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Index Derivatives Trading and the Indian Equity Market: Impact, Regulation and Contract Design

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August 4, 1997

Mr. OP Gahrotra
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Subject: Index Derivatives Trading and the Indian Equity Market: Impact, Regulation and Contract Design

Dear Mr. Gahrotra:

Price Waterhouse LLP (PW) has arranged for the Chicago Board Options Exchange (CBOE) to carry out the enclosed economic justification and review of regulation and contract design for the Securities and Exchange Board of India (SEBI) and the LC Gupta Committee on Derivatives which was appointed by SEBI to consider the introduction of derivatives into the Indian market.

The report was authored by Dr. William Barclay, Vice President of Strategic Planning and International Development at CBOE, and the CBOE Technical Assistance Program staff. CBOE carried out this study under the contract it has with PW to provide derivative technical assistance under the USAID funded Financial Institutions Reform and Expansion (FIRE) Project.

The study analyzes the economic justification for and probable cash market impact of equity index derivative trading in India and was undertaken at the request of the LC Gupta Derivatives Committee. The report

1. Assesses the likely benefits to the Indian capital market from the trading of equity index derivative products; and

2. Recommends regulatory and contract design measures to maximize the benefits and minimize possible negative effects of introducing these products.

PW trusts that SEBI and the LC Gupta Committee will find this a useful document in aiding in the design of regulations that adequately protect this market and allow it to contribute to India's continued economic development.

If you have any questions, please do not hesitate to contact me at (022) 496-3599. Thank you.

Sincerely,

W. Dennis Grubb
Principal Consultant - Capital Markets

INDEX DERIVATIVES TRADING AND THE INDIAN EQUITY MARKET:

IMPACT, REGULATION AND CONTRACT DESIGN

An Analysis Conducted for Price Waterhouse LLP by the Technical Assistance Program of the Chicago Board Options Exchange

US Agency for International Development (USAID)
Financial Institutions Reform and Expansion (FIRE) Project

CHICAGO, July 1997

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I. EXECUTIVE SUMMARY

This study analyses the economic justification for and probable cash market impact of equity index derivative trading in India. This analysis then provides the basis of several regulatory and contract design recommendations that are also contained in the study.

This analysis was undertaken at the request of the Securities and Exchange Board of India's (SEBI's) Committee on Regulation of Derivatives Trading. The Committee was interested in an assessment both of the likely benefits to the Indian capital market from the trading of equity index derivatives and of the regulatory and contract design measures that should be taken to maximize the opportunity to realize these benefits and minimize any possible negative effects of these products.

Section II of the report, reviews the benefits theorized to flow from index derivatives trading and, utilizing a range of information from both interviews and written sources, suggests why the Indian capital market may expect to realize many of these benefits. The concludes that India will likely obtain significant benefits of equity derivatives trading through:

(1) A strengthened finance system because of the more efficient allocation and management of the risks inherent in equity investment;

(2) An accelerated rate of capital formation because of increased access to equity markets by both domestic and foreign investors; and

(3) Improved economic competitiveness because of more efficient price discovery.

Section III examines the three major regulatory issues facing all capital markets as they embark on equity derivatives trading:

(1) Volatility;
(2) Liquidity; and
(3) Market manipulation.

The empirical evidence regarding the first two issues is reviewed in order to place these frequently expressed concerns within the perspective of international experience. The remainder of the section provides a list of regulatory procedures and mechanisms that should be adopted in order to minimize the potential for market manipulation while achieving the benefits from equity derivatives trading. These include:

(1) Required broker registration;

(2) Enhanced customer registration;

(3) Establishment of procedures for detecting threshold for triggering investigations in trading practice violations; and

(4) Implementation of portfolio risk assessment systems for daily margin requirements.

Section IV of the study reviews the major issues and decisions faced by designers of equity index derivative products and recommends specific courses of action for India. These include:

(1) Consider reducing the size (number of component stocks) of the proposed index product;

(2) Contract size should probably be on the smaller side for the Indian market;

(3) Do not be utilize position limits for financial protection in index derivative products. Instead financial protection should be addressed through the collateralization system and the powers of the clearing house to act promptly to transfer and/liquidate positions:

(4) Impose cash equity market price limits; and

(4) Use an averaging method for determining contract expiry value.

There are important regulatory and market structure issues that are raised by a decision to list and trade equity derivatives. Market participants at all levels will face a new and challenging market environment. Many of the results of derivatives trading are, however, positive for the overall development of the capital market. Examples of benefits include increased transparency, reduced transaction costs, and greater access to the equity market. Further, market participants may, to a significant extent, be insulated from possible negative effects through the appropriate regulatory and contract design measures. Therefore an underlying theme of this study, made explicit in the conclusion, is that India should continue the already significant progress made towards the launching of equity index derivatives.

II. POTENTIAL GAINS TO INDIAN CAPITAL MARKETS FROM DERIVATIVES TRADING

Financial systems are designed to link savers, those possessing income above and beyond their immediate needs, with those individuals and entities demanding these savings for investments that create or expand business activities. In this process of mobilizing savings for investment, financial markets convey information regarding the value of various financial assets; provide instruments that serve as vehicles for savers to store their accumulated wealth; and, if sufficiently developed, offer a range of investment choices that provide some protection via diversification. Financial markets do well or poorly on these tasks largely as result of their levels of liquidity, the efficiency of their pricing, and the trading costs associated with shifting between asset classes and instruments within a class.

Within this matrix of capital market functions, a derivatives trading capability enhances the performance of an emerging market in several ways. They

(1) Increase the resiliency of the financial system as a whole because of the risk management capabilities they bring. Futures and options markets may be used to enhance the societal distribution of risk just as cash equity and debt markets may be used to enhance the societal distribution of capital. Derivative markets thus perform the same functions for risk that cash stock and debt markets do for capital.

(2) Aid in the process of capital formation because they increase the ability of the equity (or debt) market to mobilize savings for investment. The establishment of derivatives trading increases the range of investment choices available to savers, attracting additional savings into the capital market.

(3) Offer savers a more rapid and lower cost avenue for participating in and shifting assets within a capital market because of the leveraged nature of these instruments.

(4) Improve the price discovery process throughout the economy. Additional participants are drawn into the market for an asset class, increasing the amount and scope of information that enters the price formation process.

(5) Enhance the attractiveness of a capital market to non-resident investors. In part this is the result of the low cost, leverage access noted above. However, derivatives also offer international portfolio managers, who often exhibit a herd mentality, the opportunity to manage the risks of emerging market investment without engaging in the buy first/sell first scramble to which they are restricted when only cash market instruments are available. In the absence of derivative products this herd mentality can result in overshooting of cash market equilibrium values and increased short term volatility, conditions which may deter both domestic and foreign investors from optimum commitments to the market.

(6) Increase employment in the financial industry, providing relatively high paying positions requiring technical and conceptual skills.

A. The Case Of Equity Index Derivatives

Is there reason to believe that any or all of these benefits offered by derivatives will accrue to the Indian economy with the launch of equity index derivatives? The first response to this question might reasonably be: why should the Indian experience be any different than that of other markets around the world? Indeed, in the absence of any evidence to the contrary, it is reasonable to suppose that these same benefits will in fact be evident in the Indian case. However, an answer on this level of abstraction may be insufficient to overcome hesitancy regarding the possible negative impacts of equity index derivatives.[1] Thus it is useful to consider some of the reasons for believing that in India, as elsewhere, markets in risk, particularly those focused on equity market risk, have the potential to generate significant economic and social benefits.

The evidence to support this proposition comes both from extensive interviews conducted by Chicago Board Options Exchange Technical Assistance Program (CBOE TAP) staff in 1996 with participants in the Indian equity market (no specific entities or individuals are cited in order to maintain confidentiality) and from analyses and descriptions of the potential and problems of the Indian capital market as it currently exists. The following discussion briefly examines several of the potential benefits of derivatives listed above, focusing on the likely impact of equity index derivatives since these are the probable first product to be listed for trading on any Indian derivatives exchange.

B. The Potential For Derivatives To Strengthen The Finance System Though Provision Of Risk Management Vehicles

The benefit first and most often cited for derivatives flows directly from the nature of the new market being created: the management of the risks associated with normal range of business activities, whether those activities be the production of goods and services or the management of financial resources.

Management of risk does not mean its elimination. In fact financial risk resembles matter: it is neither created nor destroyed. Financial risk, including the risks of equity investment, may, however, be transferred or transformed. In this respect the risks of finance and commerce differ fundamentally from those of gambling. Risk is inherent in business but artificially created in gambling. As noted previously, to develop markets in the allocation and management of risk parallel to the equity and debt markets in the raising and allocation of capital is the function of derivatives.

1 For an assessment of, and policy recommendations for responding to, these possible impacts see Section III.

There is considerable evidence that Indian investors recognize the salience of equity investment risk and would be attracted to liquid markets in risk. For example, mutual fund managers interviewed reported twice/year turnover of half or more of their equity holdings. This is an impressive effort in risk management in a market where the turnover ratio has been relatively low by comparison to other emerging equity markets (less then 30 percent annually during recent years) and equity market liquidity is quite limited outside of a small number of scripts. Index derivatives, because of their low transaction costs versus execution in the cash stock market and the speed with which a basket of stocks can be traded, would increase the ability of investors (Indian and foreign) to manage risk while lowering the costs of doing so. The expected result would be an increase in the attractiveness of equity holdings to investors because the diverse risk appetites of various market participants could be more readily satisfied.

C. *The Potential For Index Derivatives To Further The Capital Formation Process*

India, like most emerging markets, needs capital investment at sustained high levels in order to generate economic growth at a rate capable of raising the living standards of the country as a whole. Based upon interviews with both Indian and foreign institutional investors, index derivatives may be expected to mobilize additional domestic savings and accelerate foreign capital investment. In addition, these products have the potential for generating a more economically efficient allocation of capital within the equity market.

1. Mobilization Of Domestic Savings

The lack of certainty regarding trading, clearance and settlement procedures and the financial integrity of the Indian equity market deters many Indian investors, individual and institutional, who might otherwise commit more of their financial resources to the market. Currently it is estimated that less than 3 percent of the Indian population are direct investors in the Indian equity market while institutional investors such as mutual funds are underdeveloped and limit their holdings to a small number of scripts that are judged liquid.

Index derivatives offer an additional investment vehicle with characteristics that differ from those available in the existing equity market. First, they represent a leveraged utilization of capital and are cash settled which avoids the problems associated with clearing of cash stock transactions. Thus, index derivatives (as well as options on individual stocks that may subsequently be introduced) will allow Indian investors to expand their participation in the Indian equity market. Second, the diversification represented by an index product allows low cost diversification of equity holdings, removing many of the concerns expressed by investors regarding over-exposure to individual stocks, particularly those names with limited liquidity that may represent good strategic holdings but also exhibit considerable short term volatility and/or lack of liquidity.

The questions of establishing an index product that adequately reflects the range of desirable equity holdings and which is fairly priced is addressed in sections III and IV).

2. Mobilization of Foreign Capital for Investment in Indian Equities

Despite needs for significant inflows of capital to finance development, India has received only 3 percent of the total private capital flow to emerging markets during the 1990 to 1996 period. This reflects, in part, that the risks faced by foreign investors in India include not only those of market and credit faced by Indian investors but also currency and political risk. Unlike domestic Indian investors, however, international portfolio managers have the alternative to invest elsewhere if the risk/return trade off is judged too high.

In addition, because of the settlement and delivery problems associated with the Indian equity market, many foreign investors acquire some or all of their exposure to the market by mechanisms other than executing a transaction on one of the Indian equity markets. The result is reduced equity market transparency and reduced information regarding the true international demand for and supply of exposure to the Indian stock market.

