to A. This way, if either A or B fail on their obligations, the clearinghouse fills in the gap and ensures that payments go through without a hitch.

The clearinghouse, in turn, cannot create such a guarantee out of thin air. It uses a system of initial margin and daily mark-to-market margins, coupled with sophisticated risk containment, to ensure that it is not bankrupted in the process of supplying this guarantee. ●●

Q2.3: What is the role of arbitrage in the derivatives area?

A: All pricing of derivatives is done by arbitrage, and by arbitrage alone.

In other words, basic economics dictates a relationship between the price of the spot and the price of a futures. If this relationship is violated, then an arbitrage opportunity is available, and when people exploit this opportunity, the price reverts back to its economic value.

In this sense, arbitrage is *basic* to pricing of derivatives. Without arbitrage, there would be no market efficiency in the derivatives market: prices would stray away from fair value all the time. Indeed, a basic fact about derivatives is that *the market efficiency of the derivatives market is inversely proportional to the transactions costs faced by arbitrageurs in that market*. When arbitrage is fluent and effective, market efficiency is obtained, which improves the attractiveness of the derivatives from the viewpoint of users such as hedgers or speculators. ●●

Q2.4: What happens if there are only a few arbitrageurs ready to function in the early days of the market?

A: In most countries, there *are* bigger arbitrage opportunities in the early days of the futures market. As larger resources and greater skills get brought into the arbitrage business, these opportunities tend to vanish.

India is better placed in terms of skills in arbitrage, as compared with many other countries, thanks to years of experience with "line operators" who are used to doing arbitrage between exchanges. These kinds of traders would be easily able to redirect their skills into this new market. These "line operators" are fluent with a host

of real-world difficulties, such as different expiration dates on different exchanges, bad paper, etc. Their skills are well-suited to index arbitrage. ●●

Also see: ?, ?, ?, ?.

Q2.5: Isn't India's cash market much too inefficient to support concepts like derivatives?

A: There is no evidence to suggest that market inefficiencies on the cash market make it difficult to sustain derivatives markets. Many emerging markets that have derivatives markets are more primitive than India on the key determinants of market efficiency, i.e. (a) high information availability, (b) high skills in keeping accounts and reading accounting reports, (c) high population of speculative traders and (d) low transactions costs. Derivatives markets are successful if people face risks that they wish to hedge themselves against; market inefficiency on the underlying market probably serves to increase the demand for these hedging services.

? is a Ph.D. thesis which is devoted to an examination of BSE returns data from 1990 to 1995. This evidence supports the notion that the markets are quite informationally efficient, given the (high) level of transactions costs that has prevailed in the past. One widely prevalant practise that serves to interlink market prices and corporate news is insider trading. Insider trading is *unfair* and detrimental to market liquidity in a subtle fashion, but it does serve to rapidly bring market prices in line with corporate information.

This research is carried further in ? which examines the impact of automation and competition upon the functioning of the BSE. Here the evidence suggests that transactions costs have come down with automation, and exactly as predicted by economic theory, market efficiency has improved as a consequence.

One interesting piece of work in this area is ?, where the publication of a research study was followed by a swift elimination of the market inefficiency which this research study documented. This is an example of how market efficiency anywhere in the world works: profit-maximising speculators detect mispricings on the market, and when they trade in exploiting these mispricings, the inefficiency goes away.

The final litmus test of market efficiency is mutual fund performance. If India's markets were inefficient, it would be possible for professional fund managers to obtain excess returns through informed trading. The available evidence (?) suggests that three-quarters of Indian funds underperform the index, after adjusting for the level of systematic risk adopted. This fraction is almost exactly the same as that seen in the US. This makes it difficult to support the hypothesis that India's markets are much less efficient than those seen in OECD countries, *after controlling for the levels of transactions costs.* ●●

Also see: ?, ?, ?, ?.

Q2.6: What is the role of liquidity in enabling good derivatives markets?

A: The role of liquidity (which is defined as low transactions costs) is in making arbitrage cheap and convenient. If transactions costs are low, then the smallest mispricings on the derivatives market will be removed by arbitrageurs, which will make the derivatives market more efficient. ●●

Q2.7: What *should* a market index be?

A: A market index is a large, well-diversified portfolio which is an approximation to returns obtained in owning "the overall economy". Portfolio diversification is a powerful means of stripping out firm- and industry-effects, so that the returns on the well-diversified portfolio reflect only economy-wide effects, and are relatively insensitive to the specific companies or industries in the index portfolio. Market index returns time-series are central to modern financial economics, and have enormous value for a variety of real-world applications. A good market index should be highly liquid to support products in the real world, it should have a high hedging effectiveness against a huge variety of real-world portfolios, and it should be hard to manipulate. ●●

Q2.8: How does liquidity matter for market indexes?

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. ●●

Q2.9: What is special about Nifty for use in index derivatives?

A: The methodology created for the NSE-50 index explicitly isolates a set of securities for which the market impact cost is minimised when buying or selling the entire index portfolio. This makes Nifty well-suited to applications such as index funds, index derivatives, etc. Nifty has a explicit methodology for regular maintenance of the index set. It is successful at expressing the market risk inherent in a wide variety of portfolios in the country. ●●

Also see: ?.

Q2.10: What is the impact cost seen in trading Nifty?

A: In calendar 1996, on average, the impact cost faced in buying Rs.5 million of the Nifty portfolio was 0.25% or so. This means that if the index level is 1000, then a buy order of Rs.5 million is executed at 1002.5 and a sell order is executed at 997.5. This is the lowest level of transactions costs seen in market indexes in India.

An example of the impact cost analysis of Nifty is shown in Figure 2.1, which uses data for 5 June 1996, and shows how the impact cost in trades on Nifty varies as the transaction size is increased. ●●

Q2.11: How does this low impact cost matter?

A: As is the case in all areas of finance, in the context of index derivatives, there is a direct mapping between transactions costs and market efficiency. Index futures and options based on Nifty will benefit from a high degree of market efficiency because arbitrageurs will face low transactions costs when they eliminate mispricings. This high degree of market efficiency on the index derivatives market will make it more attractive to pure users of the derivatives, such as hedgers, speculators and investors. High liquidity also immediately implies that the index is hard to manipulate, which helps engender public confidence. ●●

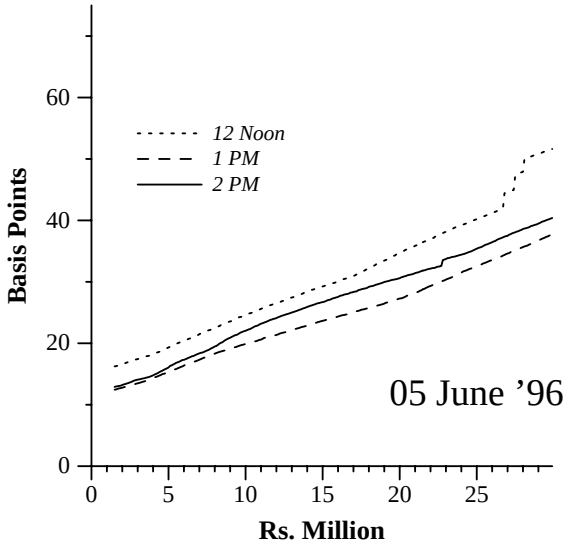

Figure 2.1: Impact cost for Nifty for Various Transaction Sizes

Q2.12: Is the liquidity in India adequate to support well-functioning derivatives markets?

A: The one-way market impact cost faced by arbitrageurs working the NSE-50 is around 0.25%. This is similar to that seen by arbitrageurs working the S&P 500. This suggests that *market liquidity* by itself will not be a serious constraint in the face of an index derivatives market in India.

It should be noted that market impact cost is not the only component of transactions costs that arbitrageurs face. It is true that post-trade costs are higher in India (thanks to the small role that the book-entry trading plays (as of today)). However, *market liquidity* is not a constraint in index-based products based on Nifty. ●●

Q2.13: 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 the round–trip cost (i.e. twice the impact cost plus brokerage) of trades on index futures of around $0.5 million are around 0.01%, i.e. the index futures are around

20 times more liquid than the spot index.[1] 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. ●●

Q2.14: How does spot-futures arbitrage affect the cash market?

A: Spot-futures arbitrage increases the flow of *market* orders to the cash market. This increases the revenues obtained by day traders who place *limit* orders, and induces an increased supply of limit orders. Limit orders are the ultimate source of liquidity on the market (indeed, low impact cost is synonymous with a thick limit order book which is highly populated with limit orders). Hence the introduction of spot-futures arbitrage will improve the liquidity on the cash market. ●●

Q2.15: Going beyond spot-futures arbitrage, how do derivatives influence liquidity on the underlying market?

A: There are also less direct channels of influence from derivatives to enhanced liquidity on the underlying market.

Day traders in individual stocks, who supply liquidity in these stocks, will be able to use index futures to offset their index exposure, and hence be able to function at lower levels of risk. For example, the NYSE specialist makes phone calls to Chicago almost every half an hour (while trading is going on) adjusting his index futures position as a function of his inventory. Everytime a day trader is long security he will simultaneously be short index futures (to strip out his index exposure), and vice versa.

