

P-2391

**TO STUDY THE APPLICABILITY OF BLACK & SCHOLES
OPTION PRICING MODEL IN INDIAN FINANCIAL MARKET
WITH REFERENCE TO SELECTED SCRIPS OF SENSEX.**

By

MANISHA. A
Reg.no.71206631024

of

Department of Management Studies
Kumaraguru College of Technology
Coimbatore

A PROJECT REPORT
Submitted to the

FACULTY OF MANAGEMENT SCIENCES

**In partial fulfillment of the requirements
for the award of the degree**

of

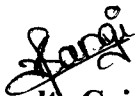
MASTER OF BUSINESS ADMINISTRATION

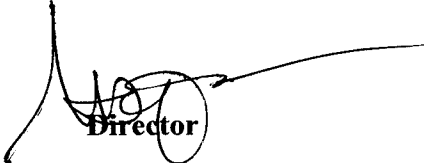
April, 2008

KCT Business School
Department of Management Studies
Kumaraguru College of Technology
Coimbatore- 641006

BONAFIDE CERTIFICATE

Certified that this project report titled “A STUDY THE APPLICABILITY OF BLACK & SCHOLES OPTION PRICING MODEL IN INDIAN FINANCIAL MARKET WITH REFERENCE TO SELECTED SCRIPS OF SENSEX” is the bonafide work of Ms. MANISHA. A (71206631024) who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.


Faculty Guide


Director

Evaluated and vice-voce conducted on ...3rd July 2008.....


Examiner I


Examiner II

DECLARATION

I, hereby declare that this project report entitled as “**A STUDY THE APPLICABILITY OF BLACK & SCHOLES OPTION PRICING MODEL IN INDIAN FINANCIAL MARKET WITH REFERENCE TO SELECTED SCRIPS OF SENSEX**”, has been undertaken for academic purpose submitted to Anna University in partial fulfillment of requirement for the award of the degree of Master of Business Administration. The project report is the record of the original work done by me under the guidance of **Ms. Sangeetha. S**, Lecturer, during the academic year 2007-2008.

I, also declare hereby, that the information given in this report is correct to the best of my knowledge and belief.

Date: 03/07/08

Place: Coimbatore



Manisha. A

- ◆ "Jaya Endave", 1057/1058, Avinashi Road, Coimbatore - 641 018 Tel : 4291000 Fax : 0422 - 4291020 E-mail : coimbatoreregion@karvy.com
- ◆ "SNV Chambers" 482/483, Opp:Power House, Coimbatore - 641 012 Tel : 2237501 - 506 Fax : 0422 - 2237507 E-mail : coimbatore@karvy.com
- ◆ 642, 1st Floor, Raja Street Opp. Kota Jewellers, Coimbatore - 641 001 Tel : 2302151- 2302153 E-mail : coimbatore1@karvy.com
- ◆ 29/1 Chinthamani Nagar Opp. IOB / KVB, NSR Road Saibaba Colony Coimbatore - 641 011 Tel : 2452161-2452163 E-mail : coimbatore2@karvy.com

/05/2008

Certificate

is is to certify that Ms. **A. Manisha**, (Register No. 1206631024), MBA student studying in Kumaraguru College of Technology, Coimbatore has successfully completed her semester project titled **"TO ANALYZE THE APPLICABILITY OF BLACK & SCHOLES OPTION PRICING MODEL IN INDIAN FINANCIAL MARKET USING 10 WIDELY TRADED COMPANIES FROM SENSEX"** for a period from 21.01.2008 to 30.04.2008. During this period her conduct and character was found good. We wish her all the best.

Kind Regards,

For **Karvy Stock Broking Limited**



S Ramachandran
Vice President & Regional Head

ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

The materialization of this report has witnessed innumerable contributions from numerous people in the form of selfless criticism, valuable suggestions and above all power packed words of motivation. I am deeply indebted to all of them and take this opportunity to express my feeling of gratitude to all of them.

I take the privilege of thanking our beloved Correspondent Prof. Dr. K. Arumugam and our Principal Dr. Joseph V. Thanikal for encouraging and providing facilities to do this project. I wish to express my sincere thanks to our Director Dr.S.V. Devanathan for his continuous encouragement throughout my project and for the moral support extended to me during the shaping of this project.

I express my profound sense of gratitude to my project guide, Ms. Sangeetha. S, Lecturer, KCT Business School for her valuable guidance and support during the course of this project and for the valuable suggestions given by her in bringing out this report.

I am very much obliged to express my sincere gratitude to Mr. S. Ramachandran, Vice-President and Regional Head, Karvy Stock Broking Ltd for giving me the opportunity to carry out the project work in their esteemed company. I wish to acknowledge my whole hearted thanks to Ms. Poornima, Assistant Manager and Mrs. Bhuvaneswari, IRO for having given utmost co-operation and guidance in collecting the needful information. Lastly I thank all the employees and the clients of Karvy for their constant support to make this work successful.

I cherish to acknowledge the benevolence of my Family and Friends for their encouragement, enthusiasm, co-operation and moral support.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Pricing is the most important factor, regarding the effectiveness of the option contract as it helps one to judge whether the premium to be paid for the contract is high or low and what is the ratio of share that should be used for effective hedging. Black & Scholes model is globally used for pricing the option contract and in India also this model has been suggested for pricing the option. Hence, in this context, the need arises to test and analyze whether this Black & Scholes model holds good in Indian stock market or not.

The main objective of this dissertation is **“to analyze the suitability and applicability of Black & Scholes option pricing model in Indian context using 10 widely traded companies from SENSEX”** with special focus on equity stock option.

The other objectives are:

- To study the basic concept of option
- Calculate the option premium value using Black & Scholes calculator and compare it with the market value to formulate the effective option strategies.
- To calculate Greeks symbol like Delta, Gamma, Theta, Vega, rho of some Indian companies so that investors will be able to find out the relationship of option price with respect to stock price, interest rate and volatility and maturity.

A key assumption underlying the Black and Scholes formulation is that the distribution of possible share prices follows a normal distribution. Therefore, this dissertation is basically focused to examine whether this assumption is tenable in case of Indian stocks using the following techniques.

1. The normality test has been done using the **Kolmogorov-Smirnov (K-S) test**.
2. In order to apply the Black and Scholes model, first of all implied volatility, expiration time period, have been calculated and fed to the Black Scholes formula to find out the option price and option Greeks.
3. The option price calculated by the Black & Scholes is compared with the actual price to find out whether the option contract is underpriced or overpriced.

4. The interpretation for the Greeks is also done to find the effect of variables on each other.

This study is basically a descriptive research and simple random sampling technique has been adopted whereby ten companies have been selected from Sensex each representing one industry. The normality test is carried out with the closing share prices of the ten selected scrip's for a period of 4 years from April-2004 to March-2008. The data used is secondary in nature.

The K-S test shows that out of the fifty observations made, only fourteen observations did not follow the normal distribution. This implies that Black and Scholes model is likely to be suitable as an option valuation model in Indian stock market.

Recommendations

The application of Black and Scholes option pricing model gives the fair value of option and it is compared with the market value or option premium. The difference between the fair value and market value of option is instrumental to formulate the effective option strategies for effective hedging. From the aforementioned examples of ten different options, it is clear that the investor can buy options namely RELIANCE, ONGC, TATASTEEL, INFOSYS, BHEL whereas the other options namely ICICI, TATAMOTORS, RANBAXY, ITC, ACC should not exercised as they are overpriced.

Therefore, investors can employ this model in pricing the option and to formulate the effective strategies for effective hedging. But the investor should not fully depend on this model only. This model should be taken as a transformation model rather than exact pricing model.

TABLE OF CONTENTS

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
	ACKNOWLEDGEMENT	iv
	EXECUTIVE SUMMARY	v
	LIST OF TABLES	viii
1	INTRODUCTION	
	1.1 Background of the study	1
	1.2 Review of literature	4
	1.3 Statement of the problem	9
	1.4 Objectives of the study	10
	1.5 Scope of the study	10
	1.6 Methodology	11
	1.7 Limitations	15
	1.8 Chapter scheme	16
2	ORGANIZATION PROFILE	
	2.1 History of the organization	17
	2.2 Management	19
	2.3 Organization Structure	20
	2.4 Product profile and market potential	21
	2.5 Competitive strength of the company	23
	2.6 Future Plans	23
	2.7 Description of various functional areas	24
3	MACRO AND MICRO ANALYSIS	26
4	DATA ANALYSIS AND INTERPRETATION	41
5	CONCLUSION	
	5.1 Results and discussions	108
	5.2 Considered recommendations	109
6	APPENDICES	111
7	BIBLIOGRAPHY	114

LIST OF TABLES

LIST OF TABLES

S.No	Table No.	Title	Page
1	4.1.1.	Calculation of K-S statistics for Reliance for the year April-2004 to Dec-2004.	41
2	4.1.2.	Calculation of K-S statistics for Reliance for the year 2005	47
3	4.1.3.	Calculation of K-S statistics for Reliance for the year 2006	53
4	4.1.4.	Calculation of K-S statistics for Reliance for the year 2007	59
5	4.1.5.	Calculation of K-S statistics for Reliance for the year 2008	66
6	4.1.6.	Calculation of K-S statistics for ICICI for the year April-2004 to Dec-2004.	68
7	4.1.7.	Calculation of K-S statistics for ICICI for the year 2005	73
8	4.1.8.	Calculation of K-S statistics for ICICI for the year 2006	80
9	4.1.9.	Calculation of K-S statistics for ICICI for the year 2007	87
10	4.1.10.	Calculation of K-S statistics for ICICI for the year 2008	94
11	4.1.11.	Table showing Final result of Hypothesis testing	96
12	4.2.1.	Consolidated results of option prices and Greeks calculated using Black & Scholes calculator	98
13	4.2.2.	Consolidated results of option prices and Greeks calculated using Black & Scholes calculator	99

CHAPTER 1

INTRODUCTION

INTRODUCTION

(i) BACKGROUND OF THE STUDY

The word ‘derivative’ originates from mathematics and refers to a variable, which has been derived from another variable. Derivatives are so called because they have no value of their own. They derive their value from the value of some other asset, which is known as the underlying (underlying can be asset, index)

Derivatives defined by Indian Laws

“Derivative is a product whose value is derived from the value of one or more basic variables, called Bases (underlying asset, index, or reference rate), in a contractual manner. The underlying asset can be equity, a commodity, forex or any other asset.”

In the Indian context the Securities Contract (Regulation) Act, 1956 (SC(R)A) defines Derivatives to include-

- A security derived from a debt instrument, share, loan whether secured or unsecured, risk instrument or contract for differences or any forms of security.
- A contract, which derives its value from the prices, or index of prices, of underlying securities.

As Derivatives are merely contracts between two or more parties, anything like weather data or amount of rain can be used as underlying assets. The Derivatives can be classified as Future Contracts, Forward Contracts, Options, Swaps and Credit Derivatives.

Among the derivatives, option and future contract have been the most dominating one. However, regarding the hedging of stock, option has been the most effective one. In NYSE option has grown to its zenith stage. It showed that option contract is an effective catalyst for the investment in any financial market. Ironically, in India, it is still in infant stage. The expiration period of an option in India is in three months whereas in US, it is six months or even one-year option contract which, in turn, can be more effective in risk management.

OPTIONS

An option is a contract, or a provision of a contract, that gives one party (the option holder) the right, but not the obligation, to perform a specified transaction with another party (the option issuer or option writer) according to specified terms. The owner of a property might sell another party an option to purchase the property any time during the next three months at a specified price. A lease might contain a provision granting the renter the option to extend the lease for an additional year.

Options take many forms. The two most common are:

a) Call options: Buying a call option gives the right (but not the obligation) to purchase shares of a company's stock at a certain price (called the strike price) from the date of purchase until the last Thursday of a specific month (called the expiration date).

People buy calls because they hope the stock will go up, and they will make a profit, either by selling the calls at a higher price, or by exercising their option (i.e., buy the shares at the strike price at a point when the market price is higher).

b) Put options: Buying a put option gives the right (but not the obligation) to sell shares of a company's stock at a certain price (called the strike price) from the date of purchase until the last Thursday of a specific month (called the expiration date).

People buy puts, because they hope the stock will go down, and they will make a profit, either by selling the puts at a higher price, or by exercising their option (i.e., forcing the seller of the put to buy the stock at the strike price at a time when the market price is lower).

Options may allow for one of two forms of exercise:

- With American exercise, the option can be exercised at any time up to the expiration date.
- With European exercise, the option can be exercised only on the expiration date.

Comparison between the spot price and the exercise price

In the Money (ITM)

If the underlying security value is higher than the strike price of a call option, the option will have intrinsic value and is said to be "In the Money" or ITM for short. Put options work the opposite way; if the underlying security is valued less than the strike price of the option, the option is ITM. At expiration, the time value component of the option has completely decayed, leaving the option worth its intrinsic value.

To take this one step further, an option which is significantly in a profit position is considered Deep in the Money. Deep in the money options are significantly in the money to the point where there is very little risk of them losing enough value to take them out of the money. For example, if the strike price of a call option is \$15 and the stock is worth \$25, we can call this deep in the money.

Out of the Money (OTM)

For a call option, "Out of the Money" indicates that an options strike price is above the current price of the underlying security. If the option is out of the money, it has no intrinsic value and is only worth the time premium. Again, the reverse can be said about put options; they are Out of the Money if the current price of the stock is above the strike price of the option.

Options in this category can also be classified as deep out of the money options as well. Deep out of the money call options have a strike price well above the current price of the security. Again, the odds of a deep out of the money option going into the money are very low and as such, the delta is very low for these options. This means that the options will not move up as fast as the stock does in the case that the stock starts to rally.

At the Money (ATM)

"At the Money" refers to the underlying security having the same value, or one that is very close to the options strike price and is also known as ATM.

Pricing of Options

Pricing is the most important factor, regarding the effectiveness of the option contract. The pricing of the option helps one to judge whether the premium to be paid for the contract is high or low and what is the ratio of share that should be used for effective hedging. Various models have been developed for valuation of options. Among them Black & Scholes Model is the most efficient and sophisticated one and is used globally as a pricing model.

As India has already introduced stock option contract and has gained momentum in Indian Financial market, the study of Black & Scholes option-pricing models in Indian context is very important and contextual as well. That's why the study of Black & Scholes option pricing model has been the topic of this study.

(ii) LITERATURE REVIEW

Origins of Option Pricing Techniques:

Modern option pricing techniques, with roots in stochastic calculus, are often considered among the most mathematically complex of all applied areas of finance. These modern techniques derive their impetus from a formal history dating back to 1877, when Charles Castelli wrote a book entitled *The Theory of Options in Stocks and Shares*. Castelli's book introduced the public to the hedging and speculation aspects of options, but lacked any monumental theoretical base. Twenty three years later, Louis Bachelier offered the earliest known analytical valuation for options. He was on the right track, but he used a process to generate share price that allowed both negative security prices and option prices that exceeded the price of the underlying asset.

Bachelier's work interested a professor at MIT named Paul Samuelson, who in 1955, wrote an unpublished paper entitled "Brownian Motion in the Stock Market". During that same year, Richard Kruizenga, one of Samuelson's students, cited Bachelier's work in his dissertation entitled "Put and Call Options: A Theoretical and Market Analysis". In 1962, another dissertation, this time by A. James Boness, focused on options. In his work, entitled

"A Theory and Measurement of Stock Option Value", Boness developed a pricing model that made a significant theoretical jump from that of his predecessors. More significantly, his work served as a precursor to that of Fischer Black and Myron Scholes, who in 1973 introduced their landmark option pricing model.