Exchange listed derivatives are not designed to cover all of these risks; however, index derivatives do address three. First, and most obviously, market risk may be effectively managed by use of a diversified index product. Second, as was noted in the above discussion of domestic investors, cash settled index derivatives avoid settlement and delivery problems. Third, to a significant extent short term currency risk is also addressed through use of derivatives. Because derivatives are leveraged instruments, the currency exposure is significantly reduced when compared to direct investment of an equivalent notional value and, of equal importance, derivative commitments may be liquidated quite rapidly when compared with holdings of the underlying cash asset. Thus foreign investors may use derivatives to achieve a comfort level with the Indian economy prior to moving to the next level of commitment.

Even in the 18 months since the first analysis by CBOE TAP staff of the potential for derivatives trading in India[2], there has been considerable shift in sentiment on the part of international portfolio managers regarding the desirability of holding Indian equities. Reality has settled in and some foreign investors have significantly reduced their exposure to the Indian equity market despite the recent run up of the BSE Sensex over few weeks before this report. Others remain committed for the long term. However, both the latter and those liquidating part or all of their Indian holdings have repeatedly stated a strong desire for risk management vehicles that provide the opportunity to maintain their holdings (or even add to the same) during periods of short term volatility and resulting prices that, in their opinion, simply represent a deviation from long term equilibrium values. In the absence of such vehicles, the short term demands of performance measurement result in selling pressures that

2 Dr. William Barclay, Chicago Board Options Exchange (CBOE), Feasibility Study of a Derivatives Exchange in India, Price Waterhouse LLP Financial Institutions Reform and Expansion (FIRE) Project, March 1996.

can artificially depress the Indian equity market. Index derivatives (as well as options on individual stocks) would allow these investors to maintain their commitment to the market over the long term and would likely reduce short term selling momentum as well. (This point has been recognized in discussions of the Derivatives Committee appointed by SEBI.)

3. Allocation Of Capital

Index derivatives may also be expected to facilitate more optimal allocation of capital within the Indian economy. Today trading costs on the Indian cash equity markets are significant. This is true not primarily because of commission and transaction fees or even bid/ask spreads (although beyond a limited number of scrips the latter are reported to be quite large), but because of relatively low operational efficiency in the Indian equity market. Despite the introduction of a depository by the National Securities Depository Limited (NSDL) in late 1996 which allows trading of dematerialized shares, Indian trades resulting in delivery are still settled predominantly by the physical movement of paper.

The resulting staffing requirements along with the risk of bad deliveries increases the overall trading cost significantly. The National Stock Exchange (NSE) remains concerned with delivery problems as illustrated by several circulars warning members against various bad paper in circulation. The result of inefficient physical settlement is lowered mobility of investment capital since the expected return differential must exceed not only the current holdings but also the cost of exiting one investment and acquiring another.

Because of their lower costs when compared to cash market trading, index derivatives, as well as stock options, will improve the allocation of capital within the Indian economy, allowing investors to respond more readily to the price signals emanating from financial markets. The lowered trading costs associated with index derivatives are not solely or even predominantly the result of transaction fee and commission differences between cash and derivative markets; instead they are primarily the result of a reduced bid/ask spread on a composite asset--an index--versus the composite bid/ask spread on the individual index components. This difference will be heightened in a trading environment in which the comparison is between cash settlement and movement of paper. Information comparing cash and derivative trading costs is provided in Appendix A.

D. Improving Economic Competitiveness: Enhancing Price Discovery

The increase of both domestic and foreign participation in the Indian equity market that may be stimulated by the listing of Indian index derivative trading, coupled with the licensing and disclosure requirements associated with these instruments (see Section III) and the educational effort that would be involved in their launch and success, would increase the overall level of financial knowledge among both active as well as potential investors. The result would be both the incorporation of more extensive information regarding the valuation

of equity securities as well as the speed with which such information is reflected in stock prices.

Currently the Indian stock market, despite the extremely important reforms made by the NSE over the past two years, suffers from very limited participation. Although perhaps 25 million Indian residents own stocks, this is, as noted above less than 3 percent of the total population. In some respects it is surprising that this number of investors have braved participation in a market characterized by inadequate disclosure of information (and at times prices) relevant to valuing of individual stocks as well as the market as a whole. In sum, trading cost are high and transparency is low for most of Indian investors. As a result India is more of a "story market" than a valuation based market. Prices may move in response to rumors regarding the machinations, alleged or real, of leading shareholders as frequently as in response to an earnings announcement. Liquidity, therefore, is a continuing problem for the Indian equity market.

In part these problems result from the sub-broker system that allows almost anyone to act as a financial intermediary; in part it reflects the continuing "private club" nature of the Indian market (a common feature of emerging equity markets and not that far in the past of many now developed markets); and in part this is a product of the fragmented nature of the Indian equity market.[3] One result of the weakness of price discovery in the Indian equity market is an overwhelming concentration of liquidity when compared to other markets: relatively few investors are willing to risk significant exposure to scripts outside of those with a large following. In turn, the result is greater vulnerability to the fortunes (misfortunes) of a few names. Although the number of listed Indian stocks exceeds 6,000 and the number available for trading on the NSE is almost 1,500, the number of stocks judged "liquid" even by medium sized investors is remarkably small. Estimates of "10" or "a dozen," liquid stocks are the common responses when this question is posed to Indian equity market investors.

This problem is illustrated in Table II-1 below which provides data on the number of stocks comprising the top 5 percent by trading value in various world markets and the share of total trading value accounted for by this group. While liquidity concentration exists in all markets, the extent of concentration within the Indian equity market is striking: 10 stocks, less than 1 percent of those listed, account for over 90 percent of trading value in a market capitalized at approximately US$125 billion (US$125,000,000,000). Clearly the creators of an Indian equity index contract are working in a unique situation. (The contract design implications of this environment are considered further in Section IV.)

3 Fragmentation occurs from the number of stock exchanges in India and the different segments trading on the same exchange. Today for instance for a share such as Reliance in Mumbai, you can have the following prices for the same class of common shares: NSE dematerialized segment, NSE physical segment, BSE Sunshine segment and BSE regular segment. This does not include the negotiated deal windows of the NSE and BSE nor the proposed introduction of trading in permitted securities on Over the Counter Exchange of India (OTCEI).

Table II-1
Concentration Of Trading Value, Selected Markets

Market	Top 5% No. of Stocks	Top 5% Share of 1996 of Trading Value	Year End Mkt. Capitalization (US$ Billions - 000,000,000)
Australia	57	75.3%	$311.8
Belgium	8	47.7%	$119.1
Denmark	12	57.8%	$71.1
Finland	4	35.0%	$61.3
France	35	70.6%	$586.9
Germany	34	81.6%	$664.9
Japan	88	43.8%	$3,106.1
Korea	38	28.2%	$139.1
Netherlands	11	62.3%	$375.6
Spain	18	80.2%	$192.3
Switzerland	17	64.7%	$400.3
UK	105	70.2%	$1,642.6
US (NYSE)	109	49.0%	$6,842.0
India*	74	>97.0%	$135.0

* Based on NSE listings of 1484, not total Indian listed stocks (latter implies approx. 350 stocks)

Index derivatives do not offer a guaranteed method of overcoming these limitations. However, successful initiation of trading in these products will present a challenge to the existing institutional structure and practices of the Indian equity market. First, as experience in other countries demonstrates, the technical skills and financial knowledge required to utilize these instruments customarily attracts attract new participants with few, if any, connections and commitments to the existing practices and procedures of the Indian equity market. Driven by the opportunity to profit from trading index derivatives as well as from offering these products to clients, both institutional and individual, these new market participants will expand the number of opinions and beliefs and the range of knowledge that goes into the formation of prices.

Second, the opportunities for arbitrage between derivatives and the underlying cash market should provide some remedy for attempts to manipulate the latter, at a minimum reducing the certainty of gain from such attempts in part because of the increased liquidity associated with trading of index derivatives. One outcome of these two factors will be improved economic efficiency of the Indian equity market.

Third, if not restricted by regulatory barriers such as transaction taxes, equity index products generate a liquidity flow back into the cash market (see discussion in Section III, "Index Derivatives, Program Trading and Stock Markets," particularly the role of arbitrage).[4] This

4 There are several issues of index contract design that must be satisfactorily resolved to maximize the liquidity

flow back will assist, along with measure to enhance the transparency of the Indian equity market, in breaking the cycle of low liquidity/low equity market participation/inefficient price discovery, improving the liquidity of the underlying market while also assisting in generating a more optimal distribution of risk among market participants.

Fourth, successful regulation in the derivatives market including the institution of a broker licensing requirement may serve as a catalyst to implement reforms in the cash equity market. India has a very large number of sub brokers (estimated between 50,000 and 200,000 individuals). Many of these individuals will not qualify to offer derivatives to their clients, either because of lack of product knowledge or inadequate position monitoring procedures, without substantial change in their operations. This may not immediately alter the functioning of the stock market but will establish a base of licensed brokers with recognized fiduciary responsibilities that over time should capture the business of more and more investors. The result will certainly be an improvement in the both the operational and pricing efficiency of the Indian market.

Before concluding this discussion of the potential benefits to India that markets in risk would provide, it is useful to stress one final point. The question facing policy makers concerned with development of the Indian capital markets is not whether there will (or should) be derivatives based on Indian cash financial markets. That question has already been answered in the affirmative. Several interviewees cited derivative trades done off shore, frequently in London, and noted that this market existed and was growing. Further, given the experience of other countries, it is reasonable to conclude that should India not develop a derivatives trading capability, at some point in the future an exchange in another country will list derivatives based on Indian cash market instruments. **Thus, the issue for Indian policy makers is whether such markets should be readily accessible to their own residents, both individual and institutional, and subject to their jurisdiction or whether such markets should be developed outside of India and away from effective Indian regulatory oversight.**

flow back contribution of index derivative trading. These are discussed in Section IV.

III. FUNDAMENTAL REGULATORY QUESTIONS: VOLATILITY, LIQUIDITY, AND MANIPULATION

This section, divided into two parts, examines some of the regulatory issues that a decision to proceed with the development of risk management markets poses. The first part addresses the impact that the introduction of equity derivatives has on underlying cash market volatility and liquidity. The evidence from several analyses is reviewed, followed by a comparison of the experiences of five markets. Three of these markets (Australia, Japan, and Malaysia) have regional proximity to India and two (Spain and Italy) are markets that exhibited size and volatility characteristics at the time of the launch of their index derivatives similar to those currently existing in India.[5]

The second part of this section contains a series specific recommendations that individuals and entities charged with regulating the Indian market should consider as plans for launch of index derivatives proceeds. These are designed to address the question of derivatives and market manipulation and, in particular, to strengthen two facets of market oversight: the deterrence and detection of attempts at manipulation and the insurance of market integrity, both financial and fiduciary.

A. Volatility And Liquidity As Policy Issues

The consideration of introducing derivative products into a capital market has invariably led to concerns being expressed about the potential for additional volatility and reduced liquidity in the underlying cash markets. However, the empirical evidence of both academic and regulatory analyses has consistently demonstrated that the introduction of index derivatives and stock options neither increases volatility nor reduces liquidity. In fact, there is strong evidence that the latter is actually increased. While most of the early studies addressing these issues were based on the US experience, the spread of equity derivatives to other markets has generated further studies of these issues drawing upon evidence from additional markets.