Another aspect is rooted in security options markets. When security options markets exist, speculators on individual securities tend to go trade on the options market, and the focus of price discovery moves away from the cash market to the options market. More informed traders tend to cluster on the options market, and less informed orders tend to go to the cash market. This reduces the risk of trading against an informed speculator on the cash market. This reduces impact cost (i.e. increases liquidity) on the cash market. ●●

Q2.16: What is the international experience in terms of how the underlying market is changed once derivatives start trading?

A: The international experience is that market quality on the underlying market improves once derivatives come to exist. Liquidity and market efficiency of the underlying market are increased once derivatives come to exist. ●●

Q2.17: Program trading in the US is often accused of generating difficulties. What does that mean for us?

A: Many post-mortems of the October 1987 crash concluded that "program trading was related to the crash". Some observers distorted this to "program trading *caused* the crash".

A more accurate depiction of the sequence of events in October 1987 may be expressed as follows:

- A market drop commenced on overseas markets (before NYSE trading time) and on the futures market (which always shows market movements before the spot market),
- As is always the case, this led to a surge of program trading orders as arbitrageurs rushed in to exploit the slight mispricings.
- The communications system to the market makers overloaded and could not cope with the orders.[2]
- This led to confirmations of many trades taking over an hour.
- This led to a panic selling on the part of traders across the world, which produced a major crash.

Hence, it is correct to say that "program trading had something to do with the October 1987 crash", but it is incorrect to *blame* the crash upon program trading. The blame, if any, falls on the computer networking which links up the world to

[1] For example, in the US, the S&P 500 futures contract (on the CME) has spreads of around $100 on a minimum tradeable lot of around $400,000; i.e., the one–way impact cost is around 0.0125%.

[2] It should be noted that the biggest 50 to 100 stocks in the S&P 500 were present in arbitrage transactions in quantities larger than 2100 shares, so that program trading could not be done for these. Trading in these stocks involved a human runner carrying the order to the specialist post.

the market maker, and on the basic methods of functioning at the NYSE.

In India, in any case, because the major markets use no market makers, the entire method of order matching is quite different – it consists of computers directly talking to the central order-matching computer. In this sense "program trading" (i.e., trading by using computers) is routine in India. The NYSE started out as a labour-intensive market, and computerised communications with the market maker was put in[3] as a sideshow to the main processes of the market. In contrast, markets in India are purely computer-driven, and their computer networking is less fragile. ●●

Also see: ?, ?, ?, ?.

Q2.18: Will derivatives destabilise the stock market? Could this happen in extreme events?

A: The available international evidence says that market quality on the underlying market *improves* once derivatives come to exist. Derivatives improve liquidity on the underlying market (for a variety of reasons outlined in Questions 2.14 and 2.15), and a more liquid market is one that is able to absorb larger shocks for a smaller change in prices. This would be the *most* useful in extreme events – it is in an extreme event that the liquidity of a market is taxed the most, and at such times a healthier cash market would be the most valued. ●●

Q2.19: Is there more or less of a "natural monopoly" in derivatives trading, as compared with the spot market?

A: In the spot market, the ability for exchanges to differentiate their products is limited by the fact that they are all trading the same paper. This reduces the avenues for product differentiation by exchanges.

In contrast, in the derivatives area, there are numerous avenues for product differentiation. Each exchange trading index options has to go through the following major decisions:

1. Choice of index
2. Choice of contract size (i.e. multiplier)
3. Choice of expiration dates
4. Choice of american vs. european options
5. Choice of rules governing strike prices
6. Choice of trading mechanism (whether market makers, or order-matching market, etc)
7. Choice of time of day when market opens and closes

In the derivatives area, it is easier for exchanges to differentiate themselves, and find subsets of the user population which require different features in the product. In the US, the experience of futures markets is that between 1921 and 1983, 180 different futures contracts had been launched, and a full 40% of these failed to survive four years. Such a steady process of entry and exit is extremely healthy in terms of the basic economics of competition.

In this sense, the derivatives area is less of a natural monopoly than the cash market. ●●

Also see: ?.

Q2.20: What are the policy implications of this lack of a natural monopoly?

A: To the extent that a marketplace is competitive, with a steady pace of entry and exit, the self-interest of exchanges will drive them to do things which their investors like. It will not be necessary to force them to do these things via regulation. The role for regulation in such competitive markets is limited to the classic regulatory functions, i.e. "health–safety–environment" style regulation. ●●

Q2.21: At the operational level, how do security contracts compare versus index-based contracts?

A: The basic fact is that index-based contracts attract a much more substantial order-flow, which helps them have tighter spreads (i.e. greater liquidity). At a more basic economic level, we say that there is less asymmetric information in the index (as opposed to securities, where insiders typically know more than others), which helps index-based trading have better liquidity.

At settlement, in the case of security-options, there is the possibility of delivery, and in that

[3] The "Designated Order Turnaround" system, which allows computers to communicate orders to market makers, was setup at NYSE in 1976 and upgraded to "SuperDOT" in 1984. As of October 1987, orders of smaller than 2100 shares could be sent electronically.

case arises the question of depository vs. physical delivery. Both alternatives are quite feasible. However, in index-based contracts, that question does not arise since all index-based contracts are cash-settled.

The index has much less volatility than individual securities. That helps index options have lower prices, and index futures can work with lower margins.

The most important difference between the index and individual securities concerns manipulation. Given that an index is carefully built with liquidity considerations in mind, it is much harder to manipulate the index as compared with the difficulty of manipulating individual securities. ●●

Chapter 3

Derivatives Disasters

Q3.1: Why do we keep reading about disasters involving derivatives?

A: Disasters involving derivatives make for good reporting. In an multi–trillion dollar worldwide industry, some disasters are inevitable. ●●

Q3.2: Why have we seen more disasters in the recent years?

A: As the derivatives industry grows, more disasters would be observed. This is perhaps like the airline industry: when more planes fly, more planes will crash (see Table 1.2 for the growth of the global derivatives industry). ●●

Q3.3: How much money has been lost in these derivatives disasters?

A: The cumulative losses from 1987 to 1995 add up to $16.7 billion. This is a tiny fraction of the outstanding positions of the industry, which were around $50 trillion as of 1995.

Derivatives account for a small fraction of the overall picture of financial disasters. Over this same period, i.e. from 1987 to 1995, the financial industry has seen other large disasters:

1. Malaysia's Central Bank lost $3 billion in 1992 and $2 billion in 1993 in taking positions on the UK pound.
2. In December 1993, the Bank of Spain took over Spain's fifth biggest bank, which had $4.7 billion in hidden losses.
3. In 1994, Credit Lyonnais (the biggest state–owned bank in France) was kept afloat using a $10 billion subsidy from the government.
4. In the 1980s, the "savings and loans" industry of the US lost $150 billion.
5. Japan's financial institutions are said to be sitting on $500 billion of nonperforming loans.

●●

Also see: ?.

Q3.4: What happened in Barings?

A: Mr. Nick Leeson, a trader for Barings Futures in Singapore, had positions on the Japanese Nikkei 225 index worth $7 billion. In addition, he had other positions on options and bond markets. Mr. Leeson was able to dodge internal corporate controls and adopt these large positions unchecked. This was assisted by weak enforcement at the exchanges in Singapore and Osaka, who did not generate alerts to his large positions. ●●

Q3.5: What should be done to minimise disasters with derivatives?

A: At the level of exchanges, position limits and surveillance procedures should be sound.

At the level of clearinghouses, margin requirements should be stringently enforced, even when dealing with a large institution like Barings.

At the level of individual companies with positions on the market, modern risk measurement systems should be established alongside the creation of capabilities in trading in derivatives. The basic idea which should be steadfastly used when thinking about returns is that risk also merits measurement. ●●

Also see: ?.

Chapter 4

Policy Issues

Q4.1: What emerging markets have already created derivatives markets?

A: The status is summarised in Table 4.1, which shows emerging markets that have derivatives markets today, and Table 4.2 which shows emerging markets which are in the process of building derivatives markets. ●●

Also see: ?.

Q4.2: What was China's experience in this area?

A: China had a mushrooming of derivatives exchanges in the early 1990s. Many of these were poorly run, and experienced significant episodes of market manipulation and counterparty risk. In 1994, the 50 exchanges were consolidated into 15. In 1995, China's futures markets did a trading volume of around $1.2 trillion (for a comparison, India's equity markets do an annual trading volume of roughly $180 billion).

Many observers have cited China's experience with 50 exchanges as an example of how poorly–regulated and hasty growth of derivatives markets may be problematic. However, the other side of the picture is now clear: the experience with these 50 exchanges got the Chinese markets off the ground, and generated the necessary know-how amongst exchange staff, regulators and users. In the end, China's derivatives exchanges has stolen a march on their rivals: they now have significant trading volumes on a world scale. ●●

Q4.3: What financial markets in India are ready for derivatives today?

A: In India, two areas are ripe for derivatives: the equity market and foreign exchange.

In the case of the dollar-rupee exchange rate, a forward market already exists; it is just a matter of formally institutionalising it at an exchange, and turning it into a modern futures market. ●●

Q4.4: Are derivatives in interest rates viable in India?

