1. Introduction to Financial Derivatives

With the globalization of the Indian economy from the regime of strict control, price volatility in financial assets and commodities has increased substantially. Though this volatility was witnessed earlier also, with globalization of business and free movement of financial assets, price risk management has become inevitable in India, like other developing and developed countries. This scenario has given birth to several engineered instruments known as financial derivatives.

This chapter discusses the introduction and concept of financial derivatives and academic research review of financial derivatives. It also discusses the brief introduction of forwards and futures, options and swaps. Research methodology applied in the thesis has also been covered in it.

1.1 Preliminary

A derivative instrument is a financial contract whose payoff structure is determined by the value of the underlying asset. The underlying asset can be commodity, security, interest rate, share price index, oil price, currency (exchange rate) in circulation, precious metals or the like. Thus, a derivative instrument derives its value from the underlying variable. A derivative instrument by itself does not constitute ownership. It is, instead, a promise to convey ownership. All derivative instruments are based on some cash products. The underlying asset of a derivative instrument may be any of the following:

- Metals like gold, silver, aluminum, nickel, etc.
- Commodities including grain, coffee, oil seeds, etc.
- Capital markets equity prices and index.
- Currency rates
- Interest rates
- Bonds of different types
- Short-term debt securities like T-bills etc.
- Money market products such as loans and deposits, etc.

Derivatives are designed to manage risks, which arise from movements in markets. The derivative markets enable institutional investors, bank treasurers, fund managers and corporates to manage their risks more efficiently and allow them to hedge or speculate on the market.

1.2 Different Types of Derivatives:

Practically, all derivatives can be classified into two categories based on the nature of contract such as futures and options or a combination of the two.

**Forwards:** A forward contract is a customized contract between two parties, where settlement takes place on a specific date in future at today’s pre-agreed price.

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

**Options:** Options are of two types, namely, call and put. Calls give the buyer the right to purchase but not the obligation to purchase a given quantity of the underlying asset, at a
given price on or before a given future date. Puts give the right, but not the obligation to sell a given quantity of underlying asset at a given price on or before a given date.

**Warrants:** Options generally have lives of up to one year, the majority of options exchanges having a maximum maturity of nine months. Longer dated options are called warrants and are generally traded over-the-counter.

**Swaps:** Swaps are private agreements between two parties to exchange cash flows in the future according to pre-arranged formulae. They can be regarded as portfolios of forward contracts. The two commonly used swaps are interest rate swaps and currency swaps. Interest rate swaps entails swapping of only the interest related cash flow between the parties in the same currency. While currency swaps entails swapping both principal and interest between the parties.

### 1.3 Participants in Derivatives Market

In general; banks, corporates, financial institutions, individuals and brokers are seen as regular participants. The derivative market allows the participants to hedge, speculate or arbitrage in the markets.

**Hedgers:** In hedging an investor tries to protect a position or anticipated position in the spot market by using an opposite position in derivatives. The parties, which perform hedging, are known as hedgers.

**Speculators:** They are traders who enter the futures or options contract, with a view to make profit from the subsequent price movements. They do not have any risk to hedge but they create risk in anticipation of profits.

**Arbitrageurs:** They obtain risk-free profits by simultaneously buying and selling similar instruments in different markets. The person who does this activity is referred to as an ‘arbitrageur’. Arbitrageurs and speculators do not have any risk to hedge.

### Exchange Vs Over the Counter Derivatives:

Derivatives trading is possible by two ways, i.e., through exchange or through OTC. The OTC markets have witnessed rather sharp growth over the last few years, which have accompanied the modernization of commercial and investment banking and globalization of financial activities. The development of information technology platform has contributed to a great extent to these developments. But the episodes of turbulence in financial markets in 1998 revealed the risks posed to market stability originating in features of OTC derivative instruments & markets. The following paragraph discusses the contributions of various researchers in financial derivatives.

### 1.4 An Academic Review of Research in Financial Derivatives

The following section presents the academic review of financial derivatives.

#### 1.4.1 Derivatives in emerging economies like India

The trading of derivative securities commenced in India after much debate (centered on the risks posed by the securities) and a long waiting period. The National Stock Exchange (NSE) sought permission from the Securities and Exchange Board of India (SEBI) to trade stock index futures in December 1995, but it was only after five years that the first
derivative security, i.e. stock index futures, was traded on the exchange. Stock index futures were introduced in June 2000, and thereafter, stock index options in June 2001. The options and futures on individual shares were introduced in July 2001 and November 2001, respectively. As on December 31, 2005, there were 119 shares for which futures and options were traded. They are traded on the Bombay Stock Exchange (BSE) and the NSE wherein the latter contributes to more than 95 percent of the total turnover in the derivative market in India. (Sandeep Srivastava et al., 2008)