1. Some Evidence From Asia

Hong Kong is a market that, at time of derivatives launch (as well as today) exhibited levels of volatility similar to or even greater than those of contemporary India and speculative or trader equity culture that is also similar to that found in India. Despite these (perhaps negative) features of the Hong Kong investment community, C.N. Kan's analysis of the introduction of futures on the Hang Seng Index demonstrated no significant increase in the volatility of the constituent stocks. Kan compared the mean return volatility of 28 stocks included in the Hang Seng Index futures contract to a similar basket of non-constituent

5 None of these markets used the account period settlement system currently in effect in India. This is not a deterrent to successful launch of equity derivatives, however, as the case of the United Kingdom, which has only quite recently moved to rolling settlement, demonstrates.

stocks. Several different time intervals were analyzed, including one, two, and three year periods (the returns during the 1987 market crash were eliminated because of possible statistical distortion). Kan concludes that the feared destabilizing effect of index futures did not occur in Hong Kong.[6]

Because of concerns expressed both by representatives of the Tokyo Stock Exchange (TSE) and the Japanese Ministry of Finance (MoF), the Japanese case has been of particular interest and attracted attention outside of the country. Both TSE and MoF personnel, as well as some other market participants, have argued publicly that index derivatives were a significant source of the problems experienced by the Japanese market during the 1990s, including decreased turnover levels and investor fears regarding increased volatility. However, studies of the impact of the introduction of index futures and options on the Nikkei 225 on the first section stocks traded on the Tokyo Stock Exchange have not substantiated these arguments. Indeed, a recent analysis revealed an actual decrease in volatility in the 225 index stocks following index options listing. The authors conclude, "the observed results are consistent with the hypothesis that the advent of options trading causes a migration of speculative and market-wide information-oriented trading activity from the underlying market to the options market."[7]

Analyses of stock option trading in Australia, the most active equity option market in Asia and among the world's 10 largest, have also failed to substantiate any increase in volatility. In fact, the results were similar to those consistently found in the US: a decrease in volatility and an increase in liquidity.[8]

2. Additional Evidence

CBOE TAP staff have compiled additional information, presented below, to illustrate the cash market impact of index derivative launch. Table III-1 presents pre- and post-launch index volatilities and Table III-2 presents pre- and post-launch cash market turnover levels for five markets.

Table III-1 compares historical volatilities on the traded index for the periods 90 days, one year and two years both before the launch date and after the launch date. While no attempt was made to filter out exogenous events impacting these markets, it is interesting to note that, in general, post-launch volatilities are similar to or lower than are pre-launch volatilities.

6 Kan, Andy C. N., "The Effect of Index Futures Trading on Volatility of HSI Constituent Stocks: A Note," The Pacific-Basin Finance Journal (February, 1997), pp. 105 -114.

7 Kumar, Raman, Sarin, Atulya and Shasti, Kuldeep, "The Impact of Index options on the Underlying Stocks: Evidence from the Listing of Nikkei Stock Average Options", The Pacific Basin Finance Journal (1995), pp. 300 - 320.

8 Aitken, Michael, Frino, Alex, and Elvis Jarnecic, "Option Listings and the Behavior of Underlying Securities: Australian Experience," Securities Industry Research Centre of Asia Pacific Finance, University of Sydney, Australia, 1995.

Table III-1
Index Volatility (%): Pre- and Post-Launch of Equity Derivatives

Country	2 years prior	1 year prior	90 days prior	90 days post	1 year post	2 years post
Australia	13.85	16.12	17.97	9.20	12.13	12.80
Japan	27.18	10.17	9.80	7.90	18.66	30.51
Spain	23.52	19.36	15.37	14.94	19.28	16.78
Italy	NA	26.76	25.53	24.78	20.74	19.22
Malaysia	28.07	20.16	14.73	18.50	13.91	16.46*

* For the period 1/1/97 through 6/11/97

Table III-2 attempts to measure the impact on liquidity that derivative product launches have by comparing the three year average turnover rates pre-and post-launch. Except in the case of Japan for which the 1990/91 market crash had a tremendous impact on the market, turnover rates increased in post launch time period.

TABLE III-2
Stock Market Turnover as % of Capitalization--3 Year Average
(Pre and Post-Launch of Equity Derivatives)

Country	Prior to Launch	After Launch
Australia	14.3%	27.8%
Japan	52.6%	31.7%
Spain	29.5%	36.3%
Italy	27.7%	40.8%
Malaysia	53.9%	58.1%*

* 1996 only

B. Index Derivatives, Program Trading And Stock Markets

The conflict between what may be labeled the conventional wisdom regarding equity derivatives and the results of empirical studies may in part be the result of confusion among the basic concepts associated with derivative trading: risk transference, arbitrage, and hedging. These strategies, frequently grouped under the single rubric of program trading, not only do not increase volatility in the underlying market, but in reality benefit the cash market. This conclusion, and many of the mechanisms by which this occurs, were discussed in detail

by the pioneering regulatory study in the area, the 1984 joint US Board of Governors of the Federal Reserve/Securities and Exchange Commission/Commodity Futures Trading Commission study on the effects of trading in futures and options.[9] The study emphasizes the following conclusions:

1. Speculators in futures and options add significant volume to those products thus increasing their liquidity. This in turn makes hedging in these products easier which brings an improved overall confidence to the underlying market;

2. Because of their simultaneous use of both cash and derivative instruments, arbitrage strategies generally tend to improve liquidity in both markets; and

3. Because of the opportunity to reduce market risk exposure with index derivatives, institutional users of the market can more confidently provide their services (e.g., underwriting and block trade executions), thus contributing liquidity to the cash markets.

Overall, this study concluded that futures and options appear to have enhanced liquidity in some of the cash markets which they overlay and do not appear to have decreased liquidity in any of them.

A second comprehensive study done by a regulator in the area of the effect of futures on underlying market volatility was carried out by the Securities and Investment Board (SIB) of England, published in June 1992.[10] This study concluded that "There is no significant evidence that spot [cash] volatilities have increased since the introduction of index futures," the listing of FT-SE 100 index futures in May 1984.

Historically, program trading has most concerned regulators and market participants as a possible source of increased volatility in the underlying cash market. In particular the argument has been that, although index-arbitrage may have a stabilizing effect, portfolio insurance is potentially destabilizing. In a comprehensive analysis published by the US Federal Reserve on program trading and its stock market volatility, the authors concluded:

> Studies examining particular program trading strategies and their relationship to volatility or to returns have come to varying conclusions, but no study to date presents evidence that program trading volume causes increased volatility of stock returns.[11]

9 A Study of the Effects on the Economy of Trading in Futures and Options, Board of Governors of the Federal Reserve System, Commodity Futures Trading Commission and Securities and Exchange Commission, Washington, D. C. 1984.

10 London School of Economics, Financial Markets Group, Inter Market Volatility and Linkages: The London Stock Exchange and London International Futures Exchange, SIB, June 1992.

11 Duffee, Gregory, Kupiec, Paul and White, Patricia, A Primer on Program Trading and Stock Price Volatility: A Survey of the Issues and the Evidence, Finance and Economics Discussion Series, Board of, Governors of the Federal Reserve Board, Division of Research and Statistics, January 1990.

The authors go on to suggest that imposing prohibitive costs on program trading strategies will only encourage shifting these trades to substitute contracts, often on markets outside of the regulator's jurisdiction. These may be abroad or, as illustrated in the following suggestive case, even within the same capital market. One of the reasons for the use of synthetic puts[12] in the dynamic hedging (portfolio insurance) strategy so popular in the US prior to the 1987 market crash were the very stringent position limits in place in the cash index option markets. These limits in effect drove institutional users to a substitute market, that of index futures. In this case the replication component of portfolio insurance (i.e., selling futures and shares into a declining market) may have caused this strategy to be destabilizing. (See Section IV for a discussion on the use of position limits in index derivative marketplaces.)

The examples cited above serve to show that empirical evidence suggests that the introduction of index derivative tools does not increase volatility or negatively impact liquidity in the underlying cash markets. Certainly, strategies currently not available without risk management tools and ones that will contribute to cash market liquidity--hedging and arbitraging--will be implemented with the introduction of index futures and options. The increased activity in the cash markets by both domestic and foreign institutional market participants in executing these strategies will increase liquidity. As many observers have argued over the years, informed speculation, i. e. that based upon careful research rather than on sheer hunch, adds to the liquidity and the pricing efficiency of the underlying cash market.

C. Regulatory Recommendations For Equity Derivatives Trading

To ensure integrity in the marketplace, at minimum regulators need to have a framework in place that gives the investor--both domestic and foreign--confidence that safeguards exist to protect against market manipulation, misconduct and financial insolvency. The following section contains a series of recommended practices to ensure proper oversight is in place for the Indian equity derivative trading capability. Among the major areas addressed are:

(1) Sales Practice and Broker Registration;
(2) Trading Practices;
(3) Market Quality; and
(4) Financial Integrity.

It is important to note, however, that these areas do not exhaust the range of regulatory issues raised by initiation of derivatives trading.

1. Sales Practice/Broker Registration

Regulators need to be responsible for monitoring adherence to sales practice rules by member firms and their associated persons. This responsibility includes developing standards for

12 A put is an option granting the holder the right to sell the underlying at a certain price for a specified period of time.

member firm/customer relations, including licensing of brokers and regulations governing sales practices.

Licensing and sales practice regulation encompasses the following:

(a) Development of appropriate examinations to assure minimum level of technical competency and knowledge of industry rules, regulations and compliance procedures by brokers seeking to offer index derivative products, whether futures or options.

(b) Procedures for conducting periodic examinations of main and branch offices of member firms, including:

  (i) Account sampling;

  (ii) Account opening auditing; and

  (iii) Compliance with exchange exercise and assignment requirements (options) or delivery notice allocation (futures).

(c) Guidelines for member firm communication with customers, including:

  (i) Compliance with rules relating to product communications, including sales literature, advertising and program descriptions; and

  (ii) Sales literature review and informal guidance to member firms and their associated persons.

(d) Procedures for investigation of sales practice violations. Major areas of concern are:

  (i) Unsuitable recommendations;
  (ii) Inappropriate risk disclosure;
  (iii) Unauthorized trading;
  (iv) Improper use of discretion;
  (v) Excessive trading; and
  (vi) Lack of supervision.

(e) Mechanisms to provide informal interpretive advice to member firms on rules compliance, including assistance in devising appropriate supervisory structures and compliance with Exchange and SEBI rules.

In the US, the above efforts are now aided substantially by the Central Registration Depository (CRD)[13] managed by the National Association of Securities Dealers (NASD) for many of the inquiries required, including open examinations, notifications of new registrants, compliance with filing time frame, filings, disciplinary actions taken and recommended and complaints. A similar system managed by SEBI would be beneficial in the Indian market.

Recommendation: Required Broker Registration

The current broker/sub-broker system in place in the Indian market is not acceptable by international standards. Registration of brokers is essential if the self regulatory organization (SRO) is going to fulfill its responsibilities in the sales practice area. The ability of non-registered brokers to handle orders to be traded in derivative products makes many of the established practices discussed throughout this report (e.g., position reporting, administering margin requirements) difficult or impossible to implement.

Recommendation: Enhanced Customer Registration

Only customers with an account at a brokerage firm registered with the derivative market center should have the ability to trade options and futures. This requirement is essential if the exchange is to fulfill its SRO responsibilities, since it must be assured access to all customer and firm activity. In addition, there must be regulations governing a firm's relations with its customers, including, at a minimum:

(a) A "know your customer requirement" that requires collection of information at the time of account opening regarding the knowledge and experience of the customer; and

(b) A requirement for disclosure of any information known to the firm that may have a material effect on the customer's investment.

2. Trading Practices

Regulators at both the exchange and national level are responsible for developing a framework for monitoring potential trading violations. Procedures must be developed for detecting and investigating an array of trading-related violations, including but not limited to the following:

(a) If position limits are to be applied to any equity derivative products (see discussion in Section IV below concerning international practices) it must be possible to monitor account activity in order to detect violations of these limits. If exercise limits are applied to index and/or stock options a similar monitoring capability should be in place.

13 The CRD is a database of all persons in the securities and commodities business in the US other than clerical. It also contains registration information for all broker-dealers. It is maintained by the NASD but serves as the record for the US Securities and Exchange Commission (SEC), all exchanges and all states.

(b) Exchange surveillance systems must be capable of tracking orders by time of entry/execution in order to detect possible front running violations, i. e. cases in which a broker acted upon knowledge of a pending customer order to buy (sell) and bought (sold) prior to execution of the order and then sold to (bought from) the customer.