A: In the case of interest-rate risk, derivatives in India are hindered by the poor liquidity on the fixed-income market.

However, a few approaches towards designing interest-rate derivatives could commence. An example of this would be a futures contracts on treasury bills, which would give people the ability to buy or sell treasury bills in the future. The lack of a liquid and transparent market for treasury bills, and constraints such as the inability to short-sell treasury bills, would hurt the ability to do arbitrage on this market. Hence, the market efficiency of the interest-rate futures market would be limited.

However, in an environment where economic agents are exposed to interest-rate risk and have no alternative risk management facility, such contracts could still prove to be viable. If interest-rate futures came about, they would generate greater order flow and improve market quality on the fixed-income market. ●●

Also see: ?.

Q4.5: Why are commodity futures markets important?

A: India's farmers, and downstream industrial users of agricultural output, are exposed to extremely high risks. The creation of commodity derivatives markets will provide them with the choice of obtaining insurance against price fluctuations. It will improve liquidity and price discovery

Table 4.1: Derivatives Exchanges in Emerging Markets

• Brazil (BM & F)	• China (SSE, SME, SHME, SCCFE)
• Guatemala (BDP)	• Hungary (BCE & BSE)
• Korea (KSE)	• Malaysia (KLOFFE, KLCE, & MME)
• Philippines (MIFE)	• Portugal (PSE)
• Russia (MICEX & MCE)	• Slovak Republic (Bratislava)
• Slovenia (Ljubljana)	• South Africa (SAFEX)

Table 4.2: Emerging Markets Working Towards Derivatives

Argentina	Bulgaria	Chile
Colombia	Costa Rica	Czech Republic
Greece	India	Indonesia
Mexico	Poland	Taiwan
Thailand	Turkey	

in the underlying spot markets. Once futures markets exist, the private sector will maintain buffer stocks which will reduce spot price volatility, and the private sector will do this far more efficiently than government-sponsored efforts at maintaining buffer stocks. In addition, the creation of these markets is consistent with the growth of skills in India's financial industry in the area of derivatives. ••

Q4.6: What are the issues in the creation of commodity derivatives markets?

A: Like most traditional financial markets in India, the commodity futures markets are weak in terms of modern skills in how exchanges should be run. These markets are weak on a variety of issues: the use of modern market mechanisms (such as the electronic limit order book market), enforcement of contract standardisation, dealing with hetereogenous grades, the counterparty guarantee of the clearinghouse, calculation and enforcement of margins, and checks against market manipulation.

The commodity markets which are now in the spotlight are: the international pepper market, the proposed markets in cotton and jute, and the proposed international castorseed market. Ideally, the management of these exchanges will be able to function to international standards. In this case, the value of having commodity futures markets would become apparent, and the stage will be set for further expansion of commodity futures markets in India. If these markets experience a visible episode of manipulation, or if they experience a payments crisis, then it will be harder to establish a consensus about the future of commodity futures markets, and the development of India's financial system will be slowed.

One serious weakness in India lies in the way individual commodity futures markets are an outgrowth of trading on individual spot markets. The cotton trading community will create a cotton futures market, the jute trading community will create a jute futures market, etc. This is inefficient insofar as it does not foster the growth of specialised skills which are common to all futures markets and not specific to one commodity. For a well-functioning derivatives exchange, specialised skills are required on the part of exchange and clearinghouse staff and on the part of trading members. These skills are primarily in the *derivatives* area, and they are easily transferable from one commodity to another.

Ideally, a derivatives exchange should have a focus on *futures, options, and other derivatives* regardless of what the underlying is, and each futures exchange should trade dozens of commodity futures contracts. This is similar to markets like

CME and CBOT which trade derivatives on hundreds of commodities, and on a host of other underlyings such as stock market indexes, treasury bills, foreign exchange, etc.

One useful alternative here is to involve mainstream financial markets into the commodities area. Exchanges which have clearing corporations (and can hence supply the counterparty guarantee) can easily introduce cash-settled derivatives on commodities. ●●

Q4.7: What can be done in derivatives on real estate?

A: In the case of real estate, derivatives can only follow clear asset securitisation. Government should work towards removing hurdles in the face of real estate asset securitisation, which would then enable derivatives on real estate to take place. Mutual funds which invest in real estate are another, easier, stepping stone towards derivatives on real estate: markets could easily trade units of such funds, and options on such units. This may be a shorter route towards obtaining derivatives on real estate. ●●

Q4.8: Should foreigners be restricted in India's derivatives markets as a matter of policy?

A: As in other areas of industry and commerce, the key objective for policy in India should be to obtain the best quality of products and services for India's economy, ensure conditions of intense competition on the domestic market, and to employ Indian labour and Indian capital at the highest possible levels of productivity. Given these objectives, the nationality of the ultimate owners of a firm operating on Indian soil has little importance.

In the case of all derivatives, foreigners should be allowed free access to trading and brokerage on India's derivatives markets. This will help improve the quality of India's derivatives markets, and help the dissemination of knowledge about the risk management capabilities that these markets supply to the community of foreign investors.

Hurdles to this level of liberalisation make it difficult for us as a country to realise the full potential of the investment that can be attracted into India given the level of development of our financial system. ●●

Q4.9: What would access to derivatives do to FII and FDI investment?

A: Access to derivatives would increase the flow of FII and FDI investment. The two important kinds of risk that foreign investors are exposed to are currency risk and country risk. The first would be manageable using dollar–rupee futures and options, and the second would be manageable using index futures and options.

The details of usage would be subject to the individual requirements. For example, some FIIs might choose to completely eliminate their dollar–rupee exposure, coupled with "portfolio insurance" to cap their downside exposure at no worse than $x\%$. Other FIIs might choose to use index derivatives as a liquid way to increase their equity exposure. Similarly, investors in India through FDI would be able to use dollar–rupee futures to control their risk of a currency devaluation, and use index futures to proxy for the overall success of India's economy.

These methods of controlling risk are quite routine in the international financial community.[1] If India had derivatives markets, then it would be a less risky environment and would better be able to attract foreign investment.

While India lacks index derivatives as of today, there is a direct opportunity to make progress on these issues via the dollar–rupee forward market. The constraints that are placed in the way of FIIs on using the dollar-rupee forward market are counterproductive. If the FII is allowed to obtain insurance using this market, he will bring more money into India. ●●

Q4.10: Is India ready for derivatives today?

A: There are four key aspects to this question.

- *Market Size*

  Derivatives markets need to work off a large foundation of asset value that is traded on an underlying market. India's debt market has a total market capitalisation of around Rs.3 trillion, and India's equity market has a market capitalisation of around Rs.5 trillion.

[1] See, for example, the article *Investors Return to Latin America* by Margaret Elliott, Derivatives Strategy, May 1997, where Hari Hariharan of Santander Investment is quoted as saying that 60–70% of FII investment into Latin America involves some use of derivatives.

India's foreign exchange market also has a considerable underlying market size.

International experience and the success of derivatives in many countries of much smaller market size (for example, the Johannesburg futures market, and the Brazilian futures markets) shows that in India, each of the three markets mentioned above is ready for derivatives.

- *Liquidity*

  In India, NSE proposes to launch futures and options contracts on the NSE-50 index. The market impact cost seen with Nifty is comparable to some of the most liquid market indexes in the world (e.g. the S&P 500 of the US). India's foreign exchange market also possesses the low transactions costs to support a healthy derivatives market. India's debt market might currently not ready for trading derivatives since most of the key instruments traded here are quite illiquid.

  Thus from the point of view of the liquidity of the market, two of India's markets are ready for derivatives trading.

- *Clearing Corporation*

  For derivatives markets to support large-scale use, it is important to have a clearing corporation which guarantees the trade.

  From July 1996 onwards, with NSCC guaranteeing trades on the NSE, this prerequisite for a derivatives market now exists in India. The human capabilities that go into creating a clearing corporation can also be easily redeployed to new markets, such as the foreign exchange market which has such a deep need for trading derivatives.

- *Sophistication of traders*

  Derivatives are complex. The payoffs that buyer and seller face, the risks that buyer and seller face, and the economic theory that is used for pricing derivatives: all these are considerably more difficult than that seen on the equity or the debt market.

  India's financial industry already has experience with many kinds of derivatives. As compared with many emerging markets where derivatives exist, India's financial industry possesses very strong human skills. It appears that the foundations of human capital that are required for derivatives might well be in place in India.

In the context of the four points above, derivatives on the debt market would be highly attractive to investors who face interest rate risk, but the debt market suffers from an illiquid underlying. The foreign exchange market is also an area where derivatives are clearly valuable; the constraints faced there concern the sequencing of liberalisation of this market. The Indian equity market satisfies all the four criterion laid out and is the logical candidate to carry the first exchange-traded derivatives in India, with the index as the underlying.[2] ●●

Q4.11: What are the costs and benefits of delaying the onset of exchange-traded financial derivatives in India?

A: The costs are on two directions:

1. The most important cost is opportunity cost.

   - India's investors will benefit from being able to access derivatives. Every investor who experiences pain owing to index fluctuations could be happier if index derivatives existed.
   - India's markets will become more liquid and efficient once derivatives are present.
   - India's financial industry will grow skills and capabilities through working with derivatives which will help it come up to international standards.