The following Exhibit shows Chronology of Derivative Market in India

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Dec 1995</td>
<td>NSE wrote to SEBI for permission to trade index futures</td>
</tr>
<tr>
<td>18 Nov 1996</td>
<td>SEBI formed L C Gupta Committee to develop the appropriate regulatory framework for derivative trading in India</td>
</tr>
<tr>
<td>7 Jul 1999</td>
<td>RBI permitted OTC Forward Rate Agreements (FRAs) and Interest Rate Swaps</td>
</tr>
<tr>
<td>24 May 2000</td>
<td>Singapore International Monetary Exchange (SIMEX) chose Nifty for trading futures and options on an Indian index</td>
</tr>
<tr>
<td>25 May 2000</td>
<td>SEBI permitted NSE and BSE to do index futures trading</td>
</tr>
<tr>
<td>9 Jun 2000</td>
<td>Trading of BSE Sensex futures commenced at BSE</td>
</tr>
<tr>
<td>12 Jun 2000</td>
<td>Trading of Nifty futures commenced at NSE</td>
</tr>
<tr>
<td>25 Sep 2000</td>
<td>Nifty futures trading commenced at Singapore Exchange (SGX)</td>
</tr>
<tr>
<td>4 Jun 2001</td>
<td>Index options introduced</td>
</tr>
<tr>
<td>2 Jul 2001</td>
<td>Stock options introduced</td>
</tr>
<tr>
<td>9 Nov 2001</td>
<td>Stock futures introduced</td>
</tr>
<tr>
<td>24 Jun 2003</td>
<td>Interest rate futures introduced</td>
</tr>
</tbody>
</table>

1.4.2 Functions of Financial Derivatives.

The securities market has witnessed a plethora of reforms which have refined the micro-market structure, modernized operations and broadened investment choices for investors. Derivatives are a new class of investment products which offer sophisticated management of risk. Financial markets are characterised by a high degree of volatility. Derivatives products are used to contain the risk arising out of the fluctuations in asset price, which partially or fully transfer price risk by locking in asset prices. Derivatives products initially emerged as hedging devices against fluctuations in commodity prices. The derivatives market performs numerous economic functions. (1) Prices in the organised derivatives market reflect market participants’ perceptions about futures. At expiration, the price of the derivatives converges with the underlying price. Thus derivatives help in the discovery of futures as well as current prices. (2) The derivatives market helps in the transfer of price risk from those who are subject to risk, but may not like it, to those who have an appetite for risk. (3) Since derivatives are linked to the underlying cash market, the underlying cash market witnesses high trading volumes, owing to the transfer of price risk. (4) Speculative trade shifts to the more controlled environment of the derivatives market. (5) Derivatives trading acts as a catalyst for new
entrepreneurial activity. (6) Derivatives trading increases saving and investment in the long run, because transfer of risk enables participants to expand their volume of activity. Derivatives contracts have several variants. The most common are forwards, futures, options and swaps. The derivatives products that are available in India are index futures, index options, stock futures and stock options. (P. Ganesan, K. T. Rengamani and P. Kiruthiga, 2004)

The functions of emerging Derivatives Markets can broadly be defined as under:

Risk Reduction/Redistribution
It is widely accepted that the primary function of the derivatives market is to facilitate the transfer of risk among economic agents. Various instruments traded in derivatives markets provide different packages of payment patterns, redistributing and reallocating the risks associated with future cash flows among different market participants. For example by taking a position in the futures markets that is opposite to that held in the spot market, a hedger can potentially offset losses in the latter with gains in the former. The organized, standardized, and centralized nature of futures exchanges means that risks are borne by others, such as speculators, in return for a premium.

Price Discovery
Trading in futures and options incurs a smaller transaction cost than does trading in the spot market. Introducing either derivative is expected to increase information flows into the market, leading to a price-discovery function in the derivatives market. The futures price contains information about anticipated demand that can feed into production decisions.

Price Stabilization
Futures markets ensure a more efficient process of private storage: By insuring against price losses, futures markets encourage storage, which is a natural mechanism to stabilize spot prices. (Donald Lien and Mei Zhang, 2008)

1.4.3 Risk Management using Derivatives

What makes derivatives so exceptional for risk management is that they are cheap: they are products which give exposure to risk (price or index changes) but without having to own any of the underlying assets from which the risk derives. In this sense, derivatives are commodified risk. You can buy (or sell) exposure to movements in the value of wheat without having to buy (or sell) any wheat, movements in the value of the dollar without trading dollars themselves. The derivative contracts which generate these possibilities carry a large risk exposure for relatively little expenditure. All your risk management expenditure is dedicated to the single phenomenon of risk exposure. The following illustration makes this clear. In expectation of an oil price increase, you could buy one barrel of oil for $50, store it and wait. Or you could buy an oil derivative which gives exposure to the same price movement per barrel of oil for just a couple of dollars. Put another way, for the price of one barrel of oil, derivatives give exposure to price movements on twenty-five barrels. Compared with the buying-oil-storing-it-and-waiting strategy, derivatives provide ‘leverage’ and reduce the costs of hedging against unwanted price movements. As a consequence they also cheapen the cost of speculating on price movements. (Dick Bryan and Michael Rafferty, 2007)