(c) Exchange (or SEBI) regulatory staff must establish procedures for detecting of various forms of market manipulation, including capping and pegging (the use of small orders near the close to influence the settlement price) and mini-manipulation.

(d) All exchanges that are allowed to list equity (or other) derivatives should establish procedures for recording and responding to all customer complaints within a pre-determined period of time.

(e) At expiration exchange regulatory staff should monitor the activity of all accounts holding offsetting cash/derivative positions. The program trades necessary to exit these positions should be the subject of particular attention since timing and execution of these may be used to influence the final value of the index on which futures and options products are based (see discussion of expiry value determination in Section IV).

(f) There are several additional trading related abuses which must be monitored including pre-arranged trading and abuse of broker error accounts. (Failure to adequately surveil the latter was one of the reasons SIMEX did not detect the activities of Barings earlier.)

(g) Upon listing of stock options regulatory staff must be prepared to review significant activity in a listed class at the account level that occurred prior to important news announcements in order to detect possible insider trading.

(h) Responsibility for notification and education concerning new rules and interpretation of existing rules should be also undertaken by regulatory staff.

Recommendation: Establish Procedures for Detecting and Thresholds for Triggering Investigations into Trading Practice Violations

The thresholds for each market are different and need to fit the level of activity, market size, and market culture of the country in question. SEBI and exchange regulators need to begin promptly developing a surveillance plan and establish the thresholds that will be used to trigger an investigation to detect the possible violations enumerated above. Because of the relative lack of regulatory oversight of cash market trading and the history of questionable practices in the Indian equity market, the parameters for initiating an investigation into possible trading violations need to be quite restrictive. In addition, as noted in the March 1996 Feasibility Study of a Derivatives Exchange in India, completed by the Chicago Board

Options Exchange (CBOE) for Price Waterhouse under the USAID Financial Institutions Reform and Expansion (FIRE) Project, there must be no question as to the ability of exchange staff to initiate such investigations without prior senior management review or approval.

3. Market Quality

India may launch equity derivatives without use of liquidity providers. If, however, this decision is reconsidered and such market participants are utilized, it is recommended that appropriate market quality standards be set. Monitoring procedures to enforce such standards must also be put in place. Briefly, these encompass:

(a) Development of criteria for performance measurement;
(b) Creation of incentives for achievement of quality markets; and
(c) Monitoring and enforcement of market quality standards.

If it is determined that liquidity providers will be utilized, CBOE TAP staff are prepared to provide, under the FIRE Project, additional information regarding possible rules and procedures for governing the activities of these entities.

4. Financial Integrity

Exchanges must be prepared to enforce the established financial, margin, and books and records requirements. This must be accomplished through financial monitoring, routine examinations, and special investigations.

The financial monitoring program must include a daily net capital computation for clearing members to ensure that the net capital is sufficient. Reviews of financial statements and net capital computations (the "FOCUS" Report in the US) submitted by members is recommended. Additionally, procedures should be established for reviewing methodologies used by member firms to monitor account risk.

Financial regulation must also include routine annual examinations that focus on the following areas:

(a) Net capital,
(b) Status of books and records,
(c) Customer protection,
(d) Margin,
(e) Financial reporting,
(f) Proprietary trading,
(g) Risk control, and
(h) Operational efficiency.

Such routine examinations should occur at a minimum frequency of once per year. Additional inspections should be performed if problems arise at a particular firm.

Recommendation: Portfolio Risk Assessment Systems for Daily Margin Requirements

Portfolio risk assessment systems are essential for any derivatives exchange and this capability should be implemented simultaneously with the launching of derivative products. Such systems are available from already established markets and include the Chicago Mercantile Exchange's (CME) SPAN and the Options Clearing Corporation's (OCC) TIMS. Table III-3 below lists the risk management systems in place at clearing houses for 21 of the 26 countries trading index derivative products at year-end 1996.

Table III-3
Margining Systems For Derivatives

TIMS	SPAN	OTHER
Australia	Australia	Austria
AOM	SFE	OTOB
Brazil	Canada	Belgium
Sao Paulo Stk Exchange	Winnipeg Com Ex	BelFox
BM&F	France	Denmark
Canada	MATIF	FUTOP
Canadian Derivatives Clearing Corp	Japan	Finland
Germany	TIFFE	SOM
Deutsche Borse	Singapore	France
Hong Kong	SIMEX	MONEP
HKFE Clearing Corp	UK	South Africa
SEHK	LCH	JSE
Italy	USA	SAFCOM
Cassa di Compensione e Garanzia	CME	Sweden
Korea	BOTCC	OM
KSE	CFCCNY	Spain
Malaysia	KCBTCC	MEFF RF
Malaysia Derivatives Clearing House	NYMEX	MEFF RV
Mexico		
Bolsa de Valores Mexicana		
Netherlands		
EOE Clearing Corp		
Switzerland		
SOFFEX		
USA		
OCC		

An additional benefit of portfolio risk assessment clearing systems is the capability offered to cross margin between derivative and cash market positions. Of course, implementation of this capability requires cooperation between various derivative and cash markets. In some instances, such as the US, the fragmentation of regulatory agencies coupled with the independence of different exchanges has made realization of this capability a slow and cumbersome process. Thus, in the years immediately following listing of index derivatives,

US derivative clearing houses did not recognize the risk offsetting nature of positions in different derivative products (e. g., index options and index futures) or derivative and cash positions (e. g., cash stock and index option positions). However, as derivative markets grew and liquidity providers experienced short term market moves of significant size, the potential benefits to the market as whole that would result from cross margining became more apparent.

Nevertheless, it was only after the 1987 market crash placed severe strains on option market makers because offsetting index option, index futures and cash stock positions were treated independently by the various exchanges and regulators that cross margining through use of portfolio risk assessment systems was implemented. These systems proved their worth during subsequent sharp declines (1989 and 1991) as well as during normal market conditions, assuring financial integrity but requiring less total collateral because offsetting positions were recognized.

Calculations of the savings achieved by cross margining at OCC for the 19 firms utilizing these accounts during 1996 results in a gross margin savings of more than US$87 billion (US$87,000,000,000). This savings was realized even though not all correlated equity products may be included in a cross margin account. Thus, even today participants in cross margin accounts on US markets may and do select which of positions on price correlated products will be included in these accounts and which will be treated separately for purposes of margin. The information routinely collected by the OCC and the CME clearing house on these positions and the claims established by both clearing entities to these positions were sufficient to provide significant benefits to market participants despite the exclusion of related positions. Of course, inclusion of all related positions may be argued to be desirable for maximizing the efficient use of capital but is clearly not necessary.

IV. REGULATORY AND CONTRACT DESIGN ISSUES IN CREATING INDEX DERIVATIVES

The discussion in Sections II and III of this study illuminate a variety of concerns and policy questions that arise whenever a capital market undertakes the creation of markets designed to manage the risk of equity investment. As has been demonstrated through a review of the evidence from the experience of several leading markets, many of these concerns are not well founded empirically; others do not present a convincing case for a decision not to develop risk management markets but rather underline the importance of various market surveillance and/or financial oversight techniques. In all cases, however, index derivative contract design is of considerable importance both for achieving the benefits of risk management markets and reducing or eliminating the potential negatives that may be associated with index derivatives trading.

This section of analyzes several significant equity index design issues as these have been addressed in the 26 countries in which index derivatives products were listed for trading as of year-end 1996. These issues are the following:

(1) Selection/Construction of a "Tradable" Index

* Market coverage
* Index weighting method

(2) Contract size (notional value)

(3) Use of position limits

(4) Use of price limits

(5) Method of expiry value determination.

However, before examining the approaches taken to these questions by other capital markets, it is important to reemphasize the underlying rationale for the existence of index derivative products: the ability to manage the risk of equity market investment. To manage investment risk does not mean, however, simply elimination of such risk. If that were the sole goal of index derivatives, this could be readily accomplished merely by cash market timing decisions, altering the portfolio beta through selecting the appropriate mix of equity and short term sovereign debt holdings. (Of course the relatively high cost of such market timing decisions using only cash instruments would greatly reduce the societal level economic efficiency of risk management when compared to the use of derivatives--see Section II.)

Management of equity market investment risk legitimately includes the decision to restructure that risk into different components, to leverage the investment exposure, to engage

in anticipatory hedging, and a range of other investment strategies that utilize futures and/or options. It is therefore essential that the design of the index derivative product(s) be not only directed at limiting the possibilities for market manipulation or inhibiting any potential a derivative may have to generate volatility spikes. It is of at least equal importance that the index derivative be an efficient and effective vehicle for those seeking to manage exposure to equity investment.

At times there may be a trade off between these two goals of contract design, a trade off that may lead to a rejection of the perfect (from a narrow regulatory perspective) contract design because the result of such design would be an inefficient risk management market. An inefficient market in risk would be of little interest or benefit to those entities and individuals seeking to use such market to obtain the promised benefits of derivatives. This somewhat abstract generalization regarding the choices that must be made in designing an index derivatives contract will be illustrated at several points in the following analysis, particularly in the consideration of expiry value determination.

A. Selection Of A Tradable Index

In most capital markets there are several different indices of stock market performance that represent possible choices for creating a traded index derivative product. Further, in several cases futures and/or options have been launched on multiple broad based market indices. However, with one exception, a single product has quickly come to dominate index derivative trading.

For example, in the Netherlands, US and Japan index futures were launched (and continue to trade) on two or more distinct indices. However, in each case a single index derivative commands more than 70 percent of trading volume and/or value.[14] With the exception of the US, this same pattern of multiple products/single index product dominance holds true in options also. (In the US, both the S&P 100 and the S&P 500 remain viable options products with neither accounting for as much as 60 percent of total trading volume but this is a unique case.)

In considering the selection of the appropriate index to serve as the underlying for Indian equity market derivatives trading, it is useful to examine some of the indices that underlie the most active (by volume and notional value) futures and option products in terms of market coverage, both number of stocks and capitalization, stock selection and index weighting.

14 This discussion is restricted to trading in broad market index products, i.e. those futures and option products in which the underlying cash index represents what economists call the market portfolio. Sector products are therefore not considered. These latter products have yet to firmly establish themselves in any market, and their long term viability remains unknown. They are most appropriately considered as a possible second generation product.

1. Market Coverage/Number of Stocks

Even when limiting consideration to those broad based index contracts that are the most active in their respective markets, there remains considerable variation in the number of stocks contained within the traded indices. The leading index futures contract in the US, and the second most active option contact in this same country, the S&P 500, contains 500 stocks. At perhaps the other end of the continuum are the BEL 20, the HEX, and the KFX, traded on BelFox (Belgium), the FOM (Finland), and FUTOP (Denmark), respectively, each with only 20 stocks. In part this difference reflects the number of stocks listed in these two capital markets, over 5000 in the US and less than 300 in Belgium and Denmark and less than 100 in Finland.

More fundamentally, however, the number of stocks in the index reflects a second dimension of market coverage, the effort to capture a substantial segment of the market by capitalization. In the US case, the S&P 500 represents almost 80 percent of the New York Stock Exchange (NYSE) capitalization (although less than 65 percent of total US market capitalization); the KFX accounts for 69 percent of Danish market capitalization; the BEL 20 for more than 75 percent of the Belgian market; and the HEX for almost 85 percent of the Finnish market. It is this dimension, coverage of market capitalization, that is actually the primary impetus for scope of the index that underlies a derivative product.

Table IV-1 lists the leading stock index products, the number of stocks in each, and the extent of market coverage for selected active index derivative markets. In these markets, as most others, the top 5 percent of all stocks account for the bulk of capitalization and (repeated from Table II-1) trading value. The indices that underlie active index derivatives generally extend beyond this 5 percent threshold (the notable exception is the DAX), effectively capturing most investors' trading interest and needs.

