Introduction

A derivative is defined as a financial instrument whose value depends on (or is derived from) the values of an underlying (physical or financial) assets like commodity, financial instruments or event. A derivative instrument by itself does not constitute ownership. It is, instead, a promise to convey the ownership. The term derivative refers how the price of a contract is derived from the price of an underlying asset or from some index, interest rate, exchange rate or event.

As defined above, the value of derivative instrument depends upon the underlying asset. The underlying asset of a derivative instrument may include any of the following forms-

i) Commodities including grains, coffee beans, orange juice etc.
ii) Precious metals like Gold and Silver.
iii) Foreign exchange rate or currencies.
iv) Different types of bonds including medium to long term negotiable debt instruments issued by Government or Companies.
v) Over-the –counter (OTC) money markets products like loans and deposits.
vi) Short term securities such as T-bills and
vii) Shares and share warrants of companies traded on recognized stock exchanges and stock index.

The emergence of derivatives is due to the risk involved in investment in either commodities or capital markets. The prices of all agricultural commodities like rice, wheat, cotton, oil seeds, tea and coffee etc. or non agricultural products like gold and silver are subject to fluctuation over time in keeping with prevailing demand and supply condition. The producers or possessors of these commodities obviously can not be sure of the prices that their produce or possession may fetch in future when they have to sell them, in the same way as the buyers or the processors are not sure what they would have to pay for their buy in future. Similarly, prices of shares and debentures or bonds and other securities are also subject to continuous change. Those who are engaged in the security or bond market are, therefore, constantly exposed to the threat of price risk of these products. In the same way, the foreign exchange rates are also subject to continuous change. Thus an importer of a certain good is not sure of the amounts he would have to pay in future in his/her domestic currency when the payments become due.

It may be observed that parties involved in all such cases are facing price risk. Derivatives came into being primarily for the reason of the need to eliminate price risk\(^1\). The other most important use of derivatives is in transforming market risk, called hedging which is a protection against losses resulting from unforeseen price or volatility changes. Thus derivative is a very important tool of risk management. As awareness about the

\(^1\) Derivatives eliminate the price risk by locking the asset prices in a contractual form. e.g. Forward contract.
usefulness of derivatives as a risk management tool has increased, the markets for derivatives too have grown. Of late, derivatives have assumed a very significant place in the field of finance and they remain one of the major driving forces in the global financial market.

Although derivatives play a useful and important role in hedging and risk management, they also pose several dangers to the stability of financial markets and thereby, to the overall economy.

Derivatives are not the new things in finance. They have been playing an important role in commerce and finance for thousand of years. The first known instance of derivatives trading dates back to 2000 BC when merchants in Bahrain Island in the Arab Gulf, made consignment transactions for goods to be sold in India. In the same era derivatives trading also occurred in Mesopotamia (Swan, 1993).

In the Bible, in Genesis Chapter 29, it is believed that about 1700 BC, Jacob purchased an option from Rachel’s father Laban with a cost of seven years of labour. That option granted Jacob the right to marry Rachel. However Laban made a default and required Jacob to marry his older daughter Leah. Jacob married Leah, but as he preferred Rachel, he purchased another option, requiring seven more years of labour and finally married Rachel. This story is very important as it was probably the first default in the history of derivatives (Don Chance, 1995).

The first exchange for trading derivatives took place in the Royal Exchange in London which permitted “forward contract”. “The Dutch Tulip Bulb” mania was characterized by forward contracting on tulip bulbs which was very popular with speculators in the tulip craze of seventeenth century Holland. Tulips flowers were a symbol of affluence; owing to the high demand, tulip bulb prices shot up. Dutch growers and dealers traded in tulip bulb. There was so much speculation that people even mortgaged their homes and businesses. These speculators were wiped out when the tulip collapsed in 1637. The first future contract can be traced back to the Yodoya rice market in Osaka, Japan around 1650 (Don Chance, 1995).

In 1848 Chicago Board of Trade (CBOT) was formed in the USA to deal with the problem of credit risk. Due to its prime location on Lake Michigan, Chicago was developing as a major center for storage and distribution of Midwestern grains. The first type of future contract, was called “to arrive”, which was created by a group of grain traders. This ‘to arrive’ contract proved an useful device for hedging on price changes of grains. In 1865, CBOT listed the first exchange traded derivatives contract, known as the

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2 The most important risk of the financial institutions is credit risk which arises from the possibility that borrowers and counterparties in derivatives transactions may default.