Dr. Hayette Gatfaoui in his Simple Two-Factor European Call Pricing, proposed a simplified European call pricing of Black & Scholes (1973). His closed-form valuation is based on the typology of risk, which was originally introduced by Sharpe (1963). Indeed, stock and call prices fluctuate due to both the systematic risk and idiosyncratic risk sources driving assets in the market. The sensitivity of stock prices to systematic risk being described by stocks' beta parameters. Thus, stock returns volatility results from two components, namely one systematic and one idiosyncratic volatility components. Analogously to Black & Scholes (1973), he inferred time-varying implied volatilities for stock returns and related systematic risk factor's return, as well as corresponding time-varying implied beta parameters. Such time-varying parameters can be considered as short-term forecasts of their average future historical counterparts (e.g., implied global volatility). Our pricing reveals generally itself as being more precise than the one proposed by Black & Scholes (1973) since we account for the two main dimensions of risk.

William M. McEneaney with his Robust Control Framework for Option Pricing has taken a new approach to the problem of option pricing. In the standard framework, the option pricing problem involves determining a price such that the option writer can guarantee a certain bound on the cost almost surely. Due to this form, the problem may be reformulated in terms of deterministic differential games of the type employed in robust and $\mathcal{H}_\infty$ control. Different models yield different prices. The standard model yields the Black and Scholes price. Both a deterministic model and the standard model with the Ito integral replaced by the Stratonovich integral yield the price corresponding to a stop-loss hedging technique. With these methods, it can also easily be shown that for the standard model with a bounded, stochastic volatility, the Black and Scholes price corresponding to the upper bound for volatility is sufficient to hedge the option.

For simplicity, the literature review has been divided into the following parts.

- Introduction to the Black and Scholes model.
- Use of Black and Scholes model.
- Assumptions underlying Black and Scholes model.

Introduction to the Black and Scholes model

Fischer Black and Myron Scholes published “The Pricing of Options and Corporate Liabilities” in 1973.

Black and Scholes Option Pricing model did not appear overnight, in fact, Fischer Black started out working to create a valuation model for stock warrants. The work involved calculating a derivative to measure how the discount rate of a warrant varies with time and stock price. The result of this calculation held a striking resemblance to a well-known heat transfer equation. Soon after this discovery, Myron Scholes joined with Black and the result of their work is startlingly accurate option pricing model. Black and Scholes can't take all credit for their work, in fact their model is actually an improved version of a previous model developed by A. James Boness in his Ph.D. dissertation at the University of Chicago. Black and Scholes' improvements on the Boness model come in the form of a proof that the risk-free interest rate is the correct discount factor, and with the absence of assumptions regarding investor's risk preferences.

It shows how five variables viz. the current underlying asset price (S) , the option strike price (E) , the option time to expiration (t) , the risk less return (r), and the underlying asset volatility (σ) ,work together to determine the value of a standard option.

According to Black and Scholes formulation, the value of call option is calculated as follows:

$$C = S_0 N(d_1) - E e^{-rt} N(d_1)$$

The value of put option can be calculated using the following formula:

$$P = E e^{-rt} [1 - N(d_1)] - S_0 [1 - N(d_1)]$$

Where,

$$d_1 = \frac{\ln\left(\frac{S_0}{E}\right) + (r + 0.5\sigma^2)t}{\sigma\sqrt{t}}$$

$$d_2 = \frac{\ln\left(\frac{S_0}{E}\right) + (r - 0.5\sigma^2)t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

Where,

- C = Current value of option
- r = continuously compounded risk free rate of return
- S₀ = Current price of stock
- E = Exercise price of the option
- t = Time remaining before expiration date
(Expressed as fraction of a year)
- σ = Implied Volatility
- Ln = Natural logarithm
- N (d) = Value of the cumulative normal distribution evaluated at 'd'
- e = Exponential Function (2.7138)

Using Black and Scholes model

An examination of the above formula reveals that the input required to value an option are; current price of the stock (S₀), exercise price or the option (E), time remaining before expiration of option (t), risk free rate of return (r), implied volatility (σ) on the stock /index and a normal probability table.

The first three are easily observable while an about the risk free rate of return may be had by taking the rate of return on a government security that has a maturity date closest to the expiration date of the call. An estimate of standard deviation of the continuously compounded annual rate of return (implied volatility) on stock may be obtained by using historical data on the stock return.

To understand Black and Scholes model, we divide it into two parts. The first part, $S_0 N(d_1)$, derives the expected benefit from acquiring a stock outright. This is found by multiplying stock price (S_0) by the change in the call premium with respect

to a change in the underlying stock price $N(d_1)$. The second part of the model, Ee^{-rt} , gives the value of paying the exercise price on the expiration day. The fair market value of the call premium is then calculated by taking the differences between these two parts.

Assumption Underlying Black and Scholes Model

The Black and Scholes model valuation is based on certain assumptions. They are as follows.

1. The option being valued is European style option, with no possibility of an early exercise.
2. There no transaction (dealing) costs and there are no taxes.
3. The risk free interest rate is known and constant over the life of the option.
4. The volatility of the underlying instrument (may be the equity share or the index) is known and constant over the life of the option.
5. The distribution of the possible share price (or index levels) at the end of time is log normal or in other words, a share's continuously compounded rate of return follows a normal distribution. Essentially this means that the share (or index) in question is ration, with the added implication that the share prices (or indices) cannot become negative.

Black & Scholes model is globally used for pricing the option contract and in India also this model has been suggested for pricing the option. Hence, in this context, the need arises to test and analyze whether this Black & Scholes model holds good in Indian stock market or not. Therefore, testing the applicability of Black & Scholes model in Indian context is the topic of this dissertation.

The dissertation is the study to find out whether the Black & Scholes option-pricing model is applicable in Indian stock market along with its application for finding out the option price and Greeks symbol like Delta, Gamma, Vega, rho of some Indian companies so that investors will be able to find out the relationship of option price with respect to stock price, interest rate and premium which in turn help them to abstract a clear picture of the future for the given contract.

Therefore, the analysis and study of Black & Scholes model in Indian context is of paramount important. This dissertation is an attempt to analyze the suitability and applicability of Black & Scholes model in India with special focus on equity stock option.

(iii) STATEMENT OF PROBLEM

Pricing is the most important factor, regarding the effectiveness of the option contract. The pricing of the option helps one to judge whether the premium to be paid for the contract is high or low and what is the ratio of share that should be used for effective hedging. Various models have been developed for valuation of options. Among them Black & Scholes Model is the most efficient and sophisticated one and is used globally as a pricing model. It envisages the clear picture about the viability of the given options offered by the seller.

The dissertation is the study to find out whether the Black & Scholes option-pricing model is applicable in Indian stock market along with its application for finding out the option price and Greeks symbol like Delta, Gamma, Vega, rho of some Indian companies so that investors will be able to find out the relationship of option price with respect to stock price, interest rate and premium which in turn help them to abstract a clear picture of the future for the given contract.

(iv) OBJECTIVES OF THE STUDY

The main objective of this dissertation is “*to analyze the suitability and applicability of Black & Scholes option pricing model in Indian context using 10 widely traded companies from SENSEX*” with special focus on equity stock option. The other objectives are:

- To study the basic concept of option.
- To analyze whether Black & Scholes model holds good in Indian stock market.
- Calculate the option premium value using Black & Scholes calculator and compare it with the actual price to find out whether the option contract is underpriced or overpriced.
- To calculate Greeks symbol like Delta, Gamma, Theta, Vega, rho so that investors will be able to find out the relationship of option price with respect to stock price, interest rate and volatility and maturity.

First of all, a test is carried out to analyze whether Black & Scholes model holds good in Indian stock market using Kolmogorov-Smirnov test and the Black & Scholes calculator is used to calculate the option price of some widely traded Indian companies

(v) SCOPE OF THE STUDY

The dissertation is the study to find out whether the Black & Scholes option-pricing model is applicable in Indian stock market along with its application for finding out the option price and Greeks symbol like Delta, Gamma, Vega, rho of some Indian companies so that investors will be able to find out the relationship of option price with respect to stock price, interest rate and premium which in turn help them to abstract a clear picture of the future for the given contract.

The Black and Scholes formula can be used to derive formulae for option hedging parameters viz. delta, gamma, rho, measure of expected return, standard deviation of return. It can be extended from individual option to portfolio of options, for the most part simply by summing the relevant parameters for the constituent options, where the number of units of each option in the portfolio weights the individual option parameters.

Using simple arbitrage arguments, the Black and Scholes formula can be easily extended from option on asset to option on currencies.

Similarly, assumption has been made that the dividend paid out by selected companies in this study has been neglected or has not been taken in to account in the analysis. Stock volatility and risk free rate of return has been assumed constant. All the analysis has been done using Microsoft Excel inbuilt statistical tools.

vi) METHODOLOGY

a) Type of research

This study is basically a descriptive research. Descriptive research is a study undertaken to define the prevailing distribution the Indian share prices follow and test the appropriate models that can be used for effective hedging.

b) Sampling technique

Among the various types of sampling technique, simple random sampling technique has been adopted in this study. A simple random sampling selects samples by a method that allows each possible sample to have an equal probability of being picked up and each item in the entire population to have an equal chance of being included in the sample.

Among the thirty companies from the Sensex, ten companies have been selected randomly representing the entire population. The probability of each being selected is given by

$$= \frac{n!(N-n)!}{N!}$$

Where,

N = Population size = 30

n = Sample size = 10

Therefore, the probability of each company being selected is given

$$= \frac{10!(30-10)!}{30!}$$

$$= 3.3283 \times 10^{-08}$$

Sample size:

Determination of sample size is very important because if sample size is too small, it may not represent the population and may not serve to achieve the objectives. Similarly, if sample size is too large, it may incur huge costs and waste resources. Therefore, the sample size must be of an optimum i.e. it should neither be excessively large nor too small.

In this dissertation, the acceptance error 'e' has been kept within ± 3 of the sample mean with 95% confidence level. The sample size for the finite population has been calculated as follows:

$$n = \frac{z^2 n \sigma_p^2}{(N-1)e^2 + z^2 \sigma_p^2}$$

Where

- N = Population size = 30
- Z = Value of standard variate at a given confidence level
= 1.96 for 95% confidence level
- e = Acceptance error = 3
- σ_p = Standard deviation of the population
= 6.0 (Determined on the basis of trial sample)
- N = Size of population

Therefore,

$$\begin{aligned}\text{Sample size} &= \frac{(1.96)^2 \times 30 \times (6)^2}{(30-1) \times (3)^2 + (1.96)^2 \times (6)^2} \\ &= 10.39 \\ &\approx 10\end{aligned}$$

Among the thirty companies from the Sensex, ten companies have been selected based on their trading volume. The most widely traded companies in options are chosen from each industry.

The following have been selected:

1. Reliance Industries (Power)
2. ONGC (Oil & Refinery)
3. ICICI (Banking)
4. Tatasteel (Metals)
5. Infosys Technologies (Information Technology)
6. Tatamotors (Automobile)
7. ITC (FMCG)
8. Ranbaxy (Pharma)
9. BHEL (Engineering)
10. ACC (cement)

c) Method of data collection

Basically, the data used in this dissertation are secondary in nature, which appeared in Economic Times, Business Standard and NSE, BSE sites. Past four year daily closing price of stock of ten randomly companies has been used in this dissertation. Approximately 1000 daily stock prices have been used for each company from April 2004 to March 2008 to test the applicability of Black and Scholes model. Similarly, option contracts that are to be analyzed have been selected from The Economic Times at different date of different months for the year 2007.

d) Tools for analysis

A key assumption underlying the Black and Scholes formulation is that the distribution of possible share prices (or index levels) at the end of a period is log normal or, in other words, a share's continuously compounded rate of return follows a normal distribution. Therefore, this dissertation is basically focused to examine whether this assumption is tenable in case of Indian stocks.

The following techniques have been followed.

1. The normality test has been done using the **Kolmogorov-Smirnov (K-S) test**.
2. In order to apply the Black and Scholes model, first of all implied volatility, expiration time period, have been calculated and fed to the Black Scholes formula to find out the option price and option Greeks.
3. The option price calculated by the Black & Scholes is compared with the actual price to find out whether the option contract is **underpriced or overpriced**.
4. The interpretation for the Greeks is done to find the effect of variables on each other.

Other software used for data analysis

Basically whole data analysis has been performed using spreadsheet in Excel by using different statistical functions inbuilt in Excel. The following statistical functions have been employed during the data analysis.

- | | |
|-------------|---|
| • AVERAGE | Calculates the average of a given data. |
| • EXP | Returns 'e' rose to the power of given number. |
| • INT | Rounds a number down to the nearest integer. |
| • LN | Calculates the natural logarithm of given number. |
| • MAX | Find out the maximum value from the given set of data. |
| • NORMSDIST | Calculates the normal cumulative distribution for a give mean and standard deviation. |
| • SQRT | Calculates the square root of given data. |

(vii) LIMITATION

- The study is restricted to ten most widely traded companies on the Bombay Stock Exchange out of thirty companies listed on Sensex. Therefore, analysis is only of a representative sample and not the whole stock market.
- The time frame for the study is comparatively smaller (from April 2004 to March 2008). Better result can be obtained if the years of observation are increased.
- Similarly, assumption has been made that the dividend paid out by selected companies in this study has been neglected or has not been taken in to account in the analysis.
- Stock volatility and risk free rate of return has also been assumed to be constant.
- The study is restricted to only European call options. Therefore, there is further scope to analyze for the put option also.

(viii) CHAPTER SCHEME

The chapter scheme of the project report consists of the following

a) Introduction

The introduction part of the report structure includes the background of the study, review of literature, objectives of the study, statement of the problem, scope of the study, the methodology which consists of the type of study, sampling design, method of data collection and the tools for analysis, limitations and also the chapter scheme.

b) Organization Profile

The organization profile includes the history of the organization, the details of the management, the structure of the organization, products profile and the competitive strength of the company and a brief description of the various functional areas of the organization.

c) Macro – Micro Analysis

The macro – micro analysis includes the details of the prevailing scenario with respect to the banking sector and the organization undertaken for the study. In this study the macro perspective is the Indian banking services and the micro perspective is the deposit services offered by State Bank Of India in Belay branch.

d) Data Analysis and Interpretation

The data analysis and interpretation chapter comprises of tables and charts, it gives the tabular distribution of the collected data, analyzed percentage values, graphical representation results.

e) Conclusion

This chapter deals with the findings of the study and gives suggestion that the researcher put forward to the management.

CHAPTER 2

ORGANISATION PROFILE

ORGANIZATION PROFILE

KARVY, is a premier integrated financial services provider, and ranked among the top five in the country in all its business segments, services over 16 million individual investors in various capacities, and provides investor services to over 300 corporates, comprising the who is who of Corporate India.

KARVY covers the entire spectrum of financial services such as Stock broking, Depository Participants, Distribution of financial products like mutual funds, bonds, fixed deposit, Merchant Banking & Corporate Finance, Insurance Broking, Commodities Broking, Personal Finance Advisory Services, placement of equity, IPOs, among others. Karvy has a professional management team and ranks among the best in technology, operations, and more importantly, in research of various industrial segments.

Vision

To achieve & sustain market leadership, Karvy shall aim for complete customer satisfaction , by combining its human and technological resources , to provide world class quality services. In the process Karvy shall strive to meet and exceed customer's satisfaction and set industry standards

Mission

Karvy's mission is to be the leading and preferred service provider to their customers, and aim to achieve the leadership position by building an innovative, enterprising, and technology driven organization which will set the highest standards of service and business ethics.

(i) BACKGROUND

Karvy was started by a group of five Chartered Accountants in 1979. The partners decided to offer, other than the audit services, value added services like corporate advisory services to their clients. The first firm in the group, Karvy Consultancy limited was incorporated on 23rd July, 1983. In a very short period, it became the largest Registrar and Transfer Agent in India. This business was spun off to form a separate joint venture with Computershare of Australia, in 2005. Karvy's foray into stock broking began with marketing IPO procurement league tables and it has consistently maintained its position among the top 5. Karvy was among the first few members of NSE, in 1994 and became a member of BSE in 2001. Dematerialization of shares gathered pace in mid 90s and Karvy was in the forefront educating investors on the advantages of dematerializing their shares. Today Karvy is among the top 5 depository Participant in India.