Table IV-1
Stock Index Derivatives: Components And Coverage

Index Derivative	Market Coverage	Components	Listed Stocks	1996 Trading Val of Top 5	% Share of Mkt. Cap
S&P 500	80%*	500	5556	49%	56%
DAX	79%	30	1971	82%	72%
KFX	69%	20	249	58%	57%
IBEX	74%	35	361	80%	68%
SMI	70%	21	436	65%	78%
FTSE	73%	100	2616	70%	72%
KOSPI 200	70%	200	721	28%	50%
AEX	87%	25	433	62%	69%
CAC	63%	40	873	71%	60%
BEL 20	75%	20	291	48%	45%
HEX	85%	20	71	35%	28%

* Of NYSE capitalization; if NASD market is included the coverage is 65 percent

At the same time, however, the best tradable index products have not been those that maximized market capitalization coverage, capturing all or almost all of the equity market. These all-share or composite indices are, after all, quite easy to construct and do exist in most countries, in many cases predating the establishment of derivative markets. It may be argued that composite indices, because of the large number of components, are the purest representatives of the market portfolio and perhaps the most difficult to manipulate. However, these indices have seldom been selected for derivatives trading and, when products have been launched on such indices, they have failed to achieve the status of leading index derivative product. The two primary examples of composite index derivative products are the NYSE Composite, which includes all the stocks on the NYSE, and the TOPIX, which includes all the first section stocks listed on the Tokyo Stock Exchange. Both index derivatives had the advantage of being listed for trading on the primary stock markets in the US and Japan. However, neither contract has developed significant liquidity nor have institutional users found either product attractive.

For most investors a contract that captures the bulk of market capitalization but remains limited to liquid stocks offers the most effective risk management vehicle. Index contracts that include a significant number of stocks with little float and little following are actually more difficult to use for those seeking an effective risk management vehicle. This is true in part because the limited trading in the smaller stocks may actually distort the index as a measure of market movement, since prices of these stocks may remain unchanged even as the broader market rises or falls; thus the index tends to lag changes in market sentiment. More importantly, composite indices are difficult for traders to arbitrage, because of execution risk (or, of a smaller basket of selected, basis risk). The result is a derivative product that has a larger arbitrage-free band, resulting in a less efficient representation of the equity market, and is therefore of less use to those seeking a risk management vehicle.

Since the NSE 50 (also known as the "Nifty 50") is proposed as the underlying for the initial equity derivative products in India, that index should be examined with reference to tradability. Based upon the evidence from active world derivative markets reviewed above, the NSE 50 certainly contains a sufficient number of stocks as well as the necessary market capitalization coverage to provide a viable underlying for index derivatives in India. In fact, the concern that arises immediately when comparing the significance of the top 5 percent of all stocks and the coverage of the traded index in markets that have established index derivative trading with the Indian case is the likelihood that the NSE 50 is too large in terms of numbers of components.

No other market listed in Table IV-1 exhibits the same degree of concentration among the most active stocks as does India. As noted previously, the 10 most active Indian stocks account for more than 90 percent of all trading; the most active 50 stocks, still less than 3 percent of the stocks listed on the NSE (and less than 1 percent of all listed Indian stocks) account for more than 95 percent of all trading. An Indian stock market index of 25 or even 20 stocks (well within the accepted international range) would likely be a better underlying

on which to launch derivatives trading. When liquidity expands to incorporate a larger number of scripts, the index could be reconfigured.

B. Index Weighting Method

Less discussion may devoted to this issue since the evidence in this case is quite consistent regarding the decisions made by capital markets in which index derivatives trading has been instituted. Stock indices themselves are most commonly capitalization or price weighted although some, such as the Value Line Index in the US, are geometrical averages. Still others, particularly in some emerging markets, are based on measures of liquidity, usually drawing upon the largest stocks by capitalization but modifying their weighting (and sometimes even their inclusion) within the index by measures of volume and value of trading. However, with one notable exception, successful index derivatives are based upon an underlying that uses capitalization weights to calculate index values. This exception is the Nikkei 225 which remains the most heavily traded index derivative in Japan, despite the best efforts of both regulatory agencies (the Japanese Ministry of Finance in particular) as well as the leading Japanese stock exchange (Tokyo) to alter this reality.[15]

Why capitalization weighted indices have been the overwhelming choice of both listing derivative exchanges and investors is relatively easy to determine, at least in retrospect. Index derivatives developed early in the current period of phenomenal growth in equity market size and activity and grew up along side the development of portfolio management as a profession. Prior to the mid 1970s in the US, and somewhat later elsewhere, a diversified portfolio meant the inclusion of perhaps 15 - 25 stocks, the minimum level necessary to achieve the majority of the benefits of diversification across companies and industries. A quarter century ago few if any portfolio mangers were responsible for investing as much as US$1 billion (US$1,000,000,000) in the equity market, and stock market turnover ratios were in the 10 - 30 percent range. In this environment there was relatively little use for derivative risk management vehicles and relatively little interest in replicating indices that included a large number of stocks as either performance benchmarks or as the determinant of portfolio composition.

In the past two decades, however, world stock market capitalization has increased 15 fold (US market capitalization has increased 10 fold during this same period, lagging that of the world overall but remaining the largest). The institutionalization of savings that has been the driving force behind the remaking of the world equity market resulted in much larger portfolios and a strong interest in performance measurement through the use of broad based market benchmarks. These indices become the milestones that faced each portfolio manager and that were therefore of greatest interest and relevance to the manger's own assessment of investment decisions. These products were thus the natural raw material out of which index derivatives were constructed. In many markets indexation has been important in the

15 Although the issue remains in dispute many observers of the Japanese market believe that the price weighting methodology of the Nikkei 225 renders both the derivative and the underlying market more susceptible to manipulation, particularly at expiration.

development of successful derivatives. Although indexation has not progressed very far among Indian investors, it is important that the index used as the basis for derivatives trading be easy for investors to replicate.[16] Note that the indices selected as the underlying for derivatives trading do not usually simply represent the largest stocks by capitalization (although this is the case for the UK market's FTSE 100) but seek to represent the various sectors of the market and, within these sectors, to select more liquid over less liquid stocks.

C. Contract Size (Notional Value)

The issues of index derivative contract design also include contract size, the amount of market capitalization controlled by a single contract. Contract notional value is calculated as the product of the index level and the contract multiplier.

Table IV- 2 below lists the 1996 average contract size of the leading index derivative products for 12 countries that have been successful in establishing liquid index derivative markets, i.e., those where the "Derivative Liquidity Ratio (DLR)" is greater than 1.0.[17] Countries listed in the table are ranked by notional value of the index derivative contract (in cases where index option contract size differs from that of futures, the former is noted on an indented line; the futures contract notional value is used to rank the listings in the table). A "theoretical per capita portfolio size" (market cap/population) is also included. For comparison purposes India is listed in italics on the table but with no information on contract size.

Table IV-2
Index Derivative Products: Average Notional Value, 1996

Country	Product	Notional Value	Average Theoretical Portfolio Value
US	S&P 500 futures	$335,245	$26,000
	S&P 100 option	$ 67,049	$26,000
Japan	Nikkei 225	$193,859	$29,000
Germany	DAX futures	$170,536	$ 7,115
	DAX option	$ 17,054	$ 7,115
UK	FTSE futures	$149,380	$24,234
	FTSE options	$ 37,345	$24,234
Switzerland	SMI	$146,513	$60,842
Italy	MIB 30	$ 96,295	$ 3,666
France	CAC 40	$ 81,270	$ 9,044
Hong Kong	Hang Seng	$ 74,174	$52,066
Netherlands	FTI	$ 68,885	$23,162
Israel	MAOF 25	$ 6,352	$ 6,716
Brazil	BOVESPA	$ 16,947	$ 928
Spain	IBEX	$ 3,244	$ 5,001
India	*NSE 50*	*NA*	*$ 139*

16 A fatal problem for the first US index product listed, Value Line futures on the KCBT, was the difficulty investors had in replicating the index. As a result, the KCBT's contract has never attracted a significant following.

17 The DLR is a ratio comparing the notional value of index derivative trading, the numerator, to the value of cash stock trading, the denominator.

Although contract size has increased with the general bull run of the world stock market over the past few years, the range of contract sizes remains substantial. Unfortunately for those charged with designing contracts for a new market index derivative contract, size does not appear to correlate directly with any obvious measure. However, large markets as measured by capitalization do tend to have larger index derivative products.

One of the important functions of an industry committee of users, such as the index committee established by the NSE in the creation of the NSE 50, is to determine the appropriate contract size for the Indian market. There will be a certain tension in this process. Institutional investors may want large contracts since this will reduce the cost/contract traded; the Exchange, on the other hand, may want a smaller contract in order to generate more transaction revenue.

Participants in the discussions of this design issue should keep in mind that there is relatively little experience with changes in contract size after launch; it may be difficult to redesign this feature of the contract if, subsequent to launch, the initial size is judged either too large or too small. Two exchanges, the Sydney Futures Exchange and the American Stock Exchange, did change contract sizes after some years of trading. In the case of the SFE's All Shares pre-split notional trading value has been surpassed although perhaps not as quickly as expected; in the case of the AMEX's MMI, the contract never returned to its previous trading levels in either volume or value terms.

Overall, evidence from other countries suggests a relatively small size contract for the Indian market because of the still modest market size, the limited investor base, and the small theoretical portfolio size.

D. Measures To Deter Manipulation

The remaining three issues of contract design and trading rules are directed primarily at the problem of price manipulation, either of the derivative product, the underlying cash market, or both. The questions to be discussed here concern the desirability of position limits, the role of price limits, and most importantly, the determination of contract expiry value.

1. Position Limits In Index Derivative Products: International Practices

Contract position limits are among the most common design feature imposed by market oversight bodies and/or exchanges to regulate trading in derivative products. Such limits date at least from the 1920s when the then US Secretary of Agriculture required US commodity exchanges to develop and apply position limits to grain futures contracts. The rationale for these limits was to control the accumulation of very large positions in a commodity with a limited supply, both absolutely and in terms of bushels in delivery position. Although such grains as corn or wheat may be stored, they are perishable, and there exists at any point in time a finite (and potentially knowable) number of bushels that meet contract standards for

delivery and a smaller amount that is actually accessible to delivery locations. If one market participant were to corner the market by controlling most of the grain deliverable against the contract there was a significant opportunity for price manipulation.

Most of the new derivative contracts, either commodity or financial, that were developed during the explosion of product innovation that began on US in the early 1970s also traded with position limits. This has been true whether these products were listed on designated contract markets regulated by the Commodity Futures Trading Commission (CFTC)--which normally requested the exchange proposing a new contract provide an analysis of deliverable supply for determining such limits--or on registered securities exchanges regulated by the US Securities and Exchange Commission (SEC). Both agencies have strongly supported the imposition of such limits in contract design.

Stock index futures were initially an exception, trading without position limits in the years immediately following listing. However, as a part of the reaction to the 1987 market crash, position limits were extended to these products. (There has, however, been some recent shift away from this position on the part of the CFTC towards position reporting or accountability.) Outside of the US, position limits have also been common, in part probably because of the US example.

During the seven decades since position limits were first applied in the 1920s, an additional rationale has developed for the application of such limits: as a form of financial protection for individual investors, their carrying firm, and the clearing house. Thus, it has frequently been argued that limiting the number of positions that may be carried by a market participant institutes a cap on the potential loss and resulting financial stresses and strains.[18]

CBOE's derivative market data base includes information on position and price limit practices among derivative markets around the world. The available data includes whether position and price limits were in existence at a particular exchange and, if so, to what products these limits are applied. In addition, each exchange has been asked whether the rationale that underlay these limits was that of anti-manipulation, financial protection, or "other."