An alternative to derivative contracts is the operational hedge, in which the firm matches the values of assets and liabilities to the same risk factor (e.g., an exporter may raise debt
attached to the same currency in which its revenues are denominated). Some evidence shows that this natural currency hedge increases foreign debt capacity and reduces the magnitude of derivative holdings for risk management purposes. Firms that benefit from local currency devaluation (e.g., exporters) hold smaller derivatives portfolios than firms with operational results that are negatively affected by or not sensitive to currency devaluation. (Rafael F. Schiozer and Richard Saito, 2009)

1.4.4 Difficulties in Derivatives Market

Recent decades have witnessed a dramatic shift in the nature of risk in global financial markets and increased volatility of many asset classes. As investors are continuously exposed to a broad range of dynamic risks, derivatives have become a valuable tool in the risk management practices of institutions. Despite the potential for derivative instruments to effectively manage the risks faced by institutions, public opinion concerning these securities suggests the general public view derivative securities as inherently dangerous. Anecdotes such as Long-Term Capital Management (LTCM) in the U.S., Barings Bank in the U.K., highlight the potential hazards of derivative use, and have attracted the close attention of risk management executives, investors, governments, market regulators, as well as the media. (Kingsley Fong, David R., 2005)

The use of risk management techniques and instruments by corporate firms in India is hindered by a number of barriers. These included (i) monitoring and evaluating the risk of derivatives, pricing, valuing and accounting and (ii) credit and liquidity risks. Transaction costs are also a significant barrier and some firms may find it expensive to invest in necessary technology and human resources. With dismantling of trade barriers, the international transactions are likely to increase, warranting greater importance for risk management. The popularity of risk management is not yet high and many firms in India do not manage all types of risks, albeit significant advances have been made by some of them. From the financial literature, it is easy to comprehend that risk affects all the facets of a company’s operations. Nowadays, shareholders and stakeholders increasingly expect management to be able to identify and manage risks. (P.K. Jain, Surendra S. Yadav and Ashish Kumar Rastogi, 2009).

Despite growth over the past years, the notional outstanding amounts in derivatives markets is fairly small in emerging market economies compared to matured markets. As for the function of derivatives markets, academic research infers how emerging derivatives markets fulfill their functions of risk reduction and redistribution and price discovery and stabilization, compared to what has occurred in mature markets. The studies support the hedging role of emerging derivatives markets. Research on optimal hedging strategies reveals the effects of emerging market factors on the formulation and implementation of the optimal hedging ratio. Such factors could include, among others, uncertainty of the existence of currency risk and management of multiple risks. Empirical studies on the futures markets in a few emerging countries suggest a price discovery function of these markets. On the other hand, research showed mixed results on the price-stabilization function of emerging derivatives markets. (Donald Lien and Mei Zhang, 2008)

Are Derivatives Risky? : If we take the analogy of cars: these can be either safe or risky, depending on who is driving. The majority of accidents are caused by drivers and not by the cars themselves. Certainly, one could say that the potential for harm might be greater with a Ferrari than a small Maruti-car. But, again, the cars sitting in the garage are not
dangerous. The danger comes from how you drive them. The same is with derivatives, intrinsically neither safe nor risky, but the strategy that uses them might be risky. Just as many share strategies are risky. The following part discusses risk minimization with various derivatives.

1.5 Examples of risk minimization using Derivatives:

The following numerical examples explain risk reduction with derivatives.

(1) **Currency futures**: A Luxembourg-based Company is planning to set-up a plant in India, which is to be imported from USA at a cost of $ 2 million on November 1, 2006. The company will be settling the dollar liability on January 15, 2007. The market quotes on November 1, 2006 were as follows:

- Spot $/ (per Euro) : 1.2500
- January $/ (per Euro) futures : 1.1800

Now we further assume that the following rates materialize on 15th January, 2007

- Spot $/ (per Euro) : 1.2290
- January $/ (per Euro) Futures : 1.1600

The standard size for futures contract is Euro 1,25,000.

Here the company can hedge its position by entering into futures contract to protect itself from the notional loss as under.