   Each of these three developments is put off further into the future when derivatives in India are delayed.

2. The second cost is the threat of foreign exchanges creating derivatives markets on Indian underlyings. If this took place, it would make it harder for derivatives exchanges in India to succeed.

The apparent benefit of delay is the opportunity to create a concerted effort in training and improving skills as a preparation for the launch of a market. This benefit is illusory, for two reasons: (a) a concerted effort to pickup skills will not take

[2] See Barclay (1996) for issues connected with India's derivatives markets.

place unless the market launch is imminent, and (b) the best form of training in derivatives is that obtained when actually using the instruments. See Question 5.25 for a further treatment of this issue. ●●

Q4.12: What international derivatives exchanges are working towards launching products off underlyings in emerging markets?

A: The Chicago Mercantile Exchange (CME), Chicago Board Of Trade (CBOT), Chicago Board Options Exchange (CBOE), American Stock Exchange, Sydney Futures Exchange, Hong Kong Futures Exchange and Singapore International Monetary Exchange (SIMEX) have all launched emerging market initiatives, whereby they aim to trade derivatives off underlyings from emerging markets. ●●

Q4.13: What derivatives on Indian underlyings are *currently* trading abroad?

A: Examples of contracts that exist abroad as of today fall into the following categories:

- Many GDR issues are bundled with warrants (option-like instruments), which are then traded separately. For example, the Hindalco issue done on 2 Nov 1995 bundled every two shares with one warrant. Similar issues have taken place on India's primary market – the difference here is that the warrants are listed and traded, in contrast with India's secondary market where the warrants are not traded.
- Warrants on mutual fund paper such as the Lazard Birla India and Fleming Indian are listed in London.
- Custom built (OTC) derivatives – specifically, options and swaps – on Indian market indexes and baskets of Indian GDRs already exist on the international market. Essentially 100% of the OTC derivatives industry on Indian underlyings lies abroad.
- Restrictions upon access to the dollar-rupee forward market in India has led to the development of the "non-deliverable forward" (i.e., cash settled) dollar-rupee market offshore.

●●

Q4.14: Would foreign derivatives markets be interested in launching trading on Indian underlyings?

A: Internationally, derivatives trading is a fiercely competitive area where exchanges are constantly trying to find interesting new contracts based on which trading volume can be attracted. Hundreds of new contracts have been attempted in the last few years, only around half survive more than a few years. In such an atmosphere of hectic innovation in contract design, Indian currency and stock index products constitute a glaring opportunity. ●●

Q4.15: Is this a real threat?

A: If India does not progress towards derivatives swiftly enough, contracts based on Indian underlyings will start trading on markets elsewhere in the world. The NSE-50 time series or the dollar-rupee exchange rate are available on international information services such as Reuters or Knight-Ridder, and nothing prevents a foreign market from launching contracts on these.[3]

Such a scenario is not without precedent. Some examples can be cited which show the forces involved:

- In 1989, regulatory errors in Japan led to the market for derivatives based on Japan's Nikkei 225 index moving off to Singapore and partly to Chicago. Today, Japan's markets feature a better set of regulations, but the market has not yet moved back to Japan.
- Similarly, a large part of Sweden's financial markets moved to London after the Government imposed a tax on trading volume in 1989. After the transactions tax was revoked, most of this volume did not return.
- After prolonged delays in creating a derivatives market in Taiwan, derivatives on the Taiwanese market index[4] started trading in Chicago and Singapre on 9 January 1997 (?),

[3] Foreign markets would prefer to have the benefit of cooperation from the Indian owner of an index before using it for derivatives. But as the example of the Nikkei-225 illustrates, this is not a binding constraint.

[4] Taiwan's equity market remains relatively closed to foreign investment and has short trading hours. Taiwan's SEC tried unsuccessfully to prevent CME and SIMEX from introducing Taiwanese index futures, but interminable delays afflicted efforts to get a lo-

- India's GDR market experience is a direct example of markets moving off offshore if the required facilities don't come about in India fast enough (see Question 4.17, however).

These examples suggest that the movement of markets indulging in "regulatory arbitrage" is not just a abstract possibility but a real alternative for investors seeking to meet their objectives. ●●

Q4.16: What are the implications of derivatives on Indian underlyings trading abroad?

A: As the Nikkei-225 experience suggests, once a contract gets well-established at a market, it doesn't easily move, even if the alternative destination proposed is the home country of the underlying. In this sense, India's financial industry could then face an uphill struggle for order flow if foreign markets are successful on establishing derivatives markets first. This would have two ramifications:

1. As long as India lacks capital account convertibility, India's citizens would be disadvantaged by not being able to access derivatives while foreigners would be able to. This would generate increased incentives for Indian citizens to use illegal channels through which positions would be adopted on foreign markets.
2. Such an event would be a setback for the development of skills and businesses in India's financial industry, and for the potential of Bombay as a world financial centre.

●●

Q4.17: But in the GDR market experience, the foreign market has hardly affected order flow into India – why are derivatives different?

A: In the case of the GDR market, two things were different.

1. The GDR market is self-liquidating in the sense that GDRs gradually convert into underlying shares. Hence the size of the GDR market inherently diminishes over time. This is not the case with derivatives.
2. In India's GDR episode, GDRs were an alternative in the face of a thriving Indian spot market. It is always difficult to take away order flow from an existing market. In the case of derivatives, if foreign markets get established first, this will not be the case.

●●

cal derivatives exchange off the ground and CME and SIMEX chose to not wait for the local market to come about. Taiwan's SEC initially prohibited local brokerage firms from trading on these contracts offshore. Later, the SEC announced that they "may" allow local orders to go to derivatives exchanges offshore.

Chapter 5

Regulatory Issues

Q5.1: What are the objectives of regulation?
A: There are three basic objectives of regulation:

- to protect market integrity,
- to ensure fierce levels of competition, and
- to prevent fraud.

●●

Also see: ?, ?.

Q5.2: What kinds of competition are possible in the financial market scenario?
A: There are many dimensions of competition:

1. The market should have a large number of traders.
2. There should be easy entry of new traders and investors.
3. No individual trader should be too large as compared with the size of the overall market, i.e., no single individual trader or coalitions of traders, should have *market power*.

●●

Q5.3: How does deviation from perfect competition (or situations of market power) arise on financial markets?
A: One form of market power that is commonly observed in the world arises with an exchange which limits the supply of seats so as to increase brokerage rates. This behaviour reflects itself in the price of a seat on the exchange, or the "seat price". In an ideal economy, the seat price (devoid of any real estate or other facilities) should be close to 0. A high seat price implies bid-ask spreads and brokerage fees above the level that is found in perfect competition.

This "implicit elevation" can sometimes even become overt: prior to 1974, NYSE specified a (elevated) brokerage commission schedule, and members were required to not offer prices better than the defined schedule.

In addition to this form, every economy has some unusually large traders. This is another avenue through which deviations from perfect competition are observed. ●●

Q5.4: How should regulation of exchanges work?
A: The most important intuition in regulation of exchanges is to view the exchange as a manufacturer of liquidity services. If exchanges do this well, they will get satisfied customers. Exchanges that fail to do this well will fail to get business and go bankrupt. In India we have seen numerous industries and services where competition and the steady process of entry and exit have proved to be a great success in producing high quality and low price. The area of trading services is no exception.

The key role for public policy is to *keep entry barriers low* and therefore *keep the competitive pressure upon the incumbents high*. It should be easy to start new exchanges; even for business houses to start exchanges. It should be easy (say) for CBOT to come to India and start an exchange. That will serve to keep up competitive pressure and steadily improve the services and costs that end-users, the investors, face. ●●

Also see: ?.

Q5.5: What can regulation do to encourage competitiveness?
A: Brokerage fees are elevated as long as a re-

stricted supply of exchange seats is used by exchanges in India. Hence regulators should pay attention to seat prices, and require exchanges to increase the supply of seats when seat prices rise to significant levels.

There is an intuitive urge to set very high capital adequacy requirements to ensure that the risk of counterparty failure is reduced. But a fundamental fact of the counterparty guarantee of a clearing corporation is that it eliminates credit risk, regardless of the size of the company that is trading. Hence the intuitive urge to set very high capital adequacy requirements should be checked, since one of the less attractive outcomes of setting high capital adequacy requirements is low competitiveness of the industry.

Position limits have been proposed as a way of preventing the damage that a large trader can cause. Position limits are particularly common in the area of commodity futures, where a short squeeze is the constant danger (with cash-settled contracts, this is less of an issue). However, position limits have not been very successful in the past, because a manipulator can always spread his position amongst several entities and avoid the position limit. Famous episodes of manipulation, like the Hunt brothers in silver, were done in the face of strong position limits. Thus the regulator should be wary of using position limits in the hope of preventing abuses of market power. ●●

Q5.6: What should entry or eligibility requirements be for derivatives trading?

A: The thrust of economic policy in India today is to encourage the competitive forces of the marketplace to differentiate winners from losers. A firm that unwittingly goes into derivatives trading without understanding the business is no different (say) from a firm which unwittingly goes into any other high technology area (like computer software or banking or floriculture). If the firm is unable to cope with the complexities of this area, it would go bankrupt. Thanks to the system of margins and counterparty guarantee, such bankruptcies would have no impact upon the rest of the market.