Information is available on 47 derivative markets. Although there were more than 75 derivative markets in operation at year end 1996, the 47 markets for which information is current includes 31 of the 40 markets listing index derivatives as well as all of the 26 stock option markets in operation and included at least one exchange from 28 of the 30 countries with listed derivatives at year end 1996. Further, it includes 23 of the 25 largest exchanges, the ones on which other smaller markets generally model their own practices. The conclusions to be drawn from this analysis should, therefore, be considered to represent both the best and the most common practices of derivative markets.

18 See the discussion of position limits in Becker, Brandon and Jeffrey P. Burns, "Regulation of Exchange Traded Options," Derivatives and Synthetics, edited by Robt. Klein and Jesse Lederman, Probus Publishing, Chicago, 1994.

Of the 47 exchanges, 37 report use of position limits. Of greater interest--and of direct relevance to the issue under discussion--were the rationales cited for application of position limits. Thirty five (35) of the 37 markets that reported use of position limits stated that these were applied both as a financial protection measure and as a preventive measure against manipulation. This suggests that both the original rationale as well as the more recent financial integrity argument have been absorbed into the contract design process. However, when the contracts to which positions limits are applied are considered, it is apparent that the stated rationales are not accurate. In the case of stock option contracts, 22 of the 26 respondents applied position limits; in contrast, only 15 of the 31 markets trading index derivatives applied position limits to this product. Even the latter figure is overstated, however. Outside of the US (where, as noted above, position limits were applied after the 1987 market crash), only eight of 24 index derivative markets reported use of position limits for index derivative products. In this regard the US may be said to deviate from common practices with respect to index derivative trading.

It is clear from this summary that position limits are primarily applied as an anti-manipulation measure to derivative contracts in which there is a limited deliverable supply available, i. e. in this case stock options which require actual delivery of the underlying stock in fulfillment of stock option exercise and assignments, a contract design feature that is found in all existing stock option markets. In contrast, index derivative contracts, in which cash settlement effectively removes deliverable supply restraints, do not commonly have position limits. If position limits were actually applied for reasons of financial protection, there would be no difference in their prevalence between these two categories of products, stock options and index futures or options. This conclusion is reinforced by the lack of position limits on currency derivatives, again a product with no deliverable supply restraints: only two of the nine markets that trade these products report use of position limits on this product.

There are a variety of regulatory tools available to deter manipulation, ensure market integrity and offer financial protection in derivative markets. To use an inappropriate or poorly adapted regulatory tool to address a potential problem can hamper the potential for market development as much as flaws in contract design. It is apparent that international practice is not to utilize position limits for financial protection in index derivative products. Instead financial protection should be addressed through the collateralization system and the powers of the clearing house to act promptly to transfer and/liquidate positions.

2. Price Limits and Index Derivatives: International Practices

Price limits present a different situation than position limits. This measure of trading regulation is quite limited in comparison with the use of position limits: only 18 of the 47 markets in the CBOE derivatives market data base apply price limits. However, the product pattern of price limit utilization should again be of interest to the contract design process for the NSE 50: of the 18 markets reporting use of price limits, 11 applied this measure of trading regulation to index derivative products. Among the products listed on the 47 respondent

markets price limits are applied more frequently to index derivatives than to any other product category.

Price limits range greatly in their intrusiveness and their significance. For example, in the US index futures trading is subject to a large number of price (or trading) limits. Thus, the CME's S&P 500 futures has trading of varying duration after 7, 15, 30, 45 and 70, point moves. It should be noted, however, that none of these price limits are linked to actions taken to halt trading in the cash stock market; similarly the NYSE's Rule 80A which alters the conditions under which index arbitrage may be conducted is unrelated to actions taken in the index futures market.

Even within the US, the application of price limits on index derivatives varies tremendously: the CBOE's index options have none of the CME's index futures limits. The governing rule is that Exchange officials may halt trading if it is judged that "a fair and orderly market" cannot be maintained. Among the factors that may be considered by Exchange officials in making this judgment is the proportion of the component stocks (by capitalization) that are open for trading, absence of a an index calculation based upon current market prices, the extent to which a rotation has been completed, etc. In contrast to these varied and uncoordinated index derivative price and trading limits, all US equity derivative markets as well as the cash equity market cease trading if the Dow Jones Industrial Average (cash) declines by 350 points (30 minutes) or 550 points (1 hour).

In contrast to the US, most other large and active equity markets have no price limits for either the derivative or the cash market. This is the case in the UK, France, and Germany, all among the five largest equity markets and the most active equity derivative markets. Each of these countries has made a policy decision that the imperative of keeping the market open overrides concerns regarding the possible panic effect of a sudden and severe decline.

Perhaps the market that most resembles the US in terms of its treatment of index derivatives is Japan. As a response to the severe and sustained bear market in the early 1990s, the regulatory authorities imposed an extensive series of trading suspensions on the Nikkei 225 futures (but not on the cash market). One result was clearly to revive the competitive contract traded on the SIMEX whose index futures volume share recovered from less than 2 percent in 1991 to over 25 percent during 1996 (adjusted for contract size). It appears that price limits may be overdone in their application.

When comparing the policy choices made by various markets in regard to index derivative price limits it is instructive to consider the nature of the equity market client base. In both Japan and the US, there are a large number of individual investors. In contrast, the UK and Germany in particular, and France to a lesser extent, are largely institutional markets. This suggests that political considerations may be at least as important as economic in the decision to implement (or not to implement) price limits on index derivatives.

As the foregoing brief discussion makes clear, the parameters of the policy choice with regards to price limits are considerably more complex than is the case for position limits. Questions to be answered include:

(1) If price limits are to be utilized how intrusive should they be?

(2) Should price limits apply only to the derivative market?

(3) Should price limits apply to both the cash and derivative markets?

(4) If price limits are to apply to both the case and derivative markets, is it the cash market index value that triggers the trading halt--even though the cash index will reach the halt number later than will the index futures derivative?

The few markets that apply trading halts to both the cash and derivative markets use the cash index value as the driver for the trading halt decision.

Despite the complexities of price limits for equity derivative trading, it is worthwhile considering this contract design feature in the context of developing an Indian index derivative product. In part this recommendation reflects the political concerns that surround the Indian equity market and in part the fact that the negative results predicted of price limits in the US have not come to pass (they have not served as "magnets," there has been no significant tendency of derivatives to de-link from cash, and trading has not been driven offshore).

Currently there are no provisions for halting trading of the Indian cash equity market although individual stocks cease trading at predetermined percentage price moves. It is important to note that these individual stock price limits will pose significant problems for NSE 50 derivatives (or derivatives based upon another index) if there is no provision for an overall trading halt of either the derivative and/or the cash market. How will the derivative price and trade if several of the component stocks, particularly the more heavily weighted ones, are halted while the index derivative remains open for trading and there are no provisions for halting of cash market trading? (One possible solution might be to halt derivative trading if a preset percentage of the index by capitalization is halted.)

3. Determination of Expiry Value: International Practices

This aspect of contract design is probably of greatest importance in the attempt to insulate index derivatives against the possibility of manipulation. In addition, however, it is also essential to the efficient pricing of the contract. The focus of this discussion is on expiry valuation, that is the value at which the contract will expire on the last day of trading and against which all open positions will be marked.

This valuation procedure is the most important for insuring fair pricing of the derivative and thus its utility to those market participants seeking to manage the risk of equity market investment. Daily marks for purposes of collateral assessment are also important to the success of an index derivative but are less determinative of product success. (It should be noted, however, that if the index option is an American exercise option on the cash value of the index, most of the issues raised in the following discussion are relevant.)

It is commonly recognized that a fair value for equity index futures can be determined at any point in time if certain factors are known: interest rates, dividends, and underlying index value. Index options require one additional piece of information, an estimate of volatility. The importance of fair value to the index derivative market cannot be overemphasized. If an index product deviates from fair value regularly and in an unpredictable manner, it will not be possible to achieve the risk management effectiveness that derivative market theory posits as the primary benefit to be achieved from derivatives. Of course, the other secondary benefits outlined in Section II, including an accelerated rate of capital accumulation, increased pricing transparency, and a more effective allocation of resources, will also be foregone. Thus, real time pricing efficiency is essential to the success and effectiveness of an index derivative market.

Index pricing efficiency requires the ability to execute spreads--arbitrage--between the index derivative and the component stocks of the index. When the derivative is overvalued based upon the fair value pricing calculation, the arbitrageur sells the futures (or synthetic futures) and buys cash stocks; when derivatives are undervalued, the arbitrageur buys the futures, actual or synthetic, and sells the cash stocks short. (As stressed in the March 1996 Feasibility Study of a Derivatives Exchange in India conducted by CBOE in under the FIRE Project in March 1996, the ability to sell short on the cash market is essential to the success of derivative trading. This capability is not yet in place in India.) Of course, different market participants may have different assumptions regarding the projected level of dividends, and each will face slightly different borrowing and lending rates. Thus, there is in reality not a single fair value for an index derivative but multiple fair values.

While the foregoing factors will determine when any particular arbitrageur may be able to act to insure fair derivative valuation, all arbitrage will be strongly influenced by execution risk--the ability to execute a trade, both the cash and derivative positions--at the expected prices. This is obviously true in establishing the position and each arbitrageur will seek the best execution facilities available in the market. In establishing the position, the arbitrageur is comparing borrowing or lending rates available elsewhere in the capital market with that available through cash/derivative arbitrage. This comparison of alternatives is possible because of derivative/cash convergence at expiration. But what, exactly, does convergence mean? At expiration, all open derivative positions (many of which are likely to be those of arbitrageurs since other market participants often exit the contract prior to expiration) will be marked to a single value and holders of offsetting cash positions will seek to exit these positions at values as close as possible to the expiry derivative value.

On some markets, this convergence is quite predictable and arbitrage is fairly easy to execute. For example, the S&P 500 index futures traded at the CME is marked to the opening trades of all component stocks on the third Friday of the expiration month. Cash stock positions are submitted to the NYSE for market on open (MOO) execution; since these are the opening prices that will be used to value derivative positions, there is relatively little expiration execution risk. However, this surety is possible because the market microstructure of the NYSE assures that all MOO orders will execute at an identical price. Most of the world's cash stock markets have no such provision, either at the open or the close, since most lack liquidity providers. Therefore arbitrage involves expiry execution risk as well as entry execution risk. Further, particularly when there is no assurance of a single final price, there is an increased risk that attempts will be made by some market participants to influence the closing cash transaction values to their benefit.

Several markets other than the US also use a single price to which expiring derivative positions are marked. This is the case in Japan, Australia, Italy, and Canada, for example. However, to limit, or at least make predictable, expiry execution risk and to deter efforts at manipulation, many stock index derivative markets use special procedures for determining the expiry value of the futures and option contract. These special procedures involve some form of index averaging over a specified period of time. The trade off, of course, is between assuring a fair price and minimizing the expiry execution risk of arbitrage positions. More extensive averaging over longer periods of time increases the probability that the cash leg of the arbitrage position will be exited at a composite price that differs from the actual expiry price. The result is a wider arbitrage-free band during trading and a derivative product whose value may wander further away from theoretical fair value.

Table IV-4 below presents information on the determination of equity index expiry values by markets around the world. The most common expiry valuation method is an average, usually taken over 30 minutes or less at some point on the last day of trading. It is recommended that the Indian index derivative market adopt this contract design feature. The length of the period over which such an average should be taken, the time of day to be used, and the decision to utilize all or only some of the index values generated during this period should be the subject of discussion among the NSE Industry Index Derivatives Committee with simulations of various alternatives run by NSE staff.

It is worth noting that the only two markets that use weighted averages in determination of expiry values, Finland and Norway, have not been successful in achieving the goal of a DLR greater than 1.0. This is in part due to the problems for arbitrage inherent in weighted average expiry valuations since the arbitrageur has no way of knowing how much of the cash position should be offset at each of the included pricing points.