While the registry business is a 50:50 Joint Venture with Computershare of Australia, they have equity participation by ICICI Ventures Limited and Barings Asia Limited, in Karvy Stock Broking Limited.

Network

Karvy has 575 offices over 375 locations across India and overseas at Dubai and New York. Over 9,000 highly qualified people staff Karvy.

Karvy has always believed in adding value to services it offers to clients. A top-notch research team based in Mumbai and Hyderabad supports its employees to advise clients' on their investment needs. On any typical working day Karvy:

- Has more than 25,000 investors visiting 575 offices.
- Publishes / broadcasts atleast 50 buy / sell calls.
- Attends to 10,000+ telephone calls.
- Mails 25,000 envelopes, containing Annual Reports, dividend cheques / advises, allotment / refund advises.
- Executes 1,50,000+ trades on NSE /BSE
- Executes 50,000 debits / credits in the depository accounts

(ii) MANAGEMENT

Mr. C Parthasarathy, a leader in the financial services industry in India is responsible for building Karvy as one of India's truly integrated Financial Services Provider; he is a fellow member of the Institute of Company Secretaries of India, a Fellow Member of the Institute of Chartered Accountants of India and a graduate in law. As Chairman, he oversees the group's operations and renders vision and business direction. His passion and vision for achieving leadership in the business made KARVY a leading financial intermediary ranking them as number one in the registrar, Share Transfer and IPO Distribution businesses. He also holds directorship in Karvy Securities Limited, Karvy Stock Broking Limited, Karvy Investor Services Limited, Karvy Computershare Private Limited, Karvy Commodities Broking Private Limited.

Other members

Mr. M Yugandhar, Managing Director

Mr. M S Ramakrishna, Executive Director

Mr. Prasad V Potluri, Director

Management team

K Sridhar

V Mahesh

V Ganesh

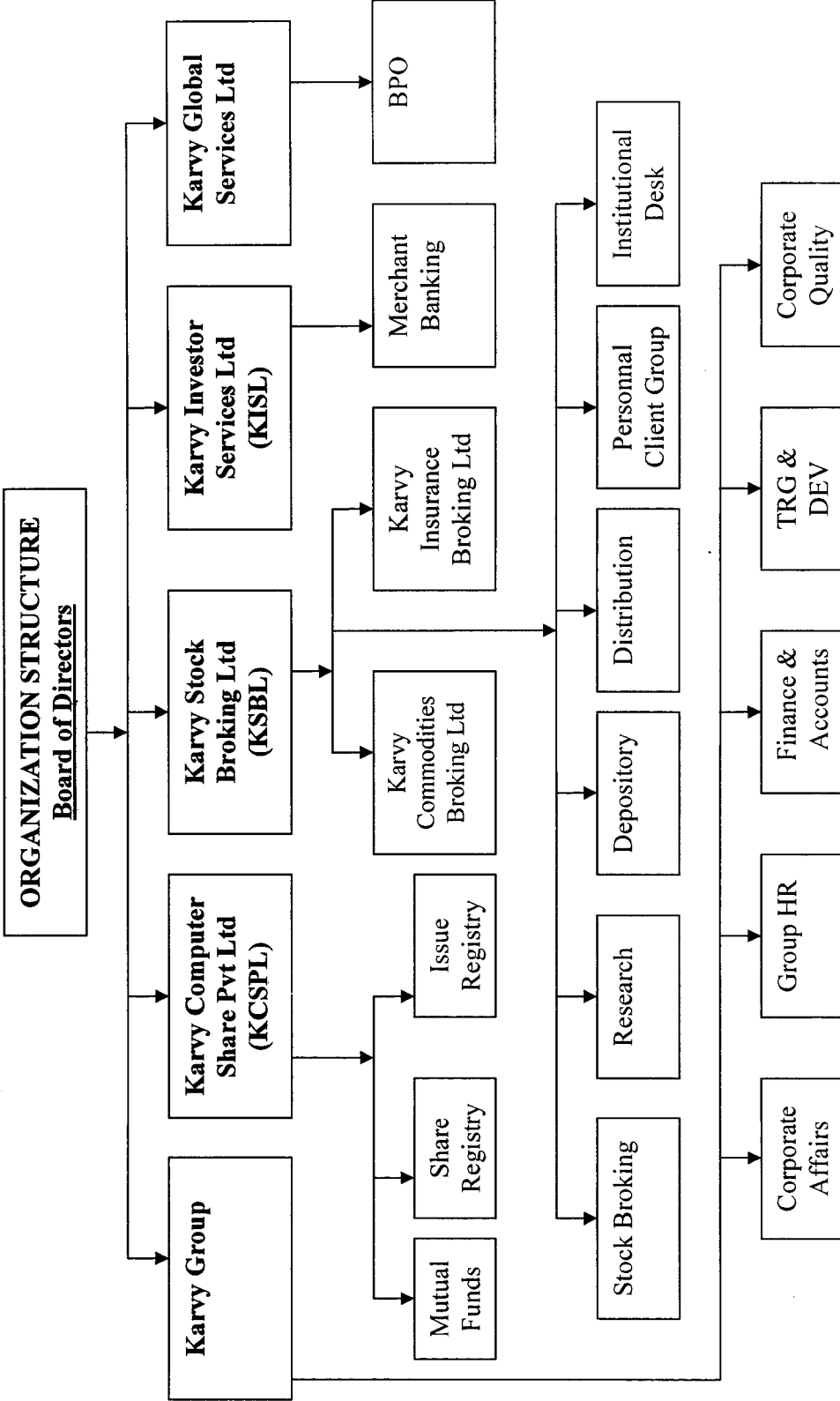
S Gopichand

J Ramaswamy

M S Manohar

S Ganapathy Subramanian

(iii) ORGANISATION STRUCTURE



(iv) PRODUCT PROFILE AND MARKET POTENTIAL

KARVY covers the entire spectrum of financial services such as Stock broking, Depository Participants, Distribution of financial products like mutual funds, bonds, fixed deposit, Merchant Banking & Corporate Finance, Insurance Broking, Commodities Broking, Personal Finance Advisory Services, placement of equity, IPO's, among others. Karvy has a professional management team and ranks among the best in technology, operations, and more importantly, in research of various industrial segments.

Achievement

The Karvy group was formed in 1983 at Hyderabad, India. Karvy ranks among the top players in almost all the fields it operates. Karvy Computershare Limited is India's largest Registrar and Transfer Agent with a client base of nearly 500 blue chip corporates, managing over 2 crore accounts. Karvy Stock Brokers Limited, member of National Stock Exchange of India and the Bombay Stock Exchange, ranks among the top 5 stock brokers in India. With over 6,00,000 active accounts, it ranks among the top 5 depository Participant in India, registered with NSDL and CDSL. Karvy Comtrade, Member of NCDEX and MCX ranks among the top 3 commodity brokers in the country.

- Among the top 5 stock brokers in India (4% of NSE volumes).
- India's No. 1 Registrar & Securities Transfer Agents.
- Among the top 3 Depository Participants.
- Largest Network of Branches & Business Associates.
- ISO 9002 certified operations by DNV.
- Among top 10 Investment bankers.
- Largest Distributor of Financial Products.
- Adjudged as one of the top 50 IT uses in India by MIS Asia.
- Full Fledged IT driven operations.

LEADERSHIP POSITION

Leading depository participant	Leading IPO distributor
■ Servicing through 380+ branches ■ Over 740,000 active DP customers ■ Amongst the largest DP in the country ■ Over Rs. 250 Bn. in custody ■ Technology driven online service at branch level	■ Largest retail distributor for IPOs (over 17% share of retail volumes in 2003 to 2005) ■ Extensive use of Karvy's broking network for IPO book building process ■ Over 8,000 active business associates in addition to 300+ branch network ■ Over 1,600 executives in sales and customer service
Leading MF distributor	Leading stock broker
■ Focus on MF distribution over the last three years ■ Today service over 420K folios from 230K households ■ Assets under advise at Rs. 28 Bn.(around 35% equity) ■ Reached 100K applications in August 2005	■ Largest retail broker (Over 160,000 trades per day representing over 5.5% of NSE trades) – over 700 terminals ■ Around 4.5% share of daily NSE Cash market volumes and 2% of F&O volumes ■ Over Rs. 6.5Bn turnover per day ■ Over 250,000 customers

v) COMPETITIVE STRENGTHS

- Controlled and low cost service culture
- Large volume processing capability
- Adherence to strict time schedules
- Expertise in co-ordination multi-location responses
- Expertise in managing independent intermediaries such as Banks, Post Offices etc.
- Pooling of group resources for peak –loads and , also for one – time Assignments.

vi) FUTURE PLANS

Overseas branches

- Investment in Indian markets
- Tap both NRI and institutional clients in India
- Get international products for Indian investor

Commodities

- New and evolving market in India
- Expected to be larger multi-fold than the equities market going forward
- Membership with 2 exchanges – NCDEX / MCX

Global Services

- BPO Operations
- Focus on HRO, Finance & Accounting, Research & analytics, Transaction processing operations

Insurance Broking

- Focus on individual customers
- Both life and general insurance
- Part of the basket to evolve as ‘personal finance advisor’

vii) DESCRIPTION OF VARIOUS FUNCTIONAL AREAS

KARVY STOCK BROKING LIMITED

Member - National Stock Exchange (NSE), The Bombay Stock Exchange (BSE), and The Hyderabad Stock Exchange (HSE).

Karvy Stock Broking Limited, one of the cornerstones of the Karvy edifice, flows freely towards attaining diverse goals of the customer through varied services. Creating a plethora of opportunities for the customer by opening up investment vistas backed by research-based advisory services. Here, growth knows no limits and success recognizes no boundaries. Helping the customer create waves in his portfolio and empowering the investor completely is the ultimate goal.

It is an undisputed fact that the stock market is unpredictable and yet enjoys a high success rate as a wealth management and wealth accumulation option. The difference between unpredictability and a safety anchor in the market is provided by in-depth knowledge of market functioning and changing trends, planning with foresight and choosing options with care. This is what we provide in our Stock Broking services.

They offer services that are beyond just a medium for buying and selling stocks and shares. Instead they provide services which are multi dimensional and multi-focused in their scope. There are several advantages in utilizing Karvy Stock Broking services, which are the reasons why it is one of the best in the country.

Stock Broking Services

Karvy offers services that are beyond just a medium for buying and selling stocks and shares. Instead they provide services which are multi dimensional and multi-focused in their scope. There are several advantages in utilizing our Stock Broking services, which are the reasons why it is one of the best in the country.

They offer trading on a vast platform ; National Stock Exchange, Bombay Stock Exchange and Hyderabad Stock Exchange. More importantly, they make trading safe to the maximum possible extent, by accounting for several risk factors and planning accordingly. They are assisted in this task by their in-depth research, constant feedback and sound advisory facilities. Their highly skilled research team, comprising of technical analysts as well as fundamental specialists, secure result-oriented information on market trends, market analysis and market predictions. This crucial information is given as a constant feedback to our customers, through daily reports delivered thrice daily ;

1. The Pre-session Report, where market scenario for the day is predicted.
2. The Mid-session Report, timed to arrive during lunch break , where the market forecast for the rest of the day is given and
3. The Post-session Report, the final report for the day, where the market and the report itself is reviewed.

Depository Services

The onset of the technology revolution in financial services Industry saw the emergence of Karvy as an electronic custodian registered with **National Securities Depository Ltd (NSDL) and Central Securities Depository Ltd (CSDL)** in 1998. Karvy set standards enabling further comfort to the investor by promoting paperless trading across the country and emerged as the **top 3 Depository Participants** in the country in terms of customer serviced.

Offering a wide trading platform with a dual membership at both NSDL and CDSL, we are a powerful medium for trading and settlement of dematerialized shares. They have established live DPMs, Internet access to accounts and an easier transaction process in order to offer more convenience to individual and corporate investors. A team of professional and the latest technological expertise allocated exclusively to their demat division including technological enhancements like SPEED-e, make the response time quick and delivery impeccable. A wide national network makes the efficiencies accessible widely.

CHAPTER 3

MACRO-MICRO ANALYSIS

MACRO – MICRO ANALYSIS

MACRO ANALYSIS

The world financial market has undergone qualitative changes in the last three decades due to phenomenal growth of derivatives. With the world embracing the derivative trading on a large scale, the Indian market cannot remain aloof, especially after liberalization has set in motion. Derivative trading was introduced in phased manner over a period of time.

Financial markets are, by nature, extremely volatile and hence the risk factor is an important concern for financial agents. To reduce this risk, the concept of derivatives comes into the picture. Derivatives are products whose values are derived from one or more basic variables called bases. These bases can be underlying assets (for example forex, equity, etc), bases or reference rates. For example, wheat farmers may wish to sell their harvest at a future date to eliminate the risk of a change in prices by that date. The transaction in this case would be the derivative, while the spot price of wheat would be the underlying asset.

Need for a derivatives market

The derivatives market performs a number of economic functions:

1. They help in transferring risks from risk averse people to risk oriented people
2. They help in the discovery of future as well as current prices
3. They catalyze entrepreneurial activity .
4. They increase the volume traded in markets because of participation of risk averse people in greater numbers.
5. They increase savings and investment in the long run

The participants in a derivatives market

- **Hedgers** use futures or options markets to reduce or eliminate the risk associated with price of an asset.
- **Speculators** use futures and options contracts to get extra leverage in betting on future movements in the price of an asset. They can increase both the potential

gains and potential losses by usage of derivatives in a speculative venture.

- **Arbitrageurs** are in business to take advantage of a discrepancy between prices in two different markets. If, for example, they see the futures price of an asset getting out of line with the cash price, they will take offsetting positions in the two markets to lock in a profit.

Development of derivatives market in India

With the world embracing the derivative trading on a large scale, the Indian market obviously can't remain aloof, especially after liberalization has been set in motion. The first step towards introduction of derivatives trading in India was the promulgation of the Securities Laws (Amendment) Ordinance, 1995, which withdrew the prohibition on options in securities. The market for derivatives, however, did not take off, as there was no regulatory framework to govern trading of derivatives.

SEBI set up a 24-member committee under the Chairmanship of Dr.L.C.Gupta on November 18, 1996 to develop appropriate regulatory framework for derivatives trading in India. The committee submitted its report on March 17, 1998 prescribing necessary pre-conditions for introduction of derivatives trading in India, which was approved by SEBI in May and circulated in June 1998.

Present scenario in stock market

Indian stock markets have corrected sharply in the month of January. Sensex has slipped to 16000 level from a high of 21206 levels. Nifty has corrected 25% from a high of 6537 to a low of 4899 on a closing basis on Jan 22, 2008. The P/E ratio of both the Sensex and Nifty has slipped to around 22 from a high of 31 during the period. The higher P/E multiple was due to strong fund flows chasing few quality stocks.

The steep fall was triggered by the turbulence in global financial markets, but gained momentum due to the heavy closure of long positions in the Futures and Options segment. At the same time, massive fund mobilization through mega IPOs left the markets with scarce liquidity.

In the F&O segment, the overall sector witnessed a decline of 2.49 percent shares in open interest on a weekly basis. Among frontline 4- wheeler stocks, addition of 18.84 percent shares was observed in Maruti while M&M and Tata Motors witnessed closure of 1.45 percent and 3.44 percent shares in open interest. Bajaj Auto and Hero Honda added 14.74 percent and 7.98 percent shares respectively in open interest.