**Strategy: Short euro futures to hedge the risk on November 1, 2006.**

- **Notional loss in spot market**
  - \((20,00,000 / 1.2290) - (20,00,000 / 1.2500)\) = Euro 27,340 Approx.

  \[\Rightarrow \text{Number of futures contracts required for hedging} = \frac{(20,00,000 / 1.1800) / 1,25,000}{13.5}\]

  \[=13.5 \text{ contracts approx.}\]

Now the gain in futures market can be calculated as follows:

- \([1.18 - 1.16] * 13.5 * 1,25,000\) = $ 33,750 \approx \text{Euro 27,460}

Therefore the net gain is \((27,460 - 27,340) = \text{Euro 120.}\)

Here, after squaring off the position in futures market the company can buy dollars in the spot market.

(2) **Interest rate Caps**:

Suppose an Indian company takes a 3-year floating rate loan of Rs. 20 crore to finance a project. The loan is indexed to 6 months MIBOR with a spread of 0.25%. The current level of MIBOR is 11.50%. The company believes that the projected cash flows from the new project would enable it to bear an interest cost not exceeding 13.50%.

So, the company has planned to enter into an interest rate cap to hedge its position. Suppose a three-year interest rate cap with a face value of Rs. 20 crore and a capped rate of 13.50% is available at a premium of 2%. Further assume that the following are
the MIBOR rates on the next five-rollover dates: 11%, 12%, 13.50%, 14.50%, and 15%. Thus the company will pay Rs. 40,00,000 upfront as a premium. But it saves probable liquidity crunch in the later half of the loan.

(3) **Stock Index futures**: Traditional methods of loaning money to the stock market suffer from (a) price risk of shares and (b) credit risk (default of the counter party). Index futures markets supply a technology to lend money to the market without bearing these risks.

The basic idea is simple. The lender buys all 50 stocks of the Nifty on the cash market, and simultaneously sells them at a future date on the futures market – almost like a repo. There is no price risk since the position is perfectly hedged. There is no credit risk since the counter party on both legs is the National Securities Clearing Corporation (NSCC). Index derivatives are an ideal lending vehicle for the risk averse, such as banks and conservative corporate treasuries. (The Rational Investor, 1st July, 2000)

After examining the current state of research on financial derivatives and analyzing the research gap, the following research problems were identified and accordingly the research objectives and the research process were designed for this thesis.

Systematic process is explained as under.

**1.6 Steps of Research Process**

The following methodology is applied in research process

**1.6.1 PROBLEM IDENTIFICATION**

The main research problems for the study are;

01. The scope for derivatives in India (under the regime of liberalization Policy of government) with special attention to stock market and foreign exchange market.
02. Risk Management with derivatives for investors, treasurers of banks and corporate finance managers, (Including pricing and strategies.)

**1.6.2 RESEARCH OBJECTIVES**

The main objective of the study is to explore the various derivatives available to an investor in India. The broad objectives are: -

(1) The scope of derivatives in Indian Financial System, mainly on the stock market and foreign exchange market.
(2) To study the problems and prospects of making derivative market investor friendly for individuals, corporate investors and institutional investors.
(3) To study pricing of options and futures under various models (with practical data)
(4) To study investment strategies with derivatives (with practical data)
(5) To study of cases of losses using derivatives in foreign country as well as in Indian context.
(6) Descriptive research:
   This includes the testing of main hypothesis that “The Indian investors and corporate finance managers, hesitate to enter into derivative markets.”

1.6.3 RESEARCH DESIGN
Though the topic has become popular now-a-days, still there are many areas which have remained uncovered in the Indian context. e.g. Exotic derivatives, etc. Therefore, to explore new vistas in the field of derivatives, an exploratory study is done mainly in stock market and foreign exchange market.

On the basis of preliminary information, a descriptive study is done to check the attitude of investors and corporate finance managers towards dealing in derivatives.

1.6.4 SOURCES OF DATA COLLECTION
Both primary and secondary data are used for the research on derivatives.

Personal interviews of investors and business managers, and Questionnaires/ schedules are the major research tools used for primary data collection. These sources help for testing of hypothesis.

Secondary data are collected from articles from financial research journals, reference books on derivatives, business magazines, daily business/ financial news papers, internet etc.

1.6.5 METHODS OF DATA COLLECTION
Personal interviews of, investors in stock market, corporate managers having exposure in foreign exchange, authorized dealers in forex, stockbrokers etc. are conducted. Convenient or Judgment sampling method is used for selection of these respondents. Questionnaire / Schedules are used to collect the data of investors on a large scale. For this Judgment sampling/Area sampling method is applied.

1.6.6 LIMITATION OF THE RESEARCH
The research is based on the present economic and financial environment relative to derivatives trading; therefore the conclusions derived will be applicable under those circumstances only. As many changes have taken place in derivatives market in the last four years, some new developments are also expected in the coming period. Some drastic changes may limit the conclusions of the research under study. As Gujarat is one of the major states in stock-market trading and in turn, Ahmedabad, the commercial capital of Gujarat, the choice is given to Ahmedabad for primary data collection as a representative city.