Table IV-4
Index Derivative Settlement Procedures

		Expiry Settlement Method		1996
Exchange	Index	Single Price	Average (Wtd/UnWtd)	Country DLR*
SFE	All Ords	close		1.09
OTOB	ATX		15 min on last day	1.35
BELFOX	BEL 20		5 min 2:30 - 3:00 - last day	0.98
BM&F	BOVESPA		15 min on last day	2.06
Toronto Fut Ex	TSE 35	open		0.08
FUTOP	KFX		1 hr average - last day	0.19
FOM	FOX		9:50 - 4:05 last day wtd ave	0.44
MATIF/MONEP	CAC - 40		20 min - last day	2.55
DTB	DAX		1:20 - 1:30 - last day	1.70
HKFE	Hang Seng		every 5 min - last day	2.56
TASE	MAOF 25	open on call		4.56
IDEM	MIB 30	open		2.94
Oska Stk Ex	Nikkei 225	open		2.68
Korea Stk Ex	KOSPI 200	open		NA
EOE	all		30 minutes - last day	2.15
NZFOE	NZFOE 40	close		0.01
Oslo Stk Ex	OBX		wtd average - all day	0.19
BDP	PSI-20		30 minutes - last day	NA
SAFEX	All Share		60 obs over last two hrs	5.01
MEFF R	IBEX 35		30 minutes - last day	1.24
OM	OMX		last day average	1.17
SOFFEX	SMI		30 minutes - last day	0.84
LIFFE	FTSE 100		21 minutes - discard 3h & 3l	1.35
CBOE/CME	S&P 500	open		3.39
CBOE	S&P 100	close		3.39

* As explained previously the DLR is the ratio: derivative notional trading value/cash trading value

V. CONCLUSION

In many respects this study should be considered as a follow up analysis to the March 1996 Feasibility Study of a Derivatives Exchange in India. In concluding that analysis, three actions were identified as logical next steps for India in creating a derivatives exchange:

(1) Create an index design committee composed of NSE and market participants;

(2) Review existing laws and regulations that may impact derivatives trading in India; and

(3) Establish a derivatives group within SEBI.

Much of the impetus for the current study comes from the actions taken to implement the first and third of these recommendations. India has, therefore, made significant progress on the road to derivatives trading. It is important to keep this in mind as the content of the current study is reviewed and assessed; the large number of issues raised and discussed during the preceding sections of this study should not be allowed to obscure the progress made to date.

The SEBI Derivatives Committee for which this analysis was undertaken should proceed both with contract design and with the creation of the necessary educational materials to answer the cost/benefit questions that were raised in the request for assistance and which are addressed in the Section II of this study. Further, SEBI, in conjunction with the NSE, should actively pursue the creation and implementation of the requisite regulatory measures that will allow India to capitalize on the benefits of equity derivatives, both index and stock, without undue risk of suffering from the potential negatives that may accompany these products.

Appendix A: The Costs of Hedging

Hedging costs may be viewed from at least two perspectives: the actual cost of the transaction and the potential gains foregone if the expected market decline does not occur during the hedging time horizon. From either perspective the "hedging cost" will vary with liquidity and depth of the derivative market and, for option hedges, with implied volatility and interest rates. Of course none of this information is available for India since derivatives are not yet listed for trading. Therefore the following is based upon reported experience with from a variety of existing derivative markets.

A. Transaction Costs

Several firms have compiled transaction costs for hedging using stocks (market timing) or derivatives, futures, options or both; transaction costs include commissions, exchange fees, and bid/ask spreads. The latter are by far the largest component of total transaction costs. The following tables, A-1 and A-2, are illustrative of hedging costs in several different markets.

Table A-1
Hedging Costs as a Percent of Portfolio Value*

	Market		
	U. S.	Japan	U.K.
Commissions - Stock	0.326%	1.322%	NA
Commissions - Futures	0.013%	0.014%	0.022%
Commissions - Options	0.010%	0.016%	0.006%
Exchange Fees - Stock	NA	0.300%	0.500%
Exchange Fees - Futures	NA	0.002%	NA
Exchange Fees - Options	NA	0.003%	NA
Bid/Ask Spread - Stock	0.546%	1.500%	1.250%
Bid/Ask Spread - Futures	0.078%	0.085%	0.462%
Bid/Ask Spread - Options	0.078%	0.064%	0.433%

*Derived from Salomon Bros data ca 1991/92; US$50 million index-replicating portfolio; all costs are round turn (i.e. sellstock/buy stock, sell futures/offset with buy, buy put/offset with sell or exercise)

Table A-2
Hedging Costs as a Percent of Portfolio Value*

	Market						
	US	UK	Japan	France	Germ.	Canada	Netherlands
Stock - Comm & Fees	0.30%	0.40%	0.40%	0.40%	0.70%	0.30%	0.25%
Futures - Comm & Fees	0.014%	0.020%	0.025%	0.025%	0.050%	0.050%	0.125%
Stock - B/A Spread	0.40%	1.00%	1.40%	1.00%	0.60%	1.50%	0.25%
Futures - B/A Spread	0.03%	0.05%	0.04%	0.05%	0.07%	0.09%	0.13%

*Derived from Morgan Stanley data ca 1993/94; US$100 million index-replicating portfolio; all costs are round turn

Obviously the costs of hedging via derivatives are considerably smaller than hedging through exiting and entering the cash market (market timing) alone. Whether these specific costs levels will be reproduced in the Indian case remains to be seen; however, it is highly likely that the relative orders of magnitude--all in stock trading costs equaling five to 15 times the equivalent costs of using derivatives for hedging--are likely to be present once the market develops a basic level of liquidity. (Although not reproduced here, relative derivative and stock trading cost data from Paine Webber and Goldman Sachs are similar to those in the above tables).

B. Opportunity Costs

As is evident from the foregoing, the trading costs of hedging, while not to be ignored, are quite small and should certainly be acceptable to any investor expecting a down turn in the market. It is the accuracy of latter expectation that is the significant potential source of hedging costs. It is also in selecting the instrument and strategy in response to this expectation that important variations in hedging costs may occur.

For an index-replicating portfolio fully hedged with a short futures position the opportunity costs are quite easy to estimate. Assuming futures fair value at the time the hedge was entered, the combined long stock/short futures position will generate returns equivalent to a short term money market instrument. To the extent the stock market outperforms such instrument over the time horizon of the hedge the costs of entering the position will equal the difference between the market gain and the interest rate on short term market instruments. If the portfolio is a diversified one but does not replicate the traded index, the hedger will presumably attempt to correct for this difference by applying the beta of the portfolio to the number of futures contracts that would otherwise be required. If the beta generated from analysis of past performance accurately describes the relative returns of the portfolio and the market during the time horizon of the hedge, the cost of hedging will again be the difference between the return to a short term money market instrument and the stock market; if the hedge time horizon beta differs from the past there will be some additional basis risk to the hedge.

For the basic option hedge, purchase of puts equal in protective value to the size of an index-replicating portfolio, the cost of the hedge is different than is the case for futures: the premium will be subtracted from any market upside move during the hedge time horizon and the extent of protection will also be reduced by the premium. Further, to the extent that the put strike[19] differed form the actual cash index value at the time of executing the hedge, there will be an additional uninsured loss to the portfolio. This uninsured loss can be reduced by choosing an in-the-money[20] put strike but the under performance in the event of an upward market move will be increased.

Because of the premium costs embedded in the put hedge, various option hedge strategies have been developed that are designed to provide protection at reduced cost. The two most common strategies are debit put spreads and collars. In the former the cost of purchasing a put at or near-the-money is reduced by selling a put further out-of-the-money.[21] The result is protection against a limited decline at a reduced cost (but still greater than with a short futures hedge). In the collar strategy the insurer sells an out-of-the-money call[22] and buys an at or near-the-money put. Because most stock markets provide a dividend yield less than the short term money market yield, it is usually possible to acquire some upside participation even with a put struck very near the cash value of the index. For option hedges, as was true for futures hedges, if the traded derivative does not match the portfolio composition a beta (or other) correction factor must be applied in determining the number of option contracts to buy or sell and, of course, the same potential basis risk exists.

There are two essential variables that determine the hedging costs using options: interest rates and implied volatility. The relationship between these variables is also important in suggesting which of the various option hedge strategies discussed above is likely to be the least costly. Review of the U. S. financial markets over the past several years highlights two of the four possible combinations of market environments as most common: high interest rates/high volatility and low interest rates/low volatility. In the former instance puts will be relatively expensive and collars will allow relatively larger upside participation (similarly overwriting would provide a large cushion against downside moves). In the latter

19 Strike price, or exercise price, is the price at which an option holder may buy or sell the underlying, as defined in the terms of the option contract. It is the price at which the call holder may exercise his right to buy the underlying or the put holder may exercise his right to sell the underlying.

20 In-the-money is a term describing any option that has intrinsic value. A call option is in-the-money if the underlying is higher than the strike price of the call. A put option is in-the-money if the underlying is below the strike price.

Intrinsic value is the value of an option if it were to expire immediately with the underlying at its current price; the amount by which an option is in-the-money. For call options, this is the difference between the underlying price and the strike price, if that number is positive, or zero otherwise. For put options, it is the difference between the strike price and the underlying price, if that difference is positive, and zero otherwise.

21 Out-of-the money is a term describing an option that has no intrinsic value. A call option is out of the money if the underlying is below the strike price of the call. A put option is out-of-the-money if the underlying is higher than the strike price of the put.

22 A call is an option which gives the holder the right to buy the underlying at a specified price for a certain period of time. (A put is described in footnote 12.)

environment puts are relatively cheap and collars allow very limited downside participation. Thus hedging costs, at least with more sophisticated instruments such as options, may vary with different market environments.

One other issue that is sometimes conflated with costs of hedging analysis is the experience of those seeking to execute futures hedges during the 1987 market crash. At the end of the day on Friday, October 16, 1987 the CME's S&P 500 futures went to a discount to the reported cash index value, reversing the normal cash/futures basis relationship. This discount remained in the market throughout October 19th (the day of the crash) and October 20th. Thus, outside of short periods during the trading day (e. g. 11:00 A. M. on October 19) it was not possible to execute futures hedges at what appeared to be futures fair value. Of course, a hedge executed early in the day on the 19th, even at the prevailing discount to cash, and lifted at then end of the day or any time on the 20th, would still have reduced losses suffered from holdings of cash stocks. (Diagrams of the S&P 500/cash index basis are attached; these are reproduced from Report of the Presidential Task Force on Market Mechanisms, January 1988; "Brady Commission".)

As a result of this experience some observers concluded that futures hedging was inefficient. However, this inefficiency was more apparent than real: the cash index value was both late and inaccurate because prices of the various index component stocks were frequently delayed and trading in many of the component stocks was suspended at one or more times during these two days. In either of these events the cash index used the last sale price for each component stock, a price that no longer reflected the actual levels at which transactions could be executed (on these points see, for example, g. W. Bassett, Jr., V. G. France, and S. R. Pliska, "The MMI Cash-Futures Spread on October 19, 1987," The Review of Futures Markets, 8:1, 1989). Finally, of course, the attempt to hedge on the 16th or the 19th is akin to calling an insurance company and asking for a quote on fire insurance while your house is burning down: the price will be considerably higher than in normal times. This re-pricing of insurance was dramatically reflected in the implied volatility levels on CBOE's OEX and SPX which exceeded 300 percent at several points during the crash (index options were less discussed than futures after the crash but the former were equally affected).

A consideration of the cost of hedging question could be extended almost indefinitely but the points outlined above should provide SEBI and the Derivatives Committee with sufficient material for their deliberations.