Present scenario in Stock option

Cement stocks are looking attractive and appear to have bottomed out. Put writing in cement stocks looks appropriate. Auto stocks lack strength and are looking rangebound. Writing OTM Call and Put options of stocks like Maruti and Tata Motors looks attractive. Telecom sector is showing signs of strength and downside looks limited in these stocks, which makes Put option writing attractive. Technology stocks are seeing some buying interest on dips and should remain rangebound. FMCG stocks are looking strong and buying interest should continue in them. Construction and Infrastructure space is not looking very attractive, selling pressure may be seen in these stocks at higher levels. Power stocks face selling pressure at higher levels and are expected to remain volatile. Banking stocks have been beaten up quite severely and they are expected to bounce back from current levels.

MICRO ANALYSIS

An option is a derivative instrument since its value is derived from the underlying asset. It is essentially a right but not an obligation to buy or sell an asset. Options can be a call option (right to buy) or a put option (right to sell). An option is valuable if and only if the prices are varying.

An option by definition has a fixed period of life, usually 3 to 6 months. An option is a wasting asset in the sense that the value of an option diminishes as the date of maturity approaches and on the date of maturity it is equal to zero.

When we talk of value of an option, we are essentially referring to the value of the right which is derived from the volatility of the stock. Greater the volatility, greater the value of the option.

Definition

An option is a derivative. That is, its value is derived from something else. In the case of a stock option, its value is based on the underlying stock (equity). In the case of an index option, its value is based on the underlying index (equity).

Puts And Calls

Options come in two primary forms. They are calls and puts. One call option gives the holder the right, not the obligation, to buy 100 shares of the underlying stock at a fixed price and for a fixed period of time. A put option gives the holder the right, not the obligation, to sell 100 shares of the underlying stock for a fixed price and for a fixed period of time. This is why an option is considered to be a 'wasting' asset. Since the option only has value for a fixed period of time, its value decreases, or 'wastes' away with the passage of time. In the case of an index option, the holder can participate in the movement of the index. However, these options are cash settled and therefore, the holder of the option will never wind up with a position in the underlying securities.

Four Components to an Option

There are four components to an option. They are: The underlying security, the type of option (put or call), the strike price, and the expiration date. Let's take an XYZ November 100-call option as an example. XYZ is the underlying security. November is the expiration month. 100 is the strike price (sometimes referred to as the exercise price). And the option is a call (the holder has the right, not the obligation, to buy 100 shares of XYZ at a price of 100).

Types Of Expiration

There are two different types of options with respect to expiration. There is a European style option and an American style option. The European style option cannot be exercised until the expiration date. Once an investor has purchased the option, it must be held until expiration. An American style option can be exercised at any time after it is purchased. Today, most stock options, which are traded, are American style options. And many index options are American style. However, there are many index options, which are European style options. An investor should be aware of this when considering the purchase of an index option.

The Parties to an Option

There are two parties to an option. There is the party who buys the option; and there is the party who sells the option. The party who sells the option is the writer. The party who writes the option has the obligation to fulfill the terms of the contract should it be exercised. This can be done by delivering to the appropriate broker 100 shares of the underlying security for each option written.

At-The-Money, In-The-Money, Out-Of-The-Money

There are three different terms for describing where an option is trading in relation to the price of the underlying security. These terms are 'at-the-money', 'in-the-money', and 'out-of-the money'. Let's use our XYZ November 100 call as an example. If XYZ stock is trading

at a price of 100, the November 100 call is considered to be trading 'at-the-money'. If XYZ stock is trading at a price greater than 100, say 102, the call option is considered to be 'in-the-money'. And if XYZ is trading at a price less than 100, say 98, the call option is considered to be trading 'out-of-the-money'. Conversely, if it was an XYZ November 100 put option we owned, if the price of XYZ stock was 102, the put option would be considered to be 'out-of-the-money'. And if XYZ stock were trading at a price of 98, the put option would be considered to be trading 'in-the-money'. If XYZ stock were again trading at 100, the put option would be 'at-the-money'.

Intrinsic Value & Time Value

Intrinsic Value

The price difference between the underlying security and the option's strike price is the intrinsic value. For example, let's take that XYZ November 100 call. If XYZ is trading at 102, and the call option is priced at 2, the intrinsic value is 2. If an XYZ November 100 put is trading at 3, and the price of XYZ stock is trading at 97, the intrinsic value of the put option is 3. If XYZ stock were trading at 99, an XYZ November 100 call would have no intrinsic value. And conversely, if XYZ stock were trading at 101, an XYZ November 100 put option would have no intrinsic value. An option must be in-the-money to have intrinsic value.

Time Value

Time value is the amount by which the price of the option exceeds its intrinsic value. For example, that XYZ November 100 call, with XYZ trading at 102, might be selling for 4-1/2. Thus, there is 2 points in intrinsic value and 2-1/2 points in time value. If XYZ were trading at 99, and the price of the option was 2, there would be no intrinsic value and 2 points in time value. If an XYZ November 100 put was priced at 3 and XYZ stock was trading at 99, there would be 1 point in intrinsic value and 2 points in time value. If an XYZ November 100 put was trading at 2 and XYZ stock was priced at 101, there would be 2

points in time value and no intrinsic value. The time value premium of an option declines as the expiration date approaches.

$$\text{Intrinsic Value} + \text{Time Value} = \text{Option Price}$$

Factors Influencing the Price of an Option:

There are four major factors, which determine the price of an option. They are:

- The price of the underlying stock
- The strike price of the option itself
- The time remaining until the option expires
- The volatility of the underlying stock

Volatility

The volatility part of the pricing model is a measure of the range the underlying security is expected to fluctuate over a given period of time. The measurement of volatility is the standard deviation of the daily price changes in the security. The more volatile the underlying security, the greater the price of the option. There are two different kinds of volatility. There is historical volatility; and there is implied volatility. Historical volatility estimates volatility based on past prices. Implied volatility starts with the option price as a given and works backward to ascertain the theoretical value of volatility equal to the market price minus any intrinsic value.

Black Scholes Option Pricing Model

There are many different option pricing models in practice. However, the original breakthrough was in the Black-Scholes model. It was a model for pricing options before options were widely traded. The original Black Scholes model worked primarily for European style options. However, it has been modified to work with American style expiration. Since then, several variations have been developed. There are other binomial option pricing formulas.

KOLMOGOROV-SMIRNOV (K-S) TEST

The Kolmogorov-Smirnov Z test([Chakravart, Laha, and Roy, 1967](#)), is a goodness-of-fit test which tests whether a given distribution is not significantly different from one hypothesized (ex., on the basis of the assumption of a normal distribution). It is used to decide if a sample comes from a population with a specific distribution.

The graph below is a plot of the empirical distribution function with a normal cumulative distribution function for 100 normal random numbers. The K-S test is based on the maximum distance between these two curves. An attractive feature of this test is that the distribution of the K-S test statistic itself does not depend on the underlying cumulative distribution function being tested. Another advantage is that it is an exact test (the chi-square goodness-of-fit test depends on an adequate sample size for the approximations to be valid). Despite these advantages, the K-S test has several important limitations:

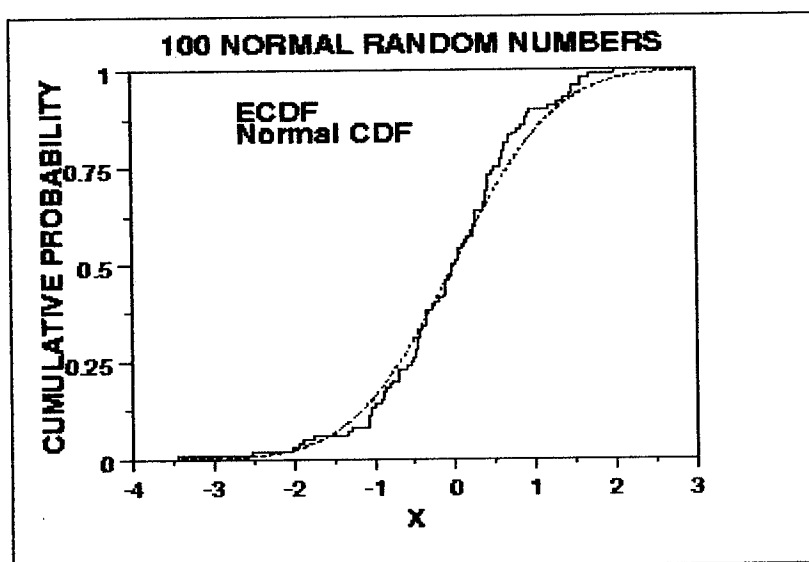


Fig 3.2.1 Comparison between Normal CDF and ECDF

1. It only applies to continuous distributions.
2. It tends to be more sensitive near the center of the distribution than at the tails.

3. Perhaps the most serious limitation is that the distribution must be fully specified. That is, if location, scale, and shape parameters are estimated from the data, the critical region of the K-S test is no longer valid. It typically must be determined by simulation.

The Kolmogorov-Smirnov test is defined by:

H_0 : The data follow a specified normal distribution.

H_a : The data do not follow a specified normal distribution.

Significance level : $\alpha = 0.01$

Test Statistics : The Kolmogorov-Smirnov test statistic is defined as

$$D = \max_{1 \leq i \leq N} \left| F(Y_i) - \frac{i}{N} \right|$$

where F is the theoretical cumulative distribution of the distribution being tested which must be a continuous distribution.

Critical Value : The hypothesis regarding the distributional form is rejected if the test Statistic D , is greater than the critical value obtained from a table.

TESTING OF HYPOTHESIS

Hypothesis is one of the major parts of this dissertation. Since the test of normality of the natural log values of the price relatives is the major problem of this dissertation, the normality test has been performed using the most widely used tools for testing normality which is the Kolmogorov-Smirnov (K-S) test and histogram.

The Kolmogorov-Smirnov test of goodness of fit is connected with the degree of agreement between the distribution of a set of sample values and some specified theoretical distribution. It involves specifying the cumulative frequency distribution that would occur under the theoretical distribution (which is the normal distribution here) and comparing it with the observed cumulative frequency distribution. The point at which these two distributions show the greatest divergence is determined. Reference to the sampling distribution indicates whether such large divergence is likely or not the basis of chance.

For this, D-statistics has been calculated and its values have been tested for its significance to establish whether such a divergence value is likely the basis of chance or not. The following steps have been followed for the hypothesis testing.

1. First of all, null and alternative hypothesis have been formed for each selected company for each year.
2. Secondly, the theoretical normal probability distribution has been calculated using the normal distribution formula.

$$f(x) = \frac{1}{\sigma \sqrt{\Pi}} e^{-\frac{1}{2} \left(\frac{x - \mu}{\sigma} \right)^2}$$

Where,

σ = Standard Deviation

Π = Constant = 3.1415

e = Exponential function = 2.7183

X = Variable

μ = Mean

3. Thirdly, K-S statistics has been calculated using the following formula.

$$D_n = \text{Max}|F_e - F_0|$$

Where,

D_n = K-S statistics

F_e = Expected theoretical distribution (which is normal distribution here)

F_0 = Observed distribution

4. Fourthly, the critical value of D_n for a 1% level of significance has been obtained from the table for a given level of sample size. Since the sample size viz. scrip price used in this dissertation for each of company is greater than 35, the following formula have been employed to calculate the critical value of D_n at 1% level of significance.

$$D_{table} = \frac{1.63}{\sqrt{n}}$$

Where, n = Sample size

5. Finally, the calculated value of D_n and the table value of D_n have been compared. If the table value of D_n is greater than the calculated value, the null hypothesis is accepted otherwise rejected.

Therefore, if $D_n < D_{table}$, accept the null hypothesis

$D_n > D_{table}$, reject the null hypothesis

CALCULATION OF VOLATILITY

The simplest way of estimating volatility is by looking backward. People extract information from the past, and use these to predict the future. This method is adequate to the extent that the future is like the past i.e. to the extent that history repeats itself.

The estimation of variance involves the following steps:

1. The price relatives for daily closing share prices is calculated using one month data. The price relative is calculated as follows

$$PR = \frac{X_t}{X_{(t-1)}}$$

Where, PR = Price relative

X_t = Stock price at the end of t^{th} period

$X_{(t-1)}$ = Stock price at the end of $(t-1)^{\text{th}}$ period

2. The natural logarithm of each of the price relatives is found. This is the continuously compounded rate of return .
3. The standard deviation of the series of continuously compounded rate of return is calculated as follows:
 - The mean rate of return is calculated as

$$\bar{X} = \frac{\sum X}{n}$$

- Then the total of squared deviation of rates of return from the mean rate of return is found by

$$\sum (X - \bar{X})^2$$

- Using the following formula the standard deviation is calculated

$$s = \sqrt{\frac{\sum (X - \bar{X})^2}{n}}$$

- The continuously compounded daily standard deviation is converted to a yearly standard deviation by multiplying it by square root of no of trading days in that year.

So, the continuously compounded daily standard deviation can be converted annually by multiplying it by $\sqrt{N}$ where N is the no of trading days in that year.

Therefore,

$$\text{Annualized volatility} = \text{Daily volatility} \sqrt{N}$$

In other words, the annualized volatility is estimated to be times the standard deviation of the returns. This is the volatility we use as input for the Black-Scholes formula.

CALCULATION OF GREEKS

Delta (Δ):

Also known as hedge ratio, this refers to the amount by which the price of an option changes for a unit change in the price of the underlying asset. A delta equal 0.7, therefore, implies that for one unit change in the stock or index, the option would move 0.7 points. This means that if stock price goes up by Rs.1, the value of option goes up by 60% of Rs.1.

The value of delta for a call option is calculated by using the following formula:

$$\Delta = N(d_1)$$

The formula for put option is

$$\Delta = N(d_1) - 1$$

Gamma (γ):

The Gamma represents the amount by which an option's delta would move in response to a unit change in the underlying stock price or index. In other words, it measures the proportional change of Delta for a given change in the underlying asset value. A movement

of Delta from 0.6 to 0.7 , yields a Gamma equal to 0.1. In the Black and Scholes formulation model, Gamma is given by,

$$\gamma = \frac{Z(d_1)}{S_0 \sigma \sqrt{t}}$$

Where,

$$Z(d_1) = \frac{e^{-\frac{d_1^2}{2}}}{\sqrt{2\pi}}$$

Theta (θ):

The theta is obtained by considering value of an option as function of time. It is thus known as the time decay of option value. Theta represents the price decay that affects an option as it ages and losses time value .It is nearly always negative for an option because as the time to maturity approaches, the option tends to become less valuable. It exhibits the greatest effects before close to the expiration of the option. For the Black and Scholes model, the theta is obtained by using the following formula.

$$\theta = Ee^{-rt} \left[\sigma \frac{Z(d_2)}{2} \sqrt{t} + rN(d_2) \right]$$

Where,

$$Z(d_2) = \frac{e^{-\frac{d_2^2}{2}}}{\sqrt{2\pi}}$$

Rho (ρ):

The rho measures the sensitivity of an option value to interest rates. This refers to the rate of change the value of the option with respect to a unit change (say one percent) in the interest rate. It is calculated by

$$\sigma = tEe^{-rt} N(d_2)$$

Vega (λ):

Also known as Kappa or lambda, Vega measures the rate of change of value an option with respect to the volatility of the underlying asset. For Black and Scholes model, it is calculated by using the following formula.

$$Vega(\lambda) = S_0 \sqrt{t} Z(d_1)$$

Where,

$$Z(d_1) = \frac{e^{-\frac{d_1^2}{2}}}{\sqrt{2\Pi}}$$

A high value of Vega suggests that option value is very sensitive to small changes in volatility while a low Vega implies that volatility changes over time cause relatively insignificant impact on the option price.

CHAPTER 4

DATA ANALYSIS & INTERPRETATION

DATA ANALYSIS AND INTERPRETATION

4.1 HYPOTHESIS TESTING

Kolmogorov-Smirnov (K-S) has been performed for each company separately for each year. The detailed hypothesis testing for Reliance and ICICI have been presented from 1st April 2004 to 31st March 2008 and for other companies only the final results are presented.