3 This claim is made by the Future Industry and Association in their 1984 publication An Introduction to the Future Markets, cited in Markham (1987) and Markham (1994)

4 This was published in Extraordinary Popular Delusion and Madness of Crowds by Charles Mackay. New York; Harmony books (1841, current version 1980).
‘Future Contract’. These future contracts were basically the standardized form of ‘to arrive’ contracts.

The first call and put option were invented by New York financier Russel Sage in 1872. He began creating synthetic loans using the principle of put-call parity. After buying the stock and a put option from his customers, Sage started to sell a call option and he was earning a higher interest than usury laws allowed through his synthetic loan.

In 1919, Chicago Butter and Egg Board, a spin-off CBOT, was reorganized to allow future trading. Its name was changed to Chicago Mercantile Exchange (CME). The first financial future to emerge was the currency futures in 1972 in the USA. The first foreign currency futures were traded on 16th May, 1972 in International- Monetary Market (IMM), a division of CME. On April 26, 1973 the Chicago Board- Option Exchange was set up for trading stock options. On October 20, 1975 interest- rate futures were traded first time on CBOT. The first stock index future contracts were traded on Kansas City Board of Trade on 20th February, 1982. The Chicago Board Option Exchange (CBOE) created an option on index of stocks in 1983. Originally it was known as the CBOE, 100 Index, which was changed soon as S&P 100.

In broader term, there are two types of derivative contracts traded in the World. One is Over the Counter (OTC) derivatives and other is Exchange traded derivatives.

The OTC derivatives contracts are privately negotiated in nature. They traded directly between two parties, without going through an exchange or other intermediary, such as swaps and forward rate agreements. The OTC derivative market is the largest market for derivatives and is largely unregulated with respect to disclosure of information between the parties, since the OTC market is made up of banks and other highly sophisticated parties, such as hedge funds. Reporting on OTC derivatives turnover are difficult because trades can occur in private, without activity being visible on any exchange. As OTC derivatives are not traded on an exchange, there is no central counter-party. Therefore, they are subject to counter-party risk, like an ordinary contract.

On the other hand, an exchange traded derivative is a standardized contract that is traded on an organized exchange. The exchange acts as a central counterparty. So there is no counter party risk associated with exchange traded derivatives. Future and option are most common exchange traded derivatives.

The derivative is the most desired instrument that allows market participants to manage risk in the modern securities trading. The main logic behind the derivatives trading is that it reduces the risk by providing an additional channel to invest with lower trading cost.

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5 This was published in ‘Essays in Derivatives: Risk-Transfer Tools and Topics Made Easy’, Second Edition by Don M Chance. Wiley Finance (May, 2008)

6 An exchange is a marketplace where individuals trade on standardized contracts that have been defined by the exchange time to time. Exchange acts as an intermediary to all related trades, are occurred on the exchange and takes initial margin from both sides of the trade to act as a guarantee.
and it facilitates the investors to extend their settlement through the future contracts. It provides extra liquidity in the stock market. However, there is a belief among some market participants that derivatives (futures & option) trading attract speculators who then destabilize spot prices of underlying assets.

This principal aims of this work are to make an attempt to study the following:

1) The trend of basis (difference between spot and future prices) at different market scenario using data from National Stock Exchange of India.

2) The performance of the Black-Scholes option pricing model at different market scenario using data from the National Stock Exchange of India Ltd.

3) The impact of derivatives (futures and option) trading on underlying spot price volatility in the Indian stock market and the result is also compared with the dividend adjusted result. The work is done with the help of GARCH model.

This thesis is organized as follows. Chapter 1 gives an overview of Indian derivatives market. This chapter attempts to discuss the genesis of Indian derivatives market by tracking its historical development, and types of derivatives product traded in the market, trends and growth of both OTC and exchange traded derivatives products and the regulation and policy pertaining to Indian derivatives market. Chapter 2 discusses the pricing of forward and futures. This chapter provides a discussion on forward and futures contracts and their pricing systems, margin associated with futures and the basis and its trend in Indian stock market. Chapter 3 deals with the pricing of options. This chapter attempts to find out the performance of Black and Scholes option pricing model in different market scenarios in India. Chapter 4 describes the impact of derivatives on spot price volatility. This chapter aims to find out the unique impact of derivatives on spot price volatility in the Indian stock market. Also, the study wants to analyze the impact of dividends in examining the behavior of volatility in spot market after the introduction of derivatives trading in India. The concluding chapter sums up the major findings of this study.