Chart 9

S & P INDEX AND FUTURES CONTRACT SPREAD

Friday, October 16, 1987

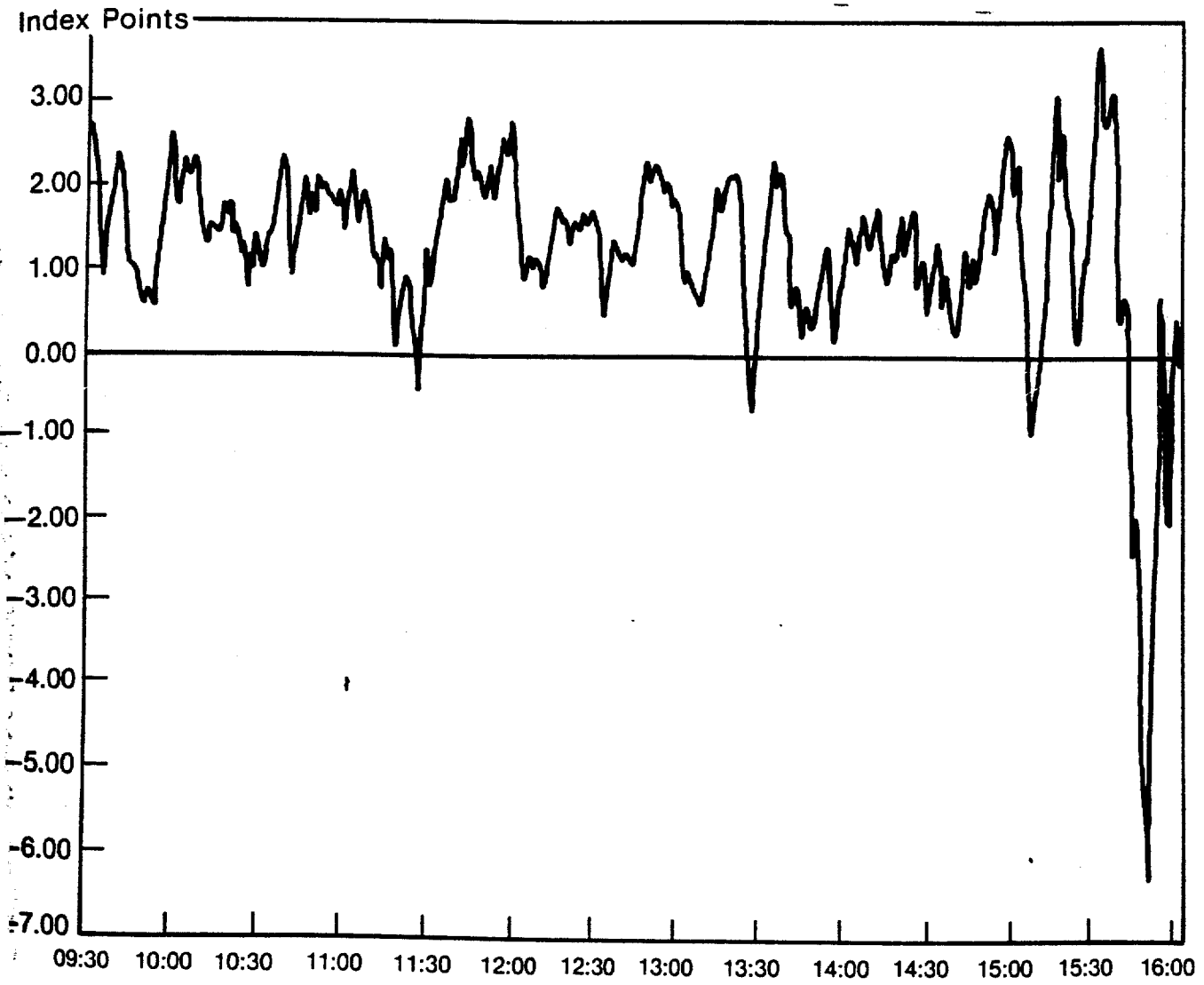


Chart 12

S & P INDEX AND FUTURES CONTRACT SPREAD

Monday, October 19, 1987

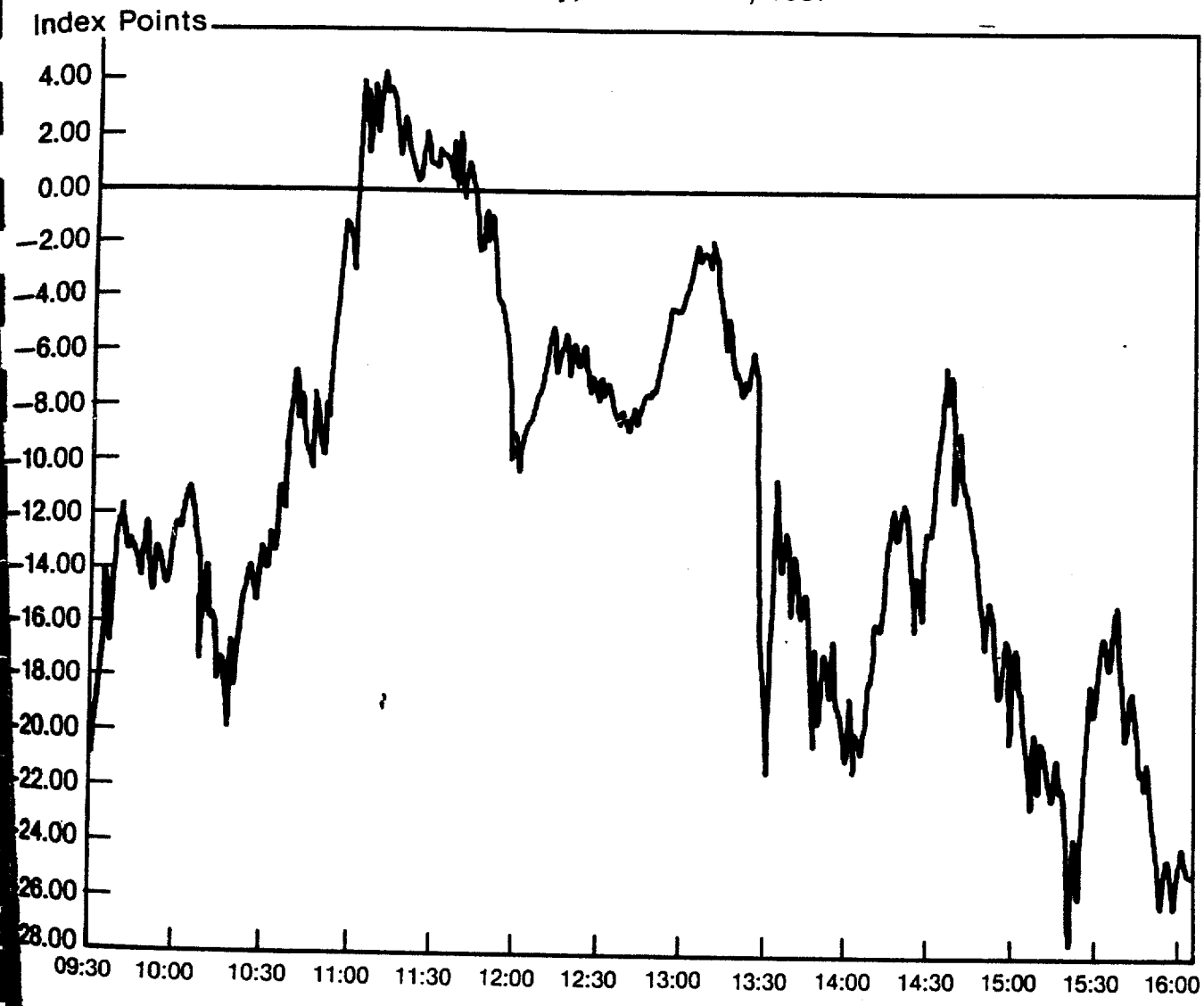
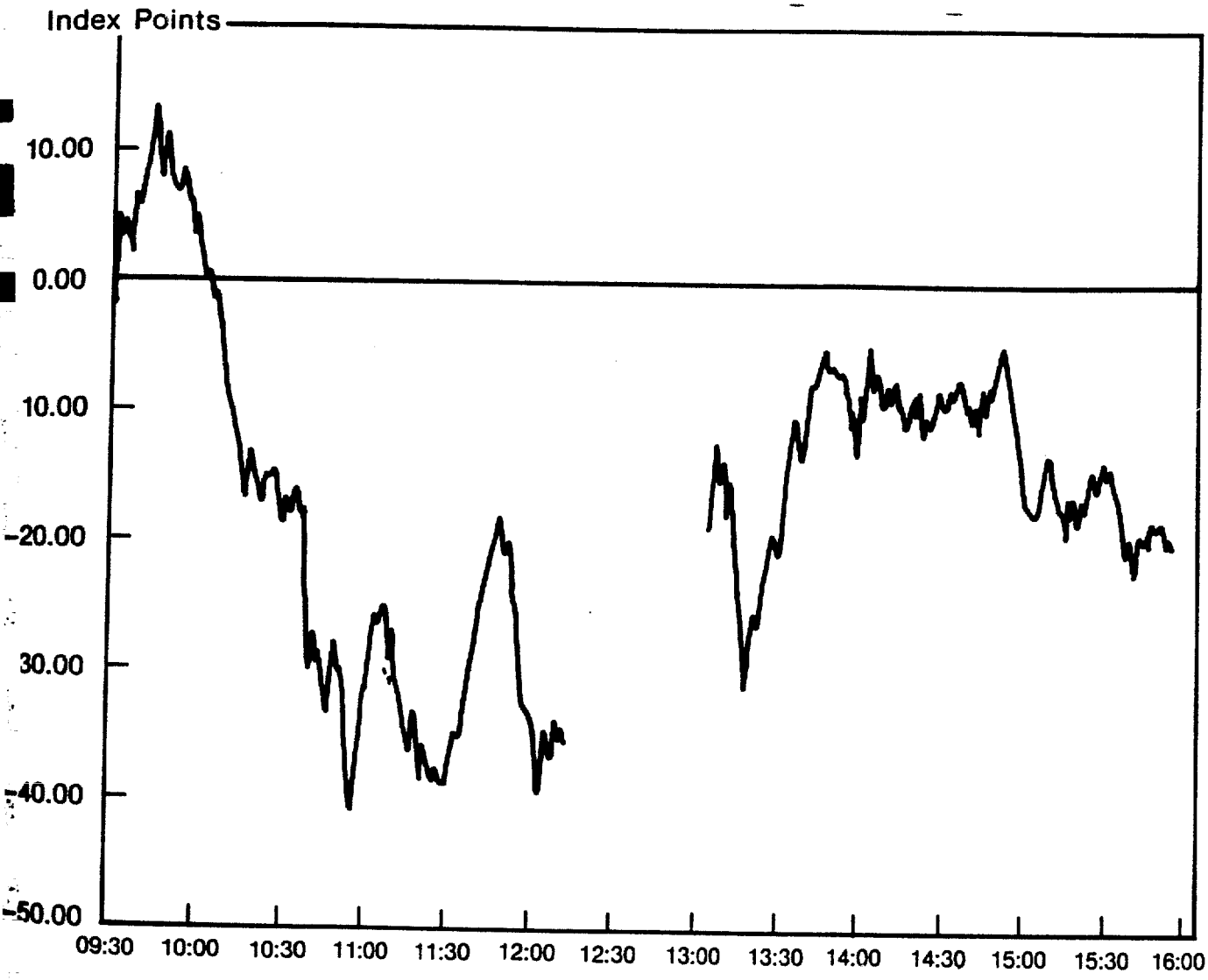


Chart 15

S & P INDEX AND FUTURES CONTRACT SPREAD

Tuesday, October 20, 1987



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The ChicagoBoard Options Exchange

COMPARING OPTION HEDGES: PUTS AND COLLARS

INTEREST RATES	IMPLIED VOLATILITY: LOW	IMPLIED VOLATILITY: HIGH
LOW	CHEAP PUTS TIGHT COLLARS	EXPENSIVE PUTS TIGHT COLLARS
HIGH	CHEAP PUTS WIDE COLLARS	EXPENSIVE PUTS WIDE COLLARS