Hypothesis testing for Reliance for the year 2004

TABLE 4.1.1: Calculation of K-S statistics for Reliance for the year April-2004 to Dec-2004

Date	Year 2004 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ Max/ $F_e - F_0$ /
	415.2861					
2-Apr-04	422.7199	1.01790	0.01774	0.000132	0.017610	
5-Apr-04	429.6681	1.01644	0.01630	0.000145	0.016158	
6-Apr-04	429.8923	1.00052	0.00052	0.000159	0.000362	
7-Apr-04	428.8463	0.99757	-0.00244	0.000175	0.002611	
8-Apr-04	428.0618	0.99817	-0.00183	0.000191	0.002022	
12-Apr-04	419.6941	0.98045	-0.01974	0.000209	0.019951	
13-Apr-04	428.3233	1.02056	0.02035	0.000229	0.020123	
15-Apr-04	422.3837	0.98613	-0.01396	0.000250	0.014214	
16-Apr-04	422.9814	1.00142	0.00141	0.000273	0.001141	
17-Apr-04	422.0102	0.99770	-0.00230	0.000298	0.002596	
19-Apr-04	412.858	0.97831	-0.02193	0.000324	0.022250	
20-Apr-04	412.6712	0.99955	-0.00045	0.000353	0.000805	
21-Apr-04	424.6251	1.02897	0.02856	0.000383	0.028172	
22-Apr-04	424.9239	1.00070	0.00070	0.000416	0.000287	
23-Apr-04	423.8406	0.99745	-0.00255	0.000451	0.003004	
27-Apr-04	403.0333	0.95091	-0.05034	0.000489	0.050827	
28-Apr-04	403.7431	1.00176	0.00176	0.000529	0.001230	
29-Apr-04	395.4501	0.97946	-0.02075	0.000573	0.021327	
30-Apr-04	393.3208	0.99462	-0.00540	0.000619	0.006018	
	394.815	1.00380	0.00379	0.000668	0.003124	
4-May-04	396.5334	1.00435	0.00434	0.000720	0.003623	
5-May-04	395.9731	0.99859	-0.00141	0.000775	0.002190	
6-May-04	403.8178	1.01981	0.01962	0.000834	0.018783	

7-May-04	397.7662	0.98501	-0.01510	0.000897	0.015997	
10-May-04	387.9042	0.97521	-0.02511	0.000963	0.026069	
11-May-04	366.2751	0.94424	-0.05737	0.001034	0.058407	
12-May-04	371.0567	1.01305	0.01297	0.001108	0.011862	
13-May-04	382.114	1.02980	0.02936	0.001186	0.028178	
14-May-04	356.4505	0.93284	-0.06952	0.001269	0.070792	
17-May-04	302.0602	0.84741	-0.16557	0.001356		
18-May-04	324.0255	1.07272	0.07020	0.001447	0.068749	
19-May-04	338.034	1.04323	0.04232	0.001543	0.040781	
20-May-04	331.1231	0.97956	-0.02066	0.001644	0.022301	
21-May-04	328.3588	0.99165	-0.00838	0.001750	0.010134	
24-May-04	339.08	1.03265	0.03213	0.001861	0.030268	
25-May-04	340.4621	1.00408	0.00407	0.001977	0.002091	
26-May-04	343.1518	1.00790	0.00787	0.002098	0.005771	
27-May-04	335.4938	0.97768	-0.02257	0.002224	0.024793	
28-May-04	323.2784	0.96359	-0.03709	0.002355	0.039444	
31-May-04	321.1118	0.99330	-0.00672	0.002491	0.009216	
	324.3991	1.01024	0.01019	0.002633	0.007552	
2-Jun-04	328.3214	1.01209	0.01202	0.002780	0.009238	
3-Jun-04	320.0284	0.97474	-0.02558	0.002933	0.028516	
4-Jun-04	323.8761	1.01202	0.01195	0.003090	0.008861	
7-Jun-04	332.3185	1.02607	0.02573	0.003253	0.022480	
8-Jun-04	340.1259	1.02349	0.02322	0.003421	0.019801	
9-Jun-04	336.8012	0.99023	-0.00982	0.003594	0.013417	
10-Jun-04	334.4852	0.99312	-0.00690	0.003772	0.010673	
11-Jun-04	322.5313	0.96426	-0.03639	0.003955	0.040348	
14-Jun-04	324.9221	1.00741	0.00739	0.004143	0.003242	
15-Jun-04	336.6518	1.03610	0.03546	0.004336	0.031128	
16-Jun-04	333.3271	0.99012	-0.00992	0.004532	0.014457	
17-Jun-04	339.4162	1.01827	0.01810	0.004733	0.013369	
18-Jun-04	332.2812	0.97898	-0.02125	0.004938	0.026183	
21-Jun-04	324.6232	0.97695	-0.02332	0.005147	0.028463	
22-Jun-04	322.5686	0.99367	-0.00635	0.005359	0.011708	
23-Jun-04	307.2527	0.95252	-0.04865	0.005574	0.054219	
24-Jun-04	316.0687	1.02869	0.02829	0.005792	0.022497	
25-Jun-04	322.4566	1.02021	0.02001	0.006013	0.013996	
28-Jun-04	330.0025	1.02340	0.02313	0.006235	0.016896	
29-Jun-04	331.1605	1.00351	0.00350	0.006460	0.002957	
30-Jun-04	320.9997	0.96932	-0.03116	0.006686	0.037849	
	327.649	1.02071	0.02050	0.006913	0.013590	
2-Jul-04	324.1749	0.98940	-0.01066	0.007141	0.017800	
5-Jul-04	321.5974	0.99205	-0.00798	0.007368	0.015351	
6-Jul-04	327.537	1.01847	0.01830	0.007596	0.010705	
7-Jul-04	327.537	1.00000	0.00000	0.007822	0.007822	

8-Jul-04	322.7554	0.98540	-0.01471	0.008048	0.022754	
9-Jul-04	327.9105	1.01597	0.01585	0.008271	0.007575	
12-Jul-04	326.3042	0.99510	-0.00491	0.008492	0.013403	
13-Jul-04	321.6347	0.98569	-0.01441	0.008711	0.023125	
14-Jul-04	312.2957	0.97096	-0.02947	0.008926	0.038392	
15-Jul-04	313.8647	1.00502	0.00501	0.009137	0.004126	
16-Jul-04	317.1147	1.01035	0.01030	0.009344	0.000957	
19-Jul-04	316.629	0.99847	-0.00153	0.009547	0.011079	
20-Jul-04	320.1779	1.01121	0.01115	0.009743	0.001402	
21-Jul-04	324.4738	1.01342	0.01333	0.009934	0.003394	
22-Jul-04	339.8644	1.04743	0.04634	0.010119	0.036223	
23-Jul-04	348.3442	1.02495	0.02464	0.010297	0.014348	
26-Jul-04	356.5999	1.02370	0.02342	0.010467	0.012956	
27-Jul-04	347.4851	0.97444	-0.02589	0.010630	0.036523	
28-Jul-04	351.8183	1.01247	0.01239	0.010784	0.001609	
29-Jul-04	354.508	1.00764	0.00762	0.010930	0.003314	
30-Jul-04	365.2665	1.03035	0.02990	0.011066	0.018830	
	369.1515	1.01064	0.01058	0.011193	0.000613	
3-Aug-04	365.64	0.99049	-0.00956	0.011311	0.020868	
4-Aug-04	368.5165	1.00787	0.00784	0.011418	0.003582	
5-Aug-04	375.8009	1.01977	0.01957	0.011514	0.008060	
6-Aug-04	369.0021	0.98191	-0.01826	0.011600	0.029857	
9-Aug-04	367.732	0.99656	-0.00345	0.011675	0.015123	
10-Aug-04	371.094	1.00914	0.00910	0.011739	0.002637	
11-Aug-04	358.5798	0.96628	-0.03430	0.011791	0.046095	
12-Aug-04	355.0683	0.99021	-0.00984	0.011831	0.021672	
13-Aug-04	356.3011	1.00347	0.00347	0.011860	0.008394	
16-Aug-04	357.7579	1.00409	0.00408	0.011877	0.007796	
17-Aug-04	358.3183	1.00157	0.00157	0.011882	0.010317	
18-Aug-04	351.5568	0.98113	-0.01905	0.011876	0.030926	
19-Aug-04	355.031	1.00988	0.00983	0.011857	0.002023	
20-Aug-04	346.2149	0.97517	-0.02515	0.011827	0.036972	
23-Aug-04	337.1375	0.97378	-0.02657	0.011785	0.038354	
24-Aug-04	338.8558	1.00510	0.00508	0.011731	0.006647	
25-Aug-04	342.1805	1.00981	0.00976	0.011666	0.001902	
26-Aug-04	344.1977	1.00590	0.00588	0.011590	0.005712	
27-Aug-04	342.3299	0.99457	-0.00544	0.011503	0.016944	
30-Aug-04	349.054	1.01964	0.01945	0.011405	0.008047	
31-Aug-04	355.3672	1.01809	0.01792	0.011296	0.006628	
	355.6286	1.00074	0.00074	0.011178	0.010442	
2-Sep-04	352.6028	0.99149	-0.00854	0.011050	0.019594	
3-Sep-04	353.985	1.00392	0.00391	0.010912	0.007000	
6-Sep-04	356.4505	1.00696	0.00694	0.010765	0.003824	
7-Sep-04	362.1659	1.01603	0.01591	0.010610	0.005298	

8-Sep-04	360.6343	0.99577	-0.00424	0.010446	0.014684	
9-Sep-04	362.8757	1.00622	0.00620	0.010275	0.004079	
10-Sep-04	364.482	1.00443	0.00442	0.010096	0.005679	
13-Sep-04	366.7981	1.00635	0.00633	0.009911	0.003576	
14-Sep-04	363.3613	0.99063	-0.00941	0.009719	0.019133	
15-Sep-04	364.3326	1.00267	0.00267	0.009521	0.006852	
16-Sep-04	366.7234	1.00656	0.00654	0.009319	0.002778	
17-Sep-04	380.3956	1.03728	0.03660	0.009111	0.027493	
20-Sep-04	375.0911	0.98606	-0.01404	0.008899	0.022942	
21-Sep-04	379.1629	1.01086	0.01080	0.008683	0.002114	
22-Sep-04	376.1371	0.99202	-0.00801	0.008465	0.016477	
23-Sep-04	373.5969	0.99325	-0.00678	0.008243	0.015019	
24-Sep-04	372.7003	0.99760	-0.00240	0.008019	0.010422	
27-Sep-04	370.1228	0.99308	-0.00694	0.007794	0.014734	
28-Sep-04	370.7952	1.00182	0.00182	0.007567	0.005752	
29-Sep-04	384.2433	1.03627	0.03563	0.007340	0.028287	
30-Sep-04	386.9329	1.00700	0.00698	0.007112	0.000136	
	398.4012	1.02964	0.02921	0.006884	0.022324	
4-Oct-04	408.0764	1.02429	0.02399	0.006657	0.017337	
5-Oct-04	403.3696	0.98847	-0.01160	0.006432	0.018033	
6-Oct-04	408.1885	1.01195	0.01188	0.006207	0.005669	
7-Oct-04	417.4901	1.02279	0.02253	0.005985	0.016547	
8-Oct-04	414.2401	0.99222	-0.00781	0.005764	0.013579	
9-Oct-04	413.7172	0.99874	-0.00126	0.005547	0.006810	
11-Oct-04	408.5994	0.98763	-0.01245	0.005332	0.017779	
12-Oct-04	399.7834	0.97842	-0.02181	0.005120	0.026932	
14-Oct-04	405.6109	1.01458	0.01447	0.004912	0.009560	
15-Oct-04	408.1511	1.00626	0.00624	0.004708	0.001536	
18-Oct-04	411.4384	1.00805	0.00802	0.004507	0.003515	
19-Oct-04	418.2746	1.01662	0.01648	0.004311	0.012168	
20-Oct-04	409.5333	0.97910	-0.02112	0.004119	0.025239	
21-Oct-04	402.8466	0.98367	-0.01646	0.003932	0.020394	
25-Oct-04	401.0535	0.99555	-0.00446	0.003750	0.008211	
26-Oct-04	412.2229	1.02785	0.02747	0.003572	0.023897	
27-Oct-04	403.8925	0.97979	-0.02042	0.003400	0.023815	
28-Oct-04	402.3983	0.99630	-0.00371	0.003232	0.006939	
29-Oct-04	395.338	0.98245	-0.01770	0.003070	0.020771	
	395.861	1.00132	0.00132	0.002913	0.001591	
2-Nov-04	405.9845	1.02557	0.02525	0.002761	0.022490	
3-Nov-04	406.2086	1.00055	0.00055	0.002615	0.002063	
4-Nov-04	401.427	0.98823	-0.01184	0.002474	0.014315	
5-Nov-04	403.7058	1.00568	0.00566	0.002338	0.003323	
8-Nov-04	405.2	1.00370	0.00369	0.002207	0.001487	
9-Nov-04	403.4443	0.99567	-0.00434	0.002082	0.006424	

H_0 : Reliance share price for the year 2004 with mean = 370.8321 follows normal distribution.

H_a : Reliance share price for the year 2004 with mean = 370.8321 does not follow normal distribution.

Level of significance (α) = 0.01

Sample size (n) = 192

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.1669247$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{192}} = 0.117635$$

Since $D_n > D_{table}$, the null hypothesis is rejected. Hence, the data are not described by normal distribution.