The danger with eligibility criteria is that they effectively become entry barriers. All too often, entry barriers are used by incumbents to reduce the degree of competition in an area. The basic focus of economic policy should always be to maximise the degree of competition in any industry. The brokerage industry is no exception. ●●

Q5.7: What is fraud?

A: *Fraud* consists of market participants making commitments which are not later upheld. A more tenuous situation is if a market participant is "opaque", which then means that there are large costs to be be paid (a) in establishing antecedents and (b) in confirming that the promise will actually be upheld, before inter-party transactions take place.

The importance of "trust" and "reputation" in the world is a reflection of relationships which are able to avoid *fear of fraud*. Unscupulous companies have a way of going bankrupt over time, so that companies with a longstanding reputation are less likely to indulge in fraud.

This ties in with the idea of restrictions to entry mentioned in Question 5.6. If many market participants require a great deal of trust and a long-standing relationship before they do business, this is effectively an entry barrier which limits the competitiveness of the industry and elevates prices. A well functioning market economy is one where strangers can trade with each other; the need to establish trust and long-standing relationships should be as limited as possible.

In this context, the counterparty guarantee of the clearinghouse is a crucial device which eliminates part of the need for trust, and hence increases the contestability of the market. The role for regulation is to steadily reduce the role for trust and relationships in the market, so as to foster free entry and increase competition on the market. ●●

Q5.8: How can regulation diminish the extent of fraud?

A: There are two key methods through which public policy can reduce the extent of fraud: through improved disclosure and by ensuring swift and credible legal redress, in cases of fraud. ●●

Q5.9: Should there be regulatory control over contract definition?

A: Some countries require that the regulator have a say in contract design. It is hard to support the claim that this has played a useful role.

When a contract is poorly designed, it will die a natural death under conditions of low trading volume. For example, ? analyses the life cycle of the first index contract to be traded in the U.S.,

the Kansas Value Line index contract, which was very complex to price and, therefore, complex to trade. These contracts had hence suffered poor liquidity since conception, and have been eventually removed from trading.

Worldwide, the derivatives industry features a hectic pace of contract design. Every year, new contracts are launched and old contracts die. It is a difficult proposition for regulation to second-guess the success of a contract.

In the case of index derivatives, one possible area of concern is the extent to which an index can be manipulated. However, the marketplace is typically a very effective check here. If futures start trading on an index which is easy to manipulate, then these contracts will find it difficult to attract trading volume. This is a more effective way to control poorly thought out contracts than to use regulation.

On the negative side, regulatory control over contract definition has often been a vehicle for political lobbying by pressure groups against futures markets. For example, large and entrenched onion traders have successfully lobbied with the CFTC in the US to prevent CBOT from allowing the trading of onion futures, even though it is almost certain that onion futures will be a highly useful contract.

Hence the worldwide experience in regulation of contract definition is ambiguous, and does not show the regulator as adding any improvement over market forces in defining good vs. bad contracts. ●●

Also see: ?, ?.

Q5.10: Should the securities that are used in an index be required by regulation to be in depository mode?

A: This is an example of the usefulness of the principle about regulatory non-involvement in contract definition, shown in Question 5.9.

If the securities are not in depository mode, the transactions costs of trading the index will be higher. This means that market efficiency of the index will be reduced, and trading volume on the derivatives market will be reduced. Hence, the self-interest of the exchanges points towards using securities in the depository. This is a question that the derivatives exchange should address. There is no role for regulation here. ●●

Q5.11: Should regulation require that derivatives trading be organised at an exchange which is distinct from the spot market?

A: This is similar to the question *should the engine factory of Mahindra & Mahindra be located at the same place as their paint shop?*. To be more precise, this is like the question *should Mahindra & Mahindra buy their gearbox from a third party or should they make it themselves?*.

How much vertical integration is optimal is a question for exchanges to address. If there are benefits of one solution over the other, then certain exchanges will succeed in obtaining order flow (see Question 5.4), and the exchange industry will endup using one kind of technological solution. Once again, there is little role for a regulator on this issue. ●●

Q5.12: At an operational level, is it better to have the spot and futures market under one roof?

A: At the operational level, it makes sense to have both index futures and the spot index being traded on the same exchange in the same time of day, for three reasons:

1. Margining can be done correctly if both legs of the transaction go through the same exchange; if a person is long index and short the spot then he should ideally be charged less initial margin.

2. A coordinated effort at manipulation is easier to detect. If the same person is long the Gujarat Cotex spot and long in call options on Gujarat Cotex, then it can send alarm bells going. In contrast, genuine inter-exchange coordination in margining and in surveillance is much more difficult to create – the Barings example shows that SIMEX and Osaka don't really talk to each other.

3. Arbitrage is made easier since both legs of the transaction are on the same exchange, which reduces the possibility that the spot and the futures markets can deviate from fair values even for a short interval of time.

At a mundane level, the distinctions between spot or derivatives (or the distinction between trading commodities vs. trading equity vs. trading foreign exchange) that are seen in other coun-

tries are typically historical accidents that reflect (a) peculiarities of regulation, and (b) pre-technological implementations of markets without using computers. We in India have the advantage of building a financial system in an era of modern technology, with a smaller set of entrenched interests defending the status quo. ●●

5.1 Risk Management at Clearing

Q5.13: Why is the clearinghouse central to derivatives markets?

A: The *key* factor enabling exchange-traded derivatives is the credit guarantee supplied by the clearing corporation. If derivatives involved obligations between individual market participants, then large positions between two random individuals would be less feasible thanks to counterparty risk (as mentioned earlier in Question 5.7).

With the clearinghouse counterparty guarantee accounting for counterparty risk, small individuals and big individuals can form positions against each other without any special risk factor favouring any one side. With the counterparty guarantee, derivatives can exist with both sides being free of the worry that the other will default. ●●

Q5.14: How should margining for derivatives work?

A: Today, margining systems are accepted as being the foundation through which the clearinghouse guarantees the trade on a futures market, all over the world. This has become extremely important in India where futures-style settlement is used in "the cash market" at all stock exchanges other than OTCEI. At futures markets worldwide, margining works in two steps:

1. An initial margin is charged, which depends upon the position taken.

   In India, unlike in other countries worldwide, the banking system is unable to move funds swiftly. However, a situation where initial margin is paid *after* the position is adopted is unsafe for the clearinghouse. Hence the solution, which has been widely utilised in India, is the *exposure limit*. This can be interpreted as an advance payment of initial margin and members are constrained to not take a position larger than that supported by the funds deposited in advance. For example, if an exposure limit of 33 times base capital is in place, then it means that the exchange requires a 3.33% initial margin.

2. The net profit or loss on a position is paid out to or in by the member on the very same day, in the form of daily mark-to-market (MTM) margins.

   A large loss, when accumulated over several days, generates a temptation to default at settlement. To prevent this from happening, the loss of each day is paid up on that day itself. The member will not default on the MTM payments as long as the the one-day loss is smaller than the initial margin (which the exchange forfeits if the member defaults).

●●

Also see: ?, ?.

Q5.15: How is initial margin (i.e. "exposure limit") calculated?

A: Earlier, we remarked that "the member will not default when the one-day loss is smaller than the initial margin". Assuming that MTM margin is fully and correctly computed and charged (i.e., net losses are taken from members on the same day, net profits are paid to members on the same day), the "correct" level of initial margin is that which is larger than what can be expected for a one-day loss *to the position*, with a comfortable safety margin.

Intuitively, the "correct" level has to be sensitive to the composition of the position taken. If a person has a position with 100% of the exposure in Apollo Tyres, then this is a highly risky position. The level of initial margin required here would be quite large. If, instead, a person has a well-spread out position with positions spread over numerous securities, then the risk is lower because he is diversified. In this case, the "worst one-day loss" scenario becomes less volatile, and therefore, the level of initial margin required is lower.

We quantify risk in terms of the *standard deviation of returns of the portfolio* or σ. Typically, a very high level of safety could be obtained by charging initial margin of four times the σ. In case a person has a 100% position in Apollo Tyres, the σ is around 8%. So a safe initial margin for

the person with the 100% Apollo Tyres position is around 30%. In other words, his exposure limit should be around three times of base capital.

At the other end, a person having exposure in a fully diversified portfolio (i.e., he has bought all the 50 stocks in their correct proportions in the NSE-50 index) has a σ of just 1.3. The NSE-50 index, being highly diversified, is much less risky as compared with Apollo Tyres. In this case, the *identical* level of safety (i.e., four times the σ) is obtained by charging him an initial margin of 5.2%, i.e., an exposure limit of 20 times base capital.

These two examples illustrate a key idea: *depending upon the portfolio composition of exposure, the same level of safety can be obtained by capping exposure of 3 times or 20 times the capital deposited with the clearinghouse.* The correct level of initial margin varies *strongly* with the portfolio composition of the exposure, whereas simple rules like "33 times base capital" or "10 times base capital" will not work correctly: they charge too little initial margin for risky positions and too much initial margin for relatively safe positions.

One more idea that flows from this logic is that *gross exposure* is an incorrect measure of risk. We need to focus on the σ of his full portfolio exposure.