Hypothesis testing for Reliance for the year 2005

TABLE 4.1.2: Calculation of K-S statistics for Reliance for the year 2005

Date	Year 2005 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ Max/ $F_e - F_0$ /
	406.321					
4-Jan-05	396.907	0.9768	-0.0234	5.0140E-05	0.02349	
5-Jan-05	395.936	0.9976	-0.0025	5.3883E-05	0.00250	
6-Jan-05	393.134	0.9929	-0.0071	5.7873E-05	0.00716	
7-Jan-05	405.125	1.0305	0.0300	6.2122E-05	0.02998	
10-Jan-05	399.074	0.9851	-0.0151	6.6644E-05	0.01512	
11-Jan-05	392.798	0.9843	-0.0159	7.1454E-05	0.01592	
12-Jan-05	387.157	0.9856	-0.0145	7.6566E-05	0.01454	
13-Jan-05	388.577	1.0037	0.0037	8.1997E-05	0.00358	
14-Jan-05	383.944	0.9881	-0.0120	8.7762E-05	0.01208	
17-Jan-05	382.189	0.9954	-0.0046	9.3877E-05	0.00468	
18-Jan-05	381.666	0.9986	-0.0014	1.0036E-04	0.00147	
19-Jan-05	383.795	1.0056	0.0056	1.0723E-04	0.00546	
20-Jan-05	382.151	0.9957	-0.0043	1.1450E-04	0.00441	
24-Jan-05	378.565	0.9906	-0.0094	1.2220E-04	0.00955	
25-Jan-05	374.755	0.9899	-0.0101	1.3033E-04	0.01025	
27-Jan-05	378.117	1.0090	0.0089	1.3893E-04	0.00879	
28-Jan-05	390.183	1.0319	0.0314	1.4801E-04	0.03126	
31-Jan-05	397.691	1.0192	0.0191	1.5759E-04	0.01890	
	405.648	1.0200	0.0198	1.6769E-04	0.01964	
2-Feb-05	398.625	0.9827	-0.0175	1.7834E-04	0.01764	
3-Feb-05	404.154	1.0139	0.0138	1.8955E-04	0.01358	
4-Feb-05	401.315	0.9930	-0.0070	2.0135E-04	0.00725	
7-Feb-05	396.235	0.9873	-0.0127	2.1376E-04	0.01295	
8-Feb-05	398.812	1.0065	0.0065	2.2680E-04	0.00626	
9-Feb-05	401.315	1.0063	0.0063	2.4050E-04	0.00602	
10-Feb-05	405.312	1.0100	0.0099	2.5488E-04	0.00966	
11-Feb-05	408.973	1.0090	0.0090	2.6997E-04	0.00872	
14-Feb-05	406.097	0.9930	-0.0071	2.8578E-04	0.00734	
15-Feb-05	402.847	0.9920	-0.0080	3.0233E-04	0.00834	
16-Feb-05	399.746	0.9923	-0.0077	3.1967E-04	0.00805	
17-Feb-05	400.344	1.0015	0.0015	3.3780E-04	0.00116	
18-Feb-05	399.111	0.9969	-0.0031	3.5675E-04	0.00344	
21-Feb-05	399.335	1.0006	0.0006	3.7654E-04	0.00018	
22-Feb-05	403.108	1.0094	0.0094	3.9721E-04	0.00901	
23-Feb-05	409.645	1.0162	0.0161	4.1876E-04	0.01567	
24-Feb-05	408.674	0.9976	-0.0024	4.4123E-04	0.00282	
25-Feb-05	403.556	0.9875	-0.0126	4.6463E-04	0.01307	
28-Feb-05	415.585	1.0298	0.0294	4.8899E-04	0.02888	

	409.085	0.9844	-0.0158	5.1433E-04	0.01628	
2-Mar-05	410.654	1.0038	0.0038	5.4067E-04	0.00329	
3-Mar-05	417.341	1.0163	0.0162	5.6802E-04	0.01558	
4-Mar-05	427.389	1.0241	0.0238	5.9642E-04	0.02320	
7-Mar-05	438.484	1.0260	0.0256	6.2587E-04	0.02500	
8-Mar-05	441.622	1.0072	0.0071	6.5639E-04	0.00647	
9-Mar-05	439.194	0.9945	-0.0055	6.8800E-04	0.00620	
10-Mar-05	443.789	1.0105	0.0104	7.2071E-04	0.00969	
11-Mar-05	439.269	0.9898	-0.0102	7.5455E-04	0.01099	
14-Mar-05	432.582	0.9848	-0.0153	7.8951E-04	0.01613	
15-Mar-05	426.493	0.9859	-0.0142	8.2561E-04	0.01500	
16-Mar-05	429.070	1.0060	0.0060	8.6286E-04	0.00516	
17-Mar-05	420.254	0.9795	-0.0208	9.0127E-04	0.02166	
18-Mar-05	427.240	1.0166	0.0165	9.4084E-04	0.01554	
21-Mar-05	418.163	0.9788	-0.0215	9.8157E-04	0.02246	
22-Mar-05	406.956	0.9732	-0.0272	1.0235E-03	0.02819	
23-Mar-05	412.970	1.0148	0.0147	1.0666E-03	0.01360	
24-Mar-05	418.387	1.0131	0.0130	1.1108E-03	0.01192	
28-Mar-05	422.944	1.0109	0.0108	1.1562E-03	0.00968	
29-Mar-05	410.280	0.9701	-0.0304	1.2028E-03	0.03160	
30-Mar-05	405.798	0.9891	-0.0110	1.2505E-03	0.01224	
31-Mar-05	407.964	1.0053	0.0053	1.2993E-03	0.00403	
	421.823	1.0340	0.0334	1.3493E-03	0.03206	
4-Apr-05	422.160	1.0008	0.0008	1.4004E-03	0.00060	
5-Apr-05	415.436	0.9841	-0.0161	1.4526E-03	0.01751	
6-Apr-05	427.053	1.0280	0.0276	1.5058E-03	0.02608	
7-Apr-05	422.458	0.9892	-0.0108	1.5601E-03	0.01238	
8-Apr-05	416.033	0.9848	-0.0153	1.6154E-03	0.01694	
11-Apr-05	408.936	0.9829	-0.0172	1.6717E-03	0.01888	
12-Apr-05	409.944	1.0025	0.0025	1.7290E-03	0.00073	
13-Apr-05	407.591	0.9943	-0.0058	1.7872E-03	0.00754	
15-Apr-05	395.786	0.9710	-0.0294	1.8462E-03	0.03124	
18-Apr-05	387.419	0.9789	-0.0214	1.9061E-03	0.02327	
19-Apr-05	384.019	0.9912	-0.0088	1.9668E-03	0.01078	
20-Apr-05	396.010	1.0312	0.0307	2.0283E-03	0.02872	
21-Apr-05	405.611	1.0242	0.0240	2.0905E-03	0.02186	
22-Apr-05	409.048	1.0085	0.0084	2.1533E-03	0.00628	
25-Apr-05	408.450	0.9985	-0.0015	2.2167E-03	0.00368	
26-Apr-05	408.786	1.0008	0.0008	2.2807E-03	0.00146	
27-Apr-05	402.697	0.9851	-0.0150	2.3451E-03	0.01735	
28-Apr-05	406.321	1.0090	0.0090	2.4100E-03	0.00655	
29-Apr-05	394.516	0.9709	-0.0295	2.4752E-03	0.03196	
	398.849	1.0110	0.0109	2.5408E-03	0.00838	
3-May-05	404.154	1.0133	0.0132	2.6065E-03	0.01061	
4-May-05	404.453	1.0007	0.0007	2.6724E-03	0.00193	
5-May-05	404.303	0.9996	-0.0004	2.7384E-03	0.00311	
6-May-05	410.243	1.0147	0.0146	2.8043E-03	0.01178	
9-May-05	413.456	1.0078	0.0078	2.8702E-03	0.00493	

10-May-05	406.620	0.9835	-0.0167	2.9359E-03	0.01961	
11-May-05	405.312	0.9968	-0.0032	3.0014E-03	0.00622	
12-May-05	402.735	0.9936	-0.0064	3.0666E-03	0.00945	
13-May-05	400.643	0.9948	-0.0052	3.1313E-03	0.00834	
16-May-05	403.631	1.0075	0.0074	3.1956E-03	0.00424	
17-May-05	392.947	0.9735	-0.0268	3.2593E-03	0.03009	
18-May-05	395.674	1.0069	0.0069	3.3223E-03	0.00359	
19-May-05	391.714	0.9900	-0.0101	3.3846E-03	0.01344	
20-May-05	388.838	0.9927	-0.0074	3.4461E-03	0.01082	
23-May-05	396.832	1.0206	0.0204	3.5066E-03	0.01684	
24-May-05	396.720	0.9997	-0.0003	3.5661E-03	0.00385	
25-May-05	396.459	0.9993	-0.0007	3.6246E-03	0.00428	
26-May-05	396.272	0.9995	-0.0005	3.6818E-03	0.00415	
27-May-05	396.907	1.0016	0.0016	3.7378E-03	0.00214	
30-May-05	393.582	0.9916	-0.0084	3.7924E-03	0.01220	
31-May-05	399.709	1.0156	0.0154	3.8456E-03	0.01160	
	404.191	1.0112	0.0112	3.8973E-03	0.00726	
2-Jun-05	395.861	0.9794	-0.0208	3.9474E-03	0.02477	
3-Jun-05	413.269	1.0440	0.0430	3.9958E-03	0.03904	
4-Jun-05	414.800	1.0037	0.0037	4.0424E-03	0.00034	
6-Jun-05	412.634	0.9948	-0.0052	4.0872E-03	0.00932	
7-Jun-05	409.309	0.9919	-0.0081	4.1301E-03	0.01222	
8-Jun-05	417.229	1.0193	0.0192	4.1711E-03	0.01499	
9-Jun-05	417.677	1.0011	0.0011	4.2100E-03	0.00314	
10-Jun-05	423.280	1.0134	0.0133	4.2468E-03	0.00908	
13-Jun-05	425.559	1.0054	0.0054	4.2814E-03	0.00109	
14-Jun-05	428.884	1.0078	0.0078	4.3138E-03	0.00347	
15-Jun-05	429.556	1.0016	0.0016	4.3439E-03	0.00278	
16-Jun-05	440.987	1.0266	0.0263	4.3717E-03	0.02189	
17-Jun-05	448.458	1.0169	0.0168	4.3971E-03	0.01240	
20-Jun-05	471.059	1.0504	0.0492	4.4201E-03	0.04475	
21-Jun-05	482.751	1.0248	0.0245	4.4407E-03	0.02008	
22-Jun-05	489.027	1.0130	0.0129	4.4587E-03	0.00846	
23-Jun-05	486.076	0.9940	-0.0061	4.4742E-03	0.01053	
24-Jun-05	489.101	1.0062	0.0062	4.4872E-03	0.00172	
27-Jun-05	484.619	0.9908	-0.0092	4.4976E-03	0.01371	
28-Jun-05	470.349	0.9706	-0.0299	4.5054E-03	0.03439	
29-Jun-05	479.538	1.0195	0.0193	4.5106E-03	0.01484	
30-Jun-05	480.061	1.0011	0.0011	4.5131E-03	0.00342	
	478.231	0.9962	-0.0038	4.5131E-03	0.00833	
4-Jul-05	481.443	1.0067	0.0067	4.5104E-03	0.00218	
5-Jul-05	476.699	0.9901	-0.0099	4.5051E-03	0.01441	
6-Jul-05	482.041	1.0112	0.0111	4.4972E-03	0.00665	
7-Jul-05	458.694	0.9516	-0.0496	4.4867E-03		
8-Jul-05	463.438	1.0103	0.0103	4.4737E-03	0.00582	
11-Jul-05	473.599	1.0219	0.0217	4.4581E-03	0.01723	
12-Jul-05	476.886	1.0069	0.0069	4.4399E-03	0.00248	
13-Jul-05	471.395	0.9885	-0.0116	4.4193E-03	0.01600	

14-Jul-05	479.277	1.0167	0.0166	4.3962E-03	0.01219	
15-Jul-05	498.067	1.0392	0.0385	4.3707E-03	0.03409	
18-Jul-05	494.443	0.9927	-0.0073	4.3428E-03	0.01164	
19-Jul-05	496.573	1.0043	0.0043	4.3126E-03	0.00002	
20-Jul-05	507.369	1.0217	0.0215	4.2801E-03	0.01723	
21-Jul-05	506.733	0.9987	-0.0013	4.2454E-03	0.00550	
22-Jul-05	515.176	1.0167	0.0165	4.2086E-03	0.01231	
25-Jul-05	513.682	0.9971	-0.0029	4.1696E-03	0.00707	
26-Jul-05	516.371	1.0052	0.0052	4.1286E-03	0.00109	
27-Jul-05	522.124	1.0111	0.0111	4.0856E-03	0.00699	
29-Jul-05	525.486	1.0064	0.0064	4.0407E-03	0.00238	
	528.773	1.0063	0.0062	3.9940E-03	0.00224	
2-Aug-05	553.951	1.0476	0.0465	3.9455E-03	0.04257	
3-Aug-05	533.817	0.9637	-0.0370	3.8954E-03	0.04092	
4-Aug-05	544.799	1.0206	0.0204	3.8437E-03	0.01652	
5-Aug-05	542.222	0.9953	-0.0047	3.7904E-03	0.00853	
8-Aug-05	531.426	0.9801	-0.0201	3.7357E-03	0.02385	
9-Aug-05	528.699	0.9949	-0.0051	3.6797E-03	0.00882	
10-Aug-05	537.515	1.0167	0.0165	3.6224E-03	0.01291	
11-Aug-05	536.133	0.9974	-0.0026	3.5639E-03	0.00614	
12-Aug-05	526.121	0.9813	-0.0188	3.5044E-03	0.02235	
16-Aug-05	522.834	0.9938	-0.0063	3.4438E-03	0.00971	
17-Aug-05	534.153	1.0216	0.0214	3.3823E-03	0.01804	
18-Aug-05	529.222	0.9908	-0.0093	3.3200E-03	0.01259	
19-Aug-05	527.279	0.9963	-0.0037	3.2569E-03	0.00693	
22-Aug-05	522.460	0.9909	-0.0092	3.1932E-03	0.01237	
23-Aug-05	511.889	0.9798	-0.0204	3.1289E-03	0.02357	
24-Aug-05	519.136	1.0142	0.0141	3.0641E-03	0.01099	
25-Aug-05	520.256	1.0022	0.0022	2.9990E-03	0.00084	
26-Aug-05	522.049	1.0034	0.0034	2.9335E-03	0.00051	
29-Aug-05	523.245	1.0023	0.0023	2.8677E-03	0.00058	
30-Aug-05	528.661	1.0104	0.0103	2.8019E-03	0.00750	
31-Aug-05	537.477	1.0167	0.0165	2.7359E-03	0.01380	
	542.931	1.0101	0.0101	2.6699E-03	0.00743	
2-Sep-05	545.770	1.0052	0.0052	2.6040E-03	0.00261	
5-Sep-05	545.658	0.9998	-0.0002	2.5383E-03	0.00274	
6-Sep-05	544.575	0.9980	-0.0020	2.4728E-03	0.00446	
8-Sep-05	551.859	1.0134	0.0133	2.4076E-03	0.01088	
9-Sep-05	554.101	1.0041	0.0041	2.3427E-03	0.00171	
12-Sep-05	562.207	1.0146	0.0145	2.2783E-03	0.01225	
13-Sep-05	562.058	0.9997	-0.0003	2.2143E-03	0.00248	
14-Sep-05	553.578	0.9849	-0.0152	2.1509E-03	0.01735	
15-Sep-05	568.408	1.0268	0.0264	2.0881E-03	0.02435	
16-Sep-05	570.836	1.0043	0.0043	2.0260E-03	0.00224	
19-Sep-05	570.948	1.0002	0.0002	1.9646E-03	0.00177	
20-Sep-05	581.221	1.0180	0.0178	1.9039E-03	0.01593	
21-Sep-05	584.434	1.0055	0.0055	1.8440E-03	0.00367	
22-Sep-05	563.664	0.9645	-0.0362	1.7850E-03	0.03797	

23-Sep-05	558.658	0.9911	-0.0089	1.7268E-03	0.01065	
26-Sep-05	582.940	1.0435	0.0425	1.6696E-03	0.04088	
27-Sep-05	588.730	1.0099	0.0099	1.6133E-03	0.00827	
28-Sep-05	598.031	1.0158	0.0157	1.5581E-03	0.01412	
29-Sep-05	603.896	1.0098	0.0098	1.5038E-03	0.00826	
30-Sep-05	592.876	0.9818	-0.0184	1.4506E-03	0.01987	
	593.399	1.0009	0.0009	1.3985E-03	0.00052	
4-Oct-05	602.664	1.0156	0.0155	1.3474E-03	0.01414	
5-Oct-05	599.227	0.9943	-0.0057	1.2975E-03	0.00702	
6-Oct-05	590.859	0.9860	-0.0141	1.2487E-03	0.01531	
7-Oct-05	589.029	0.9969	-0.0031	1.2010E-03	0.00430	
10-Oct-05	584.957	0.9931	-0.0069	1.1545E-03	0.00809	
11-Oct-05	589.327	1.0075	0.0074	1.1091E-03	0.00633	
13-Oct-05	579.204	0.9828	-0.0173	1.0649E-03	0.01839	
14-Oct-05	570.687	0.9853	-0.0148	1.0219E-03	0.01584	
17-Oct-05	576.029	1.0094	0.0093	9.8003E-04	0.00834	
18-Oct-05	565.158	0.9811	-0.0191	9.3934E-04	0.01999	
19-Oct-05	558.322	0.9879	-0.0122	8.9981E-04	0.01307	
20-Oct-05	558.957	1.0011	0.0011	8.6145E-04	0.00028	
21-Oct-05	576.178	1.0308	0.0303	8.2424E-04	0.02952	
24-Oct-05	565.644	0.9817	-0.0185	7.8818E-04	0.01924	
25-Oct-05	573.489	1.0139	0.0138	7.5326E-04	0.01302	
26-Oct-05	570.463	0.9947	-0.0053	7.1947E-04	0.00601	
27-Oct-05	560.563	0.9826	-0.0175	6.8680E-04	0.01819	
28-Oct-05	554.063	0.9884	-0.0117	6.5523E-04	0.01232	
31-Oct-05	569.678	1.0282	0.0278	6.2475E-04	0.02717	
	572.443	1.0049	0.0048	5.9534E-04	0.00425	
2-Nov-05	581.034	1.0150	0.0149	5.6698E-04	0.01433	
7-Nov-05	588.730	1.0132	0.0132	5.3967E-04	0.01262	
8-Nov-05	590.560	1.0031	0.0031	5.1337E-04	0.00259	
9-Nov-05	591.083	1.0009	0.0009	4.8807E-04	0.00040	
10-Nov-05	587.011	0.9931	-0.0069	4.6374E-04	0.00738	
11-Nov-05	594.258	1.0123	0.0123	4.4037E-04	0.01183	
14-Nov-05	596.537	1.0038	0.0038	4.1794E-04	0.00341	
16-Nov-05	610.732	1.0238	0.0235	3.9642E-04	0.02312	
17-Nov-05	619.586	1.0145	0.0144	3.7579E-04	0.01402	
18-Nov-05	617.232	0.9962	-0.0038	3.5603E-04	0.00416	
21-Nov-05	619.399	1.0035	0.0035	3.3711E-04	0.00317	
22-Nov-05	612.115	0.9882	-0.0118	3.1901E-04	0.01215	
23-Nov-05	621.603	1.0155	0.0154	3.0170E-04	0.01508	
24-Nov-05	630.643	1.0145	0.0144	2.8517E-04	0.01415	
25-Nov-05	629.560	0.9983	-0.0017	2.6939E-04	0.00199	
26-Nov-05	631.988	1.0039	0.0038	2.5433E-04	0.00360	
28-Nov-05	633.482	1.0024	0.0024	2.3998E-04	0.00212	
29-Nov-05	633.669	1.0003	0.0003	2.2631E-04	0.00007	
30-Nov-05	622.126	0.9818	-0.0184	2.1329E-04	0.01860	
	627.244	1.0082	0.0082	2.0090E-04	0.00799	
2-Dec-05	627.132	0.9998	-0.0002	1.8912E-04	0.00037	

5-Dec-05	627.767	1.0010	0.0010	1.7793E-04	0.00083	
6-Dec-05	625.152	0.9958	-0.0042	1.6730E-04	0.00434	
7-Dec-05	630.158	1.0080	0.0080	1.5722E-04	0.00782	
8-Dec-05	632.175	1.0032	0.0032	1.4766E-04	0.00305	
9-Dec-05	645.025	1.0203	0.0201	1.3860E-04	0.01998	
12-Dec-05	644.913	0.9998	-0.0002	1.3002E-04	0.00030	
13-Dec-05	651.189	1.0097	0.0097	1.2190E-04	0.00956	
14-Dec-05	643.979	0.9889	-0.0111	1.1422E-04	0.01125	
15-Dec-05	631.502	0.9806	-0.0196	1.0697E-04	0.01967	
16-Dec-05	634.566	1.0049	0.0048	1.0011E-04	0.00474	
19-Dec-05	640.393	1.0092	0.0091	9.3642E-05	0.00905	
20-Dec-05	638.451	0.9970	-0.0030	8.7540E-05	0.00313	
21-Dec-05	642.634	1.0066	0.0065	8.1788E-05	0.00645	
22-Dec-05	639.497	0.9951	-0.0049	7.6370E-05	0.00497	
23-Dec-05	629.747	0.9848	-0.0154	7.1269E-05	0.01543	
26-Dec-05	622.126	0.9879	-0.0122	6.6470E-05	0.01224	
27-Dec-05	647.677	1.0411	0.0403	6.1958E-05	0.04019	
28-Dec-05	651.861	1.0065	0.0064	5.7719E-05	0.00638	
29-Dec-05	665.758	1.0213	0.0211	5.3739E-05	0.02104	
30-Dec-05	664.413	0.9980	-0.0020	5.0004E-05	0.00207	

H_0 : The Reliance share price for the year 2005 with mean 490.5942 follows normal distribution.

H_a : The share price for the year 2005 with mean 490.5942 does not follow normal distribution.

Level of significance (α) = 0.01

Sample size (n) = 251

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.054134$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{251}} = 0.102885$$

Since $D_n < D_{table}$, the null hypothesis is accepted. Hence, the data are described by normal distribution.

Hypothesis testing for Reliance for the year 2006

TABLE 4.1.3: Calculation of K-S statistics for Reliance for the year 2006

Date	Year 2006 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm $\ln(PR)$ F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ $\text{Max}/F_e - F_0/$
	670.801					
3-Jan-06	687.349	1.02467	0.02437	2.242E-05	0.02435	
4-Jan-06	694.709	1.01071	0.01065	2.410E-05	0.01063	
5-Jan-06	688.620	0.99124	-0.00880	2.589E-05	0.00883	
6-Jan-06	687.872	0.99892	-0.00109	2.780E-05	0.00111	
9-Jan-06	679.990	0.98854	-0.01152	2.984E-05	0.01155	
10-Jan-06	667.999	0.98237	-0.01779	3.200E-05	0.01782	
12-Jan-06	662.582	0.99189	-0.00814	3.430E-05	0.00818	
13-Jan-06	661.312	0.99808	-0.00192	3.674E-05	0.00196	
16-Jan-06	652.198	0.98622	-0.01388	3.933E-05	0.01392	
17-Jan-06	693.700	1.06363	0.06169	4.209E-05	0.06165	
18-Jan-06	693.700	1.00000	0.00000	4.500E-05	0.00005	
19-Jan-06	704.500	1.01557	0.01545	4.810E-05	0.01540	
20-Jan-06	704.200	0.99957	-0.00043	5.137E-05	0.00048	
23-Jan-06	702.350	0.99737	-0.00263	5.483E-05	0.00269	
24-Jan-06	693.450	0.98733	-0.01275	5.850E-05	0.01281	
25-Jan-06	688.400	0.99272	-0.00731	6.237E-05	0.00737	
27-Jan-06	698.650	1.01489	0.01478	6.646E-05	0.01471	
30-Jan-06	711.050	1.01775	0.01759	7.078E-05	0.01752	
31-Jan-06	713.900	1.00401	0.00400	7.533E-05	0.00392	
	704.800	0.98725	-0.01283	8.013E-05	0.01291	
2-Feb-06	708.650	1.00546	0.00545	8.519E-05	0.00536	
3-Feb-06	696.600	0.98300	-0.01715	9.051E-05	0.01724	
6-Feb-06	720.350	1.03409	0.03353	9.611E-05	0.03343	
7-Feb-06	720.550	1.00028	0.00028	1.020E-04	0.00018	
8-Feb-06	716.500	0.99438	-0.00564	1.082E-04	0.00574	
10-Feb-06	719.600	1.00433	0.00432	1.147E-04	0.00420	
13-Feb-06	716.800	0.99611	-0.00390	1.215E-04	0.00402	
14-Feb-06	714.200	0.99637	-0.00363	1.286E-04	0.00376	
15-Feb-06	701.800	0.98264	-0.01751	1.361E-04	0.01765	
16-Feb-06	697.050	0.99323	-0.00679	1.439E-04	0.00694	
17-Feb-06	693.150	0.99440	-0.00561	1.521E-04	0.00576	
20-Feb-06	702.050	1.01284	0.01276	1.606E-04	0.01260	
21-Feb-06	697.750	0.99388	-0.00614	1.696E-04	0.00631	
22-Feb-06	703.950	1.00889	0.00885	1.789E-04	0.00867	
23-Feb-06	700.350	0.99489	-0.00513	1.887E-04	0.00532	
24-Feb-06	702.850	1.00357	0.00356	1.988E-04	0.00336	
27-Feb-06	700.100	0.99609	-0.00392	2.094E-04	0.00413	

28-Feb-06	708.850	1.01250	0.01242	2.204E-04	0.01220	
	708.250	0.99915	-0.00085	2.318E-04	0.00108	
2-Mar-06	713.150	1.00692	0.00689	2.437E-04	0.00665	
3-Mar-06	715.750	1.00365	0.00364	2.561E-04	0.00338	
6-Mar-06	732.200	1.02298	0.02272	2.689E-04	0.02245	
7-Mar-06	732.500	1.00041	0.00041	2.822E-04	0.00013	
8-Mar-06	719.900	0.98280	-0.01735	2.960E-04	0.01765	
9-Mar-06	726.750	1.00952	0.00947	3.103E-04	0.00916	
10-Mar-06	731.450	1.00647	0.00645	3.251E-04	0.00612	
13-Mar-06	735.350	1.00533	0.00532	3.404E-04	0.00498	
14-Mar-06	742.500	1.00972	0.00968	3.562E-04	0.00932	
16-Mar-06	768.500	1.03502	0.03442	3.725E-04	0.03405	
17-Mar-06	775.050	1.00852	0.00849	3.893E-04	0.00810	
20-Mar-06	778.050	1.00387	0.00386	4.067E-04	0.00346	
21-Mar-06	780.450	1.00308	0.00308	4.245E-04	0.00266	
22-Mar-06	772.500	0.98981	-0.01024	4.429E-04	0.01068	
23-Mar-06	777.350	1.00628	0.00626	4.619E-04	0.00580	
24-Mar-06	782.200	1.00624	0.00622	4.813E-04	0.00574	
27-Mar-06	794.350	1.01553	0.01541	5.013E-04	0.01491	
28-Mar-06	790.850	0.99559	-0.00442	5.218E-04	0.00494	
29-Mar-06	793.750	1.00367	0.00366	5.429E-04	0.00312	
30-Mar-06	795.700	1.00246	0.00245	5.644E-04	0.00189	
31-Mar-06	795.350	0.99956	-0.00044	5.865E-04	0.00103	
	828.800	1.04206	0.04120	6.090E-04	0.04059	
4-Apr-06	836.750	1.00959	0.00955	6.321E-04	0.00891	
5-Apr-06	840.500	1.00448	0.00447	6.556E-04	0.00382	
7-Apr-06	833.450	0.99161	-0.00842	6.797E-04	0.00910	
10-Apr-06	836.250	1.00336	0.00335	7.042E-04	0.00265	
12-Apr-06	828.750	0.99103	-0.00901	7.291E-04	0.00974	
13-Apr-06	846.500	1.02142	0.02119	7.545E-04	0.02044	
17-Apr-06	851.450	1.00585	0.00583	7.804E-04	0.00505	
18-Apr-06	891.300	1.04680	0.04574	8.066E-04	0.04493	
19-Apr-06	921.800	1.03422	0.03365	8.332E-04	0.03281	
20-Apr-06	992.550	1.07675	0.07395	8.602E-04	0.07309	
21-Apr-06	974.950	0.98227	-0.01789	8.876E-04	0.01878	
24-Apr-06	977.200	1.00231	0.00231	9.153E-04	0.00139	
25-Apr-06	955.100	0.97738	-0.02288	9.433E-04	0.02382	
26-Apr-06	978.650	1.02466	0.02436	9.716E-04	0.02339	
27-Apr-06	997.950	1.01972	0.01953	1.000E-03	0.01853	
28-Apr-06	1008.900	1.01097	0.01091	1.029E-03	0.00988	
29-Apr-06	1022.950	1.01393	0.01383	1.058E-03	0.01277	
	1031.150	1.00802	0.00798	1.087E-03	0.00690	
3-May-06	1035.550	1.00427	0.00426	1.116E-03	0.00314	
4-May-06	1080.200	1.04312	0.04221	1.146E-03	0.04107	
5-May-06	1099.250	1.01764	0.01748	1.175E-03	0.01631	
8-May-06	1155.000	1.05072	0.04947	1.205E-03	0.04827	
9-May-06	1154.100	0.99922	-0.00078	1.235E-03	0.00201	
9-May-06	1169.800	1.01360	0.01351	1.264E-03	0.01225	

10-May-06	1110.250	0.94909	-0.05225	1.294E-03	0.05354	
11-May-06	1066.850	0.96091	-0.03987	1.323E-03	0.04120	
12-May-06	1021.650	0.95763	-0.04329	1.353E-03	0.04464	
15-May-06	1043.700	1.02158	0.02135	1.382E-03	0.01997	
16-May-06	1086.200	1.04072	0.03991	1.411E-03	0.03850	
17-May-06	1004.800	0.92506	-0.07790	1.440E-03	0.07934	
18-May-06	978.100	0.97343	-0.02693	1.468E-03	0.02840	
19-May-06	929.400	0.95021	-0.05107	1.496E-03	0.05257	
22-May-06	967.100	1.04056	0.03976	1.524E-03	0.03824	
23-May-06	938.550	0.97048	-0.02997	1.552E-03	0.03152	
24-May-06	950.000	1.01220	0.01213	1.579E-03	0.01055	
25-May-06	958.500	1.00895	0.00891	1.605E-03	0.00730	
26-May-06	955.950	0.99734	-0.00266	1.631E-03	0.00430	
29-May-06	954.950	0.99895	-0.00105	1.657E-03	0.00270	
30-May-06	954.150	0.99916	-0.00084	1.682E-03	0.00252	
	925.350	0.96982	-0.03065	1.706E-03	0.03235	
2-Jun-06	958.100	1.03539	0.03478	1.729E-03	0.03305	
5-Jun-06	925.350	0.96582	-0.03478	1.752E-03	0.03653	
6-Jun-06	906.500	0.97963	-0.02058	1.775E-03	0.02236	
7-Jun-06	893.000	0.98511	-0.01500	1.796E-03	0.01680	
8-Jun-06	825.700	0.92464	-0.07836	1.817E-03	0.08017	
9-Jun-06	922.750	1.11754	0.11113	1.836E-03		
12-Jun-06	901.050	0.97648	-0.02380	1.855E-03	0.02565	
13-Jun-06	858.650	0.95294	-0.04820	1.873E-03	0.05007	
14-Jun-06	858.450	0.99977	-0.00023	1.890E-03	0.00212	
15-Jun-06	895.350	1.04298	0.04209	1.906E-03	0.04018	
16-Jun-06	921.600	1.02932	0.02890	1.921E-03	0.02698	
19-Jun-06	933.700	1.01313	0.01304	1.935E-03	0.01111	
20-Jun-06	925.000	0.99068	-0.00936	1.948E-03	0.01131	
21-Jun-06	964.150	1.04232	0.04145	1.960E-03	0.03949	
22-Jun-06	975.100	1.01136	0.01129	1.971E-03	0.00932	
23-Jun-06	1011.900	1.03774	0.03705	1.981E-03	0.03506	
25-Jun-06	1007.200	0.99536	-0.00466	1.990E-03	0.00665	
26-Jun-06	981.200	0.97419	-0.02615	1.997E-03	0.02815	
27-Jun-06	985.750	1.00464	0.00463	2.004E-03	0.00262	
28-Jun-06	1000.950	1.01542	0.01530	2.009E-03	0.01329	
29-Jun-06	1008.350	1.00739	0.00737	2.013E-03	0.00535	
30-Jun-06	1059.850	1.05107	0.04981	2.016E-03	0.04780	
	1071.100	1.01061	0.01056	2.018E-03	0.00854	
4-Jul-06	1074.700	1.00336	0.00336	2.018E-03	0.00134	
5-Jul-06	1094.150	1.01810	0.01794	2.018E-03	0.01592	
6-Jul-06	1083.250	0.99004	-0.01001	2.016E-03	0.01203	
7-Jul-06	1031.600	0.95232	-0.04885	2.013E-03	0.05087	
10-Jul-06	1043.300	1.01134	0.01128	2.009E-03	0.00927	
11-Jul-06	1049.200	1.00566	0.00564	2.003E-03	0.00364	
12-Jul-06	1098.050	1.04656	0.04551	1.997E-03	0.04351	
13-Jul-06	1075.450	0.97942	-0.02080	1.989E-03	0.02279	
14-Jul-06	1069.100	0.99410	-0.00592	1.981E-03	0.00790	