A nuance here concerns long vs. short positions. A position which is long Reliance and long SBI has a certain σ. A position which is long Reliance and short SBI has a *smaller* σ. This is because when market index fluctuations take place, then the short position is a *hedge* against the long position. In this sense, if a person has Reliance exposure, he can actually reduce his risk by increasing his gross exposure (i.e. by shorting SBI). This is an example of how gross exposure is a poor measure of risk. Good portfolio margining would correctly integrate long vs. short positions into the initial margin calculation.

These ideas are standard procedure at futures markets all over the world. Well-established software systems named SPAN or TIMS are available to calculate margins, and less-well-established alternatives are available which do more sophisticated calculations of the true σ of the portfolio. This is the direction which should be adopted in India's markets also. ●●

Q5.16: How is daily mark to market (MTM) margin calculated?

A: The calculation of daily MTM margin is easily done as the net loss associated with a position. This is paid up each evening after trading has ended. Two nuances are of interest here:

1. The correct computation of MTM margin is to focus on the *net loss* across all different securities on which positions are held by the member.

2. On futures markets all over the world, profits are paid by the clearinghouse to members on a daily basis, just like losses are paid in to the clearinghouse by members. The margins reflect the symmetry in taking positions on the futures markets – the losses made by one side of the contract are the profits made by the other side.

●●

Q5.17: How does the slow payments system change these calculations?

A: Suppose daily MTM payments cannot be confirmed on the same day. In this case, the clearinghouse takes a risk of a multi-day loss instead of a single-day loss. This is easily handled using the $\sqrt{T}$ formula: T day exposure has a standard deviation which is $\sqrt{T}$ times larger than one-day exposure. Hence, if we think that the typical initial margin has to be 4σ, and if the payments system introduces a three day delay, then the appropriate level of initial margin is 7σ, where 7 is roughly $4\sqrt{3}$.

Many exchanges abroad have the *capability* of suspending trading at 11:30 in the morning on days of exceptional market index volatility, and doing a MTM margin call. This obviously demands a strong banking system which can move funds within five minutes. This *capability* allows the exchange to further reduce the size of initial margin required. If the exchange has this *capability*, of stopping trading for five minutes halfway in the day on exceptionally volatile days and charging MTM margin on the spot, then the appropriate level of initial margin becomes $\frac{4}{\sqrt{2}}\sigma$, or 2.8σ.

In this way, infrastructure in the form of a fast payments system reduces the working capital required in the financial industry. ●●

Q5.18: What are prospects for improvements of the banking system?

A: Some banks are already much faster than others on movement of funds. As of today, the National Securities Clearing Corporation has contracted with HDFC Bank as a clearing bank; HDFC Bank has Electronic Funds Transfer (EFT) and offers same-day confirmation of funds. Global Trust Bank also offers 30-minute confirmation of funds.

Canara Bank (also a clearing bank with NSCC) is in the process of setting up EFT. The Reserve Bank of India has a major initiative to establish a nationwide infrastructure for electronic funds movement. ●●

Q5.19: How does options margining work?

A: In the case of futures, both short and long are charged initial margin, and after this, both sides pay daily mark-to-market margin. This is not how options work. In the options market, the long pays up the full price of the option on the same day, and the short puts up initial margin. After this, the long is relieved of all responsibilities to his position, and the short pays daily mark-to-market margin.

The initial margin of the option short is the largest loss that he can suffer with a one-day price change that goes against him. This is calculated using theoretical option-pricing formulas. ●●

Q5.20: What are the special difficulties of margining options?

A: For options series that have a strike price that is far away from the current spot price, the options market is often quite illiquid. For these options series, mark to market margins (which are charged to the option short) is hard to calculate – either because the illiquidity of the options market makes the market's option price less reliable, or because the market fails to trade the option at all on a given date. In such a situation, theoretical models are used to impute the fair price of the option, and mark-to-market is done using this notional price.

In keeping with our argument of Question 5.15 above, the initial margin calculation is always concerned with calcualating the largest loss which a position can suffer. This becomes quite complex when options are a part of the portfolio, given the nonlinear payoffs of options. ●●

Q5.21: What constraints should regulation impose upon the time to expiration of these contracts?

A: As discussed earlier, there is a common intuition in India where we know that "forward contracting becomes more dangerous as the time to expiration increases". This intuition is out of touch with the functioning of *futures* markets which have daily mark-to-market margins. As long as daily mark-to-market margins are charged correctly, it is asif daily settlement is in force. Daily mark-to-market margins break the link between time to expiration and default risk.

Hence the time to expiration seen in the market is a question that the exchanges should address. As long as daily MTM margin is being charged correctly, it is not a regulatory concern. ●●

Q5.22: How does the margining system *change* the way people trade?

A: One of the subtle and valuable things about a good margining system is the way it changes the behaviour of people who trade. People will always adjust their behaviour to minimise the margins that they have to pay up. If margins are calculated correctly using portfolio reasoning, then we will start seeing the phenomenon of "undiversified risk" diminishing. As in the Apollo Tyres case, the level of initial margin charged there would be very steep (a limit of three times base capital) and people would start avoiding such risks.

Such understanding, and wisdom in safe speculation, will be good for exchanges and good for the country. As long as we charge initial margin in the form of fixed rules like "10 times base capital", we do not give people incentives for improving their skills in diversification and hedging. ●●

Q5.23: What are the policy issues in clearing corporation failure?

A: While famous events like Barings have captured the media attention, it should be noted that these did not interrupt the smooth functioning of the clearing corporation, which is the center of focus of the regulator.

However, it is to be expected that once every few decades, market fluctuations *will* take place which are large enough to bankrupt clearinghouse. For such infrequent events, it makes a lot of sense for the central bank to supply a line of credit for a

few days to a clearinghouse at such a time to tide over the exigency.[1]

It is all too easy for such a guarantee to be counterproductive. Once such a guarantee is given, there is, what is called, a *moral hazard* problem. If the clearinghouse thinks that the central bank is there to take care of difficulties, then the quality of attention that the clearinghouse puts into its work of ensuring clearinghouse strengths through safe margining systems would be reduced.

Hence if the central bank wishes to be a lender of last resort to the clearing corporation, then it should set standards to confirm that the risk containment procedures and margin calculations are strong enough to support a failure of no more than once in 25 years. This implies that a stress-testing of the clearing corporation should find that the probability of failure of the clearing corporation is below 0.015 or so. The econometrics profession knows a fair amount about measuring these probabilities, using models of the data generating process underlying the returns. ●●

Also see: ?, ?.

5.2 Other Aspects of the Risks

Q5.24: What are the risks that derive from usage of derivatives?

A: ? observe that because all derivative instruments are equivalent to combinations of existing securities, they cannot introduce any new or fundamentally different risks into the financial system. What derivatives do accomplish, however, is a facility for transferring these risks, and concentrating their risk management into a few entities.

A common classification of the risks in the derivatives area uses three areas (a) risks to individual users owing to mistakes in their positions, (b) risks to the clearinghouse owing to large market fluctuations and (c) risks to the economy from a breakdown of all the markets in the country. ●●

Also see: ?.

[1] The terms "credit risk", "default risk", and "counterparty risk" all pertain to the same thing. "Settlement risk" and "Herstatt risk" are default risk on the date of settlement. These terms do not hence imply new kinds of risk.

Q5.25: What are the policy issues in individual risk?

A: Examples like Barings fall into this first category of risks.

Individual users of markets *will* make mistakes from time to time. But this is not unusual – on a larger plane, companies make mistakes in manufacturing, or marketing, or in the relationships with banks, etc. This is one more kind of mistake that companies can make. In the modern world, a certain collection of skills are required in order to do certain things, and people who lack those skills *will* experience difficulties. There are umpteen examples in India of people who have made losses in short-selling. There is no direct role for regulation here; the role of regulation would be to assure that the *market itself* does not breakdown in a payments crisis.

At the level of an individual company, episodes like Barings reflect "agency conflicts", where employees of the firm fail to act in the interests of the owners (shareholders) of the company. Agency conflicts are a problem well-known to economists (?) and are rampant in the functioning of all sorts of companies. In all these situations, the economic challenge is one of creating an organisational structure which encourages employees to act in the interests of the organisation.

In the specific situation of Barings, several solutions (that should have been built into the bank's business plans) would have ensured that the individual risk was reduced. One is the separation of trading and backoffice functions (which was not done at Barings) which would allow management to get untainted information about the trading activity. Another is by setting position limits for traders limits the size of the bets, and the worst possible damage, that they can do. Compensating traders based on long-term performance, in a manner which is sensitive to the risk adopted, is safer than paying bonuses for short-term trading gains without regard for risk.

At a policy level, the most pragmatic approach is to create the markets, and then the skills will come. There is no real incentive for firms to grapple with these risks until derivatives markets are in India. For example, companies in India did not invest in obtaining computer skills until computers became available in India.

Once the markets arrive, top management will start looking for consultants in risk management,

J. P. Morgan's "Riskmetrics" software, notions like "Value at Risk", etc. This entire process of learning will begin once India has derivatives markets. ••

Also see: ?.

Q5.26: What about systemic risk, or risks to the economy?

A: Systemic risk manifests itself when there is a large and *complex* organisation of financial positions in the economy. "Systemic risk" is said to arise when the failure of one big player or of one clearing corporation somehow puts all other clearing corporations in the economy at risk.

At the simplest, suppose that an index arbitrageur is long the index on one exchange and short the futures on another exchange. Such a position generates a *mechanism* for transmission of failure – the failure of one of the exchanges could possibly influence the other.

Systemic risk also appears when very large positions are taken on the OTC derivatives market by any one player.

Neither of these scenarios are in the offing in India. Hence it is hard to visualise how exchange-traded derivatives could generate systemic risk in India. ••

Q5.27: How should the use of derivatives by mutual funds be regulated?

A: Mutual funds are just one special case of "individual risk" described in Question 5.25 above. Mutual funds could make mistakes in the securities that they invest in, they could make mistakes in the way they interact with their investors, etc. Mistakes in derivatives trading is just one more kind of mistake that they can make.

Given free entry into the mutual fund industry, funds which are unable to cope with such complexity will go bankrupt, and funds which are good at figuring out this world will succeed. There is no role for some agency to protect mutual funds from making mistakes.

There *is*, however, a useful role for *disclosure*. Mutual funds should clearly show investors (in the prospectus) their planned policies about how they would use derivatives. This will enable investors to use the fund with knowledge. An analogy here would be that a car manufacturer should be supplying complete information to the potential buyer of the car of the internal details of how the car would work. ••

5.3 Market manipulation

Q5.28: What are the issues in terms of manipulation in the context of derivatives markets in general?

A: In all areas, a basic fact about derivatives is that they magnify the profit rate from manipulating the underlying. In other words, if there are profits to be made from manipulating Gujarat Cotex, then the gains to the manipulator would be magnified if he had purchased call options on Gujarat Cotex in advance. ••

Q5.29: What are the issues on short squeezes?

A: In the commodity markets area, a major concern is the "short squeeze", where a manipulator knows the amount of physical goods which can possibly show up for delivery and buys futures contracts worth more than this floating stock (he often tries to also buy the physical goods to reduce the floating stock. This is another sense in which India's "cash market" for equity is actually a futures market – we have seen short squeezes taking place on the weekly futures market.

However, with cash settled derivatives (e.g. index-based contracts), this style of manipulation is not a threat. This is a very important *difference* between the traditional reasoning employed in the context of futures markets. Between 1874 (when the CBOT first started supplying the counterparty guarantee) and the early 1980s (when cash settlement first appeared), the history of futures markets has been pockmarked with short squeezes. It is very important to observe that as India moves into futures markets with the most modern style of product (using cash settlement), this is a very different environment than that which has characterised a century of experience worldwide. ••

Also see: ?.

Q5.30: What kinds of manipulation are found with index derivatives?

A: Index derivatives are cash settled, hence the short-squeeze style of manipulation is infeasible.

Typically, the index *derivatives* are far more

liquid than the underlying stocks. Manipulation would hence work by

1. Adopting a position on the derivatives market and then
2. Trying to move the index in order to make that position yield a profit.

At the policy level, dealing with this style of manipulation has two implications:

1. Understanding manipulation in the context of index derivatives is synonymous with understanding manipulation of the underlying index, and
2. The exchange which supplies spot prices which are used in an index calculation is the place where attempts at manipulation would take place, and it is the liquidity and surveillance procedures on *this* exchange which should be seen as a check against manipuilation. In general, there is no reason why the spot and the derivatives have to trade at the same location.

●●

Q5.31: How do manipulators attack an index?

A: The reasoning of a profit-maximising manipulator leads him to focus on stocks *which have a high weight in the index but have poor liquidity.* This would obtain the maximum change in the index per unit of capital deployed into manipulation.

To cite an example, if a manipulator has Rs.1 million of capital, it makes no sense for him to spend that on trying to affect the price of State Bank (a highly liquid stock, where a purchase of Rs.500 million would typically move the price by less than 1%). Instead, that money is much better spend on Hindustan Lever (a less liquid stock). The best stocks to target would be those where liquidity is low and weight in the index is high.

A manipulator would choose those index stocks where the number $w * i$ is the highest, where $w =$ weight of the security in the in index (in percent), and $i =$ impact cost (in percent). If impact cost is hard to measure, then stocks with large values of w/s would be used, where $s =$ bid-ask spread (in percent). These formulas isolate vulnerabilities in the form of largecap stocks which are illiquid. Obviously, these formulas would use data for liquidity (such as impact cost or the bid-ask spread) from the exchange which supplies the prices which are used in calculating the index under question.

The basic index construction methodology of an index like Nifty works via the impact cost seen in *actual index purchases or sales of Rs.5 million.* Hence this methodology effectively requires that stocks should have liquidity in *proportion* to their market capitalisation. This ensures that there are no unusually weak points for attack by a manipulator. ●●

Q5.32: What kinds of manipulation can take place on security options?

A: In options markets, manipulation would consist of first adopting a position in the options market, and then trying to manipulate the underlying so as to obtain a good payoff from the options position. This is akin to the increased activity that takes place to affect the 3:20pm Friday price in Calcutta in the context of their *teji-mandi* market.

Another style of manipulation involves options which use physical delivery, and it is basically a variant of the short squeeze. The manipulator becomes long on call options to the tune of more shares than can be obtained for physical delivery. This would lead to a skyrocketing of the price of the underlying, and hence of the call option price.

A useful policy for derivatives exchanges would be something like this: security options markets should only be launched for securities which meet a rule such as "the security price should move by less than 0.5% upon purchases of Rs.0.5 crore".[2] It should be noted that the liquidity of the underlying stock would *improve* once security options come about, so that a security which meets such a criterion would be likely to seen see the price movement upon purchases of Rs.0.5 crore drop to less than 0.5%. ●●

Q5.33: Are individual securities in India liquid enough to support security options?

A: The most liquid stocks in the country are. The liquidity of State Bank and Reliance in one snapshot of NSE's order book, taken from June 1996, are displayed in Figure 5.1. Here we see around Rs.50 crore of shares of State Bank being sourced while impact cost stays under 1%; it is the highest liquidity available in India's equity market as of today. Many other securities which are in the

[2] This is basically the levels of liquidity seen in Nifty.

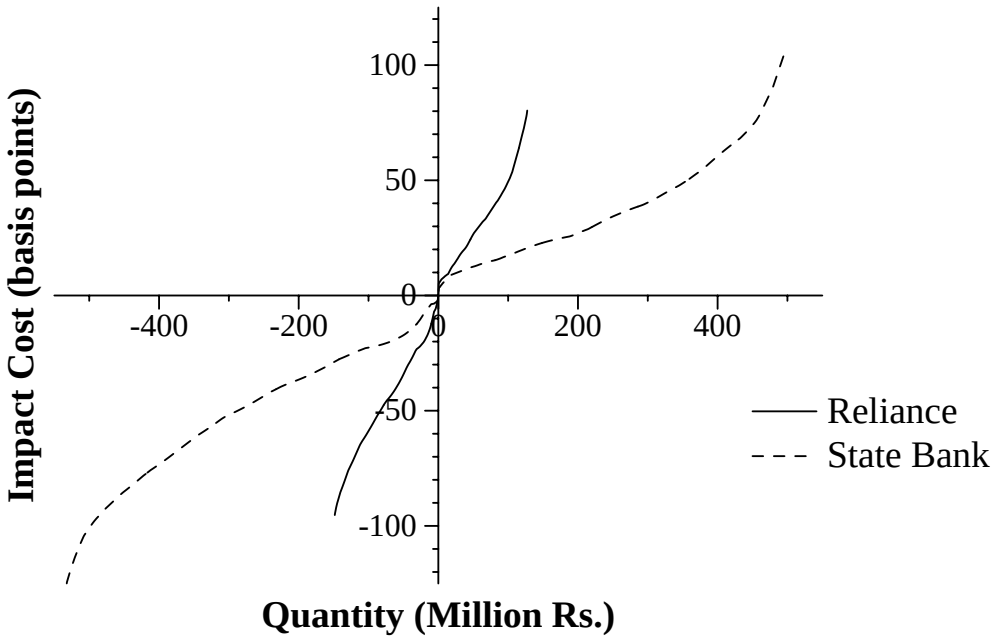

Figure 5.1: Impact cost on SBI and RIL at Various Transaction Sizes

NSE-50 index are also highly liquid. ●●

Q5.34: What would concerns about manipulation imply for the sequencing of index derivatives vs. security options?

A: Given the concerns about market manipulation in India, the safer sequencing is to first have index-based contracts. ●●

Q5.35: Would a slow launch of security options harm the economy?

A: The vast majority of trading volume in equity derivatives worldwide lies in index derivatives. This suggests that the economy really finds *index*-based contracts very valuable; usage of index derivatives is very widespread, while usage of security options is restricted to a smaller set of people.

Hence a a slow start for security options would have smaller deleterious economic consequences than delays in availability of index derivatives. ●●

Q5.36: What spot market should supply prices which are used for calculating payoffs with cash–settled security options?

A: An important principle here is that regardless of where the options trade, the payoffs from the option should be calculated using the market where the underlying is the most liquid. If we have options on Reliance trading on an exchange where Reliance is illiquid, and if the payoffs from the options are calculated using the cash market prices on that same exchange, then it would encourage market manipulation on that exchange.

Hence, at the level of individual securities, options markets anywhere should only calculate payoffs using closing prices from an exchange which meets two conditions: (a) strong surveillance procedures, and (b) it should have the highest liquidity in the country (i.e. it should have the lowest impact cost at transactions of Rs.0.5 crore or so).

A facility for borrowing and lending of shares will also greatly help reduce the risk of a short squeeze in the security options market. ●●

Q5.37: To what extent are these issues a regulatory issue?

A: Given the basic competitive market structure of derivatives markets, there are strong incentives for the *market* to be careful about issues surrounding manipulation. If investors suffer manipulation on one derivatives market, they will move their order flow out to other derivatives markets or to alternative avenues of investment.

Policy analysis should adopt the framework that the exchange is an entity that tries to attract order flow and maximise volumes. As long as this is the case, the aims of the exchange and the needs of the investor are the same. Exchanges that fail to cater to the interests of investors will lose order flow.

The policy suggested in Question 5.36 above, i.e. that "cash–settled options payoffs should be calculated with respect to the prices seen on the most liquid exchange" is an example of this principle. If (say) the Poona exchange tries to trade options on State Bank, then there are two choices: to use the State Bank price from PSE or from the most liquid exchange (NSE). If the former is adopted, there is a greater risk of manipulation. This fear would serve to widen the spreads on the PSE options market, and hence diminish the order flow to that market. This would spontaneously generate a strong pressure for PSE to redefine their option contract definition to calculate payoffs differently. There is little need for regulation to enter the picture.

This is perhaps like the question about the Maruti 800 being an unsafe car. To the extent that the market for cars lacks entry barriers, the safety of the Maruti 800 is not a regulatory concern: if consumers feel unsafe with the Maruti 800, they can always buy another car. ●●

5.4 In Summary

Q5.38: What does this discussion translate to in terms of specific regulations in the derivatives area?

A: Translating these abstract ideas into specific policy avenues:

1. SEBI should not allow any exchange to function without a clearinghouse that guarantees the trade, and it should conduct inspections to confirm that margin payments are being calculated as claimed, and actually being charged to members.

2. The clearinghouse must charge initial margin using a portfolio approach to measuring risk. If the clearinghouse can move funds swiftly enough, then it can be a true "initial margin", alternatively it should be a "exposure limit". If the payments system is slow, then the initial margin should be correspondingly larger.

3. SEBI should require exchanges to open up their entry criteria to the extent required so that the pure seat price (devoid of physical infrastructure) drops to low levels.

4. SEBI should require that exchanges disclose copious information about the trading (including things like open interest, the standard deviation of member-positions, etc) on the exchange. This information should be freely available in newspapers and on the Internet.

5. The surveillance department at SEBI should require, and possibly do an investigative followup on, reports of positions and trading activity of "large" players on the market. "Large" could possibly be defined as an open position above Rs.100 crore, or a one-day trading volume above Rs.50 crore. These are the traders who might command market power and possibly manipulate the market.

6. SEBI should be accessible to individual users of the market who would be able to complain about manipulative episodes where they have been hurt.

●●

Chapter 6

Derivatives and the Economy

Q6.1: What are the benefits of derivatives to India?

A: India's financial market system will strongly benefit from smoothly functioning index derivatives markets.

- Internationally, the launch of derivatives has been associated with substantial improvements in market quality on the underlying equity market. Liquidity and market efficiency on India's equity market will improve once the derivatives commence trading.
- Many risks in the financial markets can be eliminated by *diversification*. Index derivatives are special insofar as they can be used by investors to protect themselves from the one risk in the equity market that cannot be diversified away, i.e., a fall in the market index. Once investors use index derivatives, they will suffer less when fluctuations in the market index take place.
- Foreign investors coming into India would be more comfortable if the hedging vehicles routinely used by them worldwide are available to them. See Question 4.9 for more details here.
- The launch of derivatives is a logical next step in the development of human capital in India. Skills in the financial sector have grown tremendously in the last few years, thanks to the structural changes in the market, and the economy is now ripe for derivatives as the next area for addition of skills.

Once India has skills in the core derivatives markets, capabilities in derivatives can be easily applied into unexpected areas. The world over, innovative contracts such as pollution permits, electricity prices, garment quotas, etc, are being used to solve economic problems. Each of these markets is small when taken in isolation, but has a tremendous impact upon the specific area. But progress in these directions first requires a core capability on the part of exchanges and traders in mainstream financial derivatives. ●●

Q6.2: How do index derivatives change the *overall* level of equity investment in the economy?

A: We can think of the *overall* economy making choices about debt vs. equity, based on decisions by households and firms. In this big picture, derivatives have *no* role. Recall that all derivatives are in net zero supply: when one person leverages by going long on index futures, there is an equal and opposite counterparty who is deleveraging by going short index futures. If either of a short or a long are unavailable, no trade takes place.

In this sense, when aggregating *at the level of the full economy*, derivatives are unimportant. Where derivatives *do* help, however, is in allowing the repackaging and movement of risk from people who do not want to bear it to the people who are willing to bear it. Derivatives allow many economic agents in the economy to sell insurance to others, and the availability of this insurance enables many economic activities without which the risks would be too high. ●●

Q6.3: How will index derivatives assist capital formation and growth in the economy?

A: At the larger level of the economy, well-functioning derivatives markets will improve the market efficiency of the underlying cash market.

It will improve the market's ability to carefully direct resources towards the projects and industries where the rate of return is highest; this will improve the *allocative efficiency* of the market. By improving the allocative efficiency, a given stock of investible funds will be better used in procuring the highest possible GDP growth for the country.

Hence the real linkages go (a) from derivatives to market liquidity and market efficiency, and (b) from market efficiency to GDP growth. ●●

Q6.4: What is the evidence about derivatives and market liquidity and efficiency?

A: There is strong empirical evidence from other countries that after derivatives markets have come about, the liquidity and market efficiency of the underlying market have improved. ●●

Q6.5: What is the evidence about market quality and economic growth?

A: An important study of the relationship between stock market development and long-term economic growth has been recently conducted by Ross Levine and Sara Zervos (1996). They create a measure of stock market development which combines three dimensions of market quality. By this measure, a country is said to have a well-developed stock market when (a) the assets intermediated by the stock market are large when compared with GDP (b) the stock market is highly liquid, and (c) the stock market is highly integrated into world markets.

Their empirical analysis controls for the independent contribution of seven kinds of other factors. After taking into account the contribution of all these factors, they find that stock market development is highly significant statistically in forecasting future growth of per capita GDP. Their regressions imply that stock market development is also highly economically significant. For example, their regressions forecast that if Mexico or Brazil were to obtain stock markets as advanced as Malaysia, then they might obtain an additional per capita GDP growth per year of 1.6 percentage points. Even allowing for the imprecision and hazards of such extrapolation, this is an extremely large effect. ●●

Also see: ?, ?.

Q6.6: How do derivatives alter the *exposure* of different people in the economy?

A: Derivatives allow a shifting of risk from a person who does not want to bear the risk to a person who wants to bear the risk. Without derivatives, people suffer risk without much choice. The only investment decision that can be made is whether to be in a certain area of business or not. For example, if a garment exporter dislikes currency risk, the only choice that he faces (in a world before derivatives) is whether to be in garment export or not. With derivatives, he has the ability and choice to insure against currency exposure. And he is able to do this by trading this exposure with others in the economy who are equipped to deal with it. ●●

Q6.7: How do derivatives alter the *informational* structure of the economy?

A: Both futures and options markets have a significant impact upon the informational efficiency of financial markets.

In the case of futures:

1. The simplest and most direct effect is that the launch of a derivatives market is correlated with improvements in market efficiency in the underlying market. This improved market efficiency means that the market prices of individual securities are more informative.

2. Once futures markets appear, a certain *delinking* of roles in the two markets is observed. The cash market caters to relatively non-speculative orders, and the futures markets takes over the major brunt of price discovery. The futures market is better suited for this role, because of high liquidity and leverage. Whenever news strikes, it first appears as a shock in the futures market prices, which arbitrage then carries into the cash market.

3. Another unique feature applies for the *market index*. In todays economy, speculation on the level of the index is difficult, because a tradeable index does not exist. Hence informed speculators might try to take positions on individual securities in order to implement views about the index, but this is difficult because of higher transactions costs.

Index futures will hence improve the informational quality of the market index.

In the case of options,

1. Options are important to the market efficiency of the underlying in much the same way that futures are important,

2. In addition, options play one unique role of *revealing the market's perception of volatility*. High-quality volatility forecasts have serious ramifications for decisions in portfolio optimisation, production planning, physical investment decisions, etc.

   By using the option price in the market, it is possible to infer the market's consensus view about volatility through a simple formula. This is a completely unique role that options play, that neither the cash market nor the futures market can possibly play.

   This is a very important reason why security options are important. If options on TISCO existed, the entire market would be able to observe the price of options on the market, and infer a very good forecast about volatility on TISCO in the coming weeks and months.

●●

Also see: **?**.