17-Jul-06	1031.400	0.96474	-0.03590	1.971E-03	0.03787	
18-Jul-06	1004.400	0.97382	-0.02653	1.960E-03	0.02849	
19-Jul-06	983.050	0.97874	-0.02149	1.948E-03	0.02343	
20-Jul-06	995.400	1.01256	0.01248	1.935E-03	0.01055	
21-Jul-06	967.550	0.97202	-0.02838	1.920E-03	0.03030	
24-Jul-06	971.500	1.00408	0.00407	1.905E-03	0.00217	
25-Jul-06	987.800	1.01678	0.01664	1.889E-03	0.01475	
26-Jul-06	999.900	1.01225	0.01218	1.872E-03	0.01030	
27-Jul-06	1000.100	1.00020	0.00020	1.854E-03	0.00165	
28-Jul-06	979.050	0.97895	-0.02127	1.835E-03	0.02311	
31-Jul-06	978.800	0.99974	-0.00026	1.815E-03	0.00207	
	981.600	1.00286	0.00286	1.795E-03	0.00106	
2-Aug-06	990.900	1.00947	0.00943	1.773E-03	0.00766	
3-Aug-06	988.000	0.99707	-0.00293	1.751E-03	0.00468	
4-Aug-06	967.800	0.97955	-0.02066	1.728E-03	0.02239	
7-Aug-06	954.950	0.98672	-0.01337	1.704E-03	0.01507	
8-Aug-06	977.150	1.02325	0.02298	1.680E-03	0.02130	
9-Aug-06	988.000	1.01110	0.01104	1.655E-03	0.00939	
10-Aug-06	978.950	0.99084	-0.00920	1.629E-03	0.01083	
11-Aug-06	1011.000	1.03274	0.03221	1.603E-03	0.03061	
14-Aug-06	1029.250	1.01805	0.01789	1.577E-03	0.01631	
16-Aug-06	1046.500	1.01676	0.01662	1.550E-03	0.01507	
17-Aug-06	1066.100	1.01873	0.01856	1.522E-03	0.01703	
18-Aug-06	1055.900	0.99043	-0.00961	1.495E-03	0.01111	
21-Aug-06	1067.600	1.01108	0.01102	1.466E-03	0.00955	
22-Aug-06	1064.800	0.99738	-0.00263	1.438E-03	0.00406	
23-Aug-06	1061.900	0.99728	-0.00273	1.409E-03	0.00414	
24-Aug-06	1106.850	1.04233	0.04146	1.380E-03	0.04008	
25-Aug-06	1110.650	1.00343	0.00343	1.351E-03	0.00208	
28-Aug-06	1122.100	1.01031	0.01026	1.321E-03	0.00894	
29-Aug-06	1118.850	0.99710	-0.00290	1.292E-03	0.00419	
30-Aug-06	1128.800	1.00889	0.00885	1.262E-03	0.00759	
31-Aug-06	1117.350	0.98986	-0.01020	1.233E-03	0.01143	
	1122.500	1.00461	0.00460	1.203E-03	0.00340	
4-Sep-06	1131.600	1.00811	0.00807	1.174E-03	0.00690	
5-Sep-06	1125.950	0.99501	-0.00501	1.144E-03	0.00615	
6-Sep-06	1137.500	1.01026	0.01021	1.115E-03	0.00909	
7-Sep-06	1125.700	0.98963	-0.01043	1.085E-03	0.01151	
8-Sep-06	1130.800	1.00453	0.00452	1.056E-03	0.00346	
11-Sep-06	1087.700	0.96189	-0.03886	1.027E-03	0.03989	
12-Sep-06	1106.850	1.01761	0.01745	9.983E-04	0.01645	
13-Sep-06	1116.150	1.00840	0.00837	9.697E-04	0.00740	
14-Sep-06	1126.350	1.00914	0.00910	9.414E-04	0.00816	
15-Sep-06	1140.600	1.01265	0.01257	9.134E-04	0.01166	
18-Sep-06	1133.450	0.99373	-0.00629	8.858E-04	0.00717	
19-Sep-06	1117.850	0.98624	-0.01386	8.584E-04	0.01472	
20-Sep-06	1128.150	1.00921	0.00917	8.314E-04	0.00834	
21-Sep-06	1138.900	1.00953	0.00948	8.048E-04	0.00868	

22-Sep-06	1156.000	1.01501	0.01490	7.786E-04	0.01412	
25-Sep-06	1163.100	1.00614	0.00612	7.528E-04	0.00537	
26-Sep-06	1179.100	1.01376	0.01366	7.275E-04	0.01294	
27-Sep-06	1174.050	0.99572	-0.00429	7.025E-04	0.00499	
28-Sep-06	1168.000	0.99485	-0.00517	6.781E-04	0.00584	
29-Sep-06	1171.750	1.00321	0.00321	6.541E-04	0.00255	
	1161.800	0.99151	-0.00853	6.305E-04	0.00916	
4-Oct-06	1149.050	0.98903	-0.01104	6.075E-04	0.01164	
5-Oct-06	1154.900	1.00509	0.00508	5.850E-04	0.00449	
6-Oct-06	1162.850	1.00688	0.00686	5.630E-04	0.00630	
9-Oct-06	1153.450	0.99192	-0.00812	5.414E-04	0.00866	
10-Oct-06	1150.900	0.99779	-0.00221	5.205E-04	0.00273	
11-Oct-06	1143.300	0.99340	-0.00663	5.000E-04	0.00713	
12-Oct-06	1168.750	1.02226	0.02202	4.800E-04	0.02154	
13-Oct-06	1190.700	1.01878	0.01861	4.606E-04	0.01815	
16-Oct-06	1213.400	1.01906	0.01888	4.417E-04	0.01844	
17-Oct-06	1215.200	1.00148	0.00148	4.233E-04	0.00106	
18-Oct-06	1208.500	0.99449	-0.00553	4.055E-04	0.00593	
19-Oct-06	1197.100	0.99057	-0.00948	3.882E-04	0.00987	
20-Oct-06	1203.550	1.00539	0.00537	3.714E-04	0.00500	
21-Oct-06	1201.200	0.99805	-0.00195	3.551E-04	0.00231	
23-Oct-06	1193.850	0.99388	-0.00614	3.393E-04	0.00648	
26-Oct-06	1174.950	0.98417	-0.01596	3.241E-04	0.01628	
27-Oct-06	1222.700	1.04064	0.03984	3.093E-04	0.03953	
30-Oct-06	1236.150	1.01100	0.01094	2.951E-04	0.01065	
31-Oct-06	1226.000	0.99179	-0.00824	2.813E-04	0.00853	
	1264.400	1.03132	0.03084	2.680E-04	0.03057	
2-Nov-06	1283.350	1.01499	0.01488	2.553E-04	0.01462	
3-Nov-06	1287.700	1.00339	0.00338	2.429E-04	0.00314	
6-Nov-06	1304.500	1.01305	0.01296	2.311E-04	0.01273	
7-Nov-06	1291.300	0.98988	-0.01017	2.196E-04	0.01039	
8-Nov-06	1252.250	0.96976	-0.03071	2.087E-04	0.03092	
9-Nov-06	1260.600	1.00667	0.00665	1.981E-04	0.00645	
10-Nov-06	1285.300	1.01959	0.01940	1.880E-04	0.01922	
13-Nov-06	1285.400	1.00008	0.00008	1.783E-04	0.00010	
14-Nov-06	1279.400	0.99533	-0.00468	1.690E-04	0.00485	
15-Nov-06	1262.650	0.98691	-0.01318	1.601E-04	0.01334	
16-Nov-06	1265.750	1.00246	0.00245	1.515E-04	0.00230	
17-Nov-06	1259.250	0.99486	-0.00515	1.434E-04	0.00529	
20-Nov-06	1259.000	0.99980	-0.00020	1.356E-04	0.00033	
21-Nov-06	1274.050	1.01195	0.01188	1.281E-04	0.01175	
22-Nov-06	1278.150	1.00322	0.00321	1.210E-04	0.00309	
23-Nov-06	1271.950	0.99515	-0.00486	1.142E-04	0.00498	
24-Nov-06	1262.350	0.99245	-0.00758	1.078E-04	0.00768	
27-Nov-06	1252.850	0.99247	-0.00755	1.016E-04	0.00766	
28-Nov-06	1250.700	0.99828	-0.00172	9.573E-05	0.00181	
29-Nov-06	1249.300	0.99888	-0.00112	9.015E-05	0.00121	
30-Nov-06	1244.450	0.99612	-0.00389	8.485E-05	0.00397	

	1261.050	1.01334	0.01325	7.981E-05	0.01317	
4-Dec-06	1259.900	0.99909	-0.00091	7.503E-05	0.00099	
5-Dec-06	1279.550	1.01560	0.01548	7.049E-05	0.01541	
6-Dec-06	1281.350	1.00141	0.00141	6.619E-05	0.00134	
7-Dec-06	1301.000	1.01534	0.01522	6.211E-05	0.01516	
8-Dec-06	1269.150	0.97552	-0.02479	5.825E-05	0.02484	
11-Dec-06	1240.000	0.97703	-0.02324	5.460E-05	0.02329	
12-Dec-06	1205.400	0.97210	-0.02830	5.115E-05	0.02835	
13-Dec-06	1238.400	1.02738	0.02701	4.789E-05	0.02696	
14-Dec-06	1259.450	1.01700	0.01685	4.480E-05	0.01681	
15-Dec-06	1253.700	0.99543	-0.00458	4.190E-05	0.00462	
18-Dec-06	1289.100	1.02824	0.02785	3.916E-05	0.02781	
19-Dec-06	1253.550	0.97242	-0.02796	3.657E-05	0.02800	
20-Dec-06	1248.900	0.99629	-0.00372	3.414E-05	0.00375	
21-Dec-06	1261.450	1.01005	0.01000	3.185E-05	0.00997	
22-Dec-06	1272.550	1.00880	0.00876	2.970E-05	0.00873	
26-Dec-06	1277.000	1.00350	0.00349	2.767E-05	0.00346	
27-Dec-06	1293.350	1.01280	0.01272	2.577E-05	0.01270	
28-Dec-06	1274.700	0.98558	-0.01452	2.399E-05	0.01455	
29-Dec-06	1270.150	0.99643	-0.00358	2.231E-05	0.00360	

H_0 : The share price for the year 2006 with mean 999.6309 follows normal distribution.

H_a : The share price for the year 2006 with mean 999.6309 does not follow normal distribution.

Level of significance (α) = 0.01

Sample size (n) = 250

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.109291$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{250}} = 0.10309$$

Since $D_n > D_{table}$, the null hypothesis is rejected. Hence, the data are not described by normal distribution.

Hypothesis testing for Reliance for the year 2007

TABLE 4.1.4: Calculation of K-S statistics for Reliance for the year 2007

Date	Year 2007 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm $\ln(\text{PR})$ F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ $\text{Max}/F_e - F_0/$
	1270.15					
3-Jan-07	1280.90	1.00846	0.00843	8.319E-06	0.00842	
4-Jan-07	1284.55	1.00285	0.00285	8.945E-06	0.00284	
5-Jan-07	1280.50	0.99685	-0.00316	9.613E-06	0.00317	
8-Jan-07	1288.15	1.00597	0.00596	1.032E-05	0.00595	
9-Jan-07	1276.85	0.99123	-0.00881	1.108E-05	0.00882	
10-Jan-07	1278.30	1.00114	0.00113	1.189E-05	0.00112	
11-Jan-07	1273.15	0.99597	-0.00404	1.275E-05	0.00405	
12-Jan-07	1296.50	1.01834	0.01817	1.366E-05	0.01816	
15-Jan-07	1339.50	1.03317	0.03263	1.463E-05	0.03261	
16-Jan-07	1364.95	1.01900	0.01882	1.565E-05	0.01881	
17-Jan-07	1346.95	0.98681	-0.01328	1.674E-05	0.01329	
18-Jan-07	1349.85	1.00215	0.00215	1.790E-05	0.00213	
19-Jan-07	1367.40	1.01300	0.01292	1.912E-05	0.01290	
22-Jan-07	1382.75	1.01123	0.01116	2.042E-05	0.01114	
23-Jan-07	1373.85	0.99356	-0.00646	2.179E-05	0.00648	
24-Jan-07	1360.55	0.99032	-0.00973	2.323E-05	0.00975	
25-Jan-07	1369.50	1.00658	0.00656	2.476E-05	0.00653	
29-Jan-07	1370.60	1.00080	0.00080	2.638E-05	0.00078	
31-Jan-07	1382.30	1.00854	0.00850	2.808E-05	0.00847	
	1366.45	0.98853	-0.01153	2.988E-05	0.01156	
2-Feb-07	1377.60	1.00816	0.00813	3.177E-05	0.00809	
5-Feb-07	1375.05	0.99815	-0.00185	3.376E-05	0.00189	
6-Feb-07	1387.35	1.00895	0.00891	3.585E-05	0.00887	
7-Feb-07	1389.20	1.00133	0.00133	3.805E-05	0.00129	
8-Feb-07	1394.90	1.00410	0.00409	4.037E-05	0.00405	
9-Feb-07	1397.05	1.00154	0.00154	4.280E-05	0.00150	
12-Feb-07	1391.80	0.99624	-0.00376	4.535E-05	0.00381	
13-Feb-07	1358.95	0.97640	-0.02389	4.802E-05	0.02393	
14-Feb-07	1366.00	1.00519	0.00517	5.082E-05	0.00512	
15-Feb-07	1377.05	1.00809	0.00806	5.375E-05	0.00800	
19-Feb-07	1406.95	1.02171	0.02148	5.681E-05	0.02142	
20-Feb-07	1420.75	1.00981	0.00976	6.002E-05	0.00970	
21-Feb-07	1414.60	0.99567	-0.00434	6.337E-05	0.00440	
22-Feb-07	1406.75	0.99445	-0.00556	6.687E-05	0.00563	
23-Feb-07	1412.05	1.00377	0.00376	7.051E-05	0.00369	

26-Feb-07	1413.25	1.00085	0.00085	7.432E-05	0.00078	
27-Feb-07	1406.55	0.99526	-0.00475	7.828E-05	0.00483	
28-Feb-07	1405.45	0.99922	-0.00078	8.240E-05	0.00086	
	1352.50	0.96233	-0.03840	8.669E-05	0.03849	
2-Mar-07	1367.75	1.01128	0.01121	9.115E-05	0.01112	
5-Mar-07	1316.20	0.96231	-0.03842	9.579E-05	0.03851	
6-Mar-07	1259.35	0.95681	-0.04415	1.006E-04	0.04425	
7-Mar-07	1297.85	1.03057	0.03011	1.056E-04	0.03001	
8-Mar-07	1288.65	0.99291	-0.00711	1.108E-04	0.00722	
9-Mar-07	1335.55	1.03639	0.03575	1.161E-04	0.03563	
12-Mar-07	1318.20	0.98701	-0.01308	1.216E-04	0.01320	
13-Mar-07	1315.70	0.99810	-0.00190	1.274E-04	0.00203	
14-Mar-07	1326.75	1.00840	0.00836	1.333E-04	0.00823	
15-Mar-07	1285.35	0.96880	-0.03170	1.394E-04	0.03184	
16-Mar-07	1283.40	0.99848	-0.00152	1.457E-04	0.00166	
19-Mar-07	1300.15	1.01305	0.01297	1.522E-04	0.01281	
20-Mar-07	1313.55	1.01031	0.01025	1.589E-04	0.01009	
21-Mar-07	1322.95	1.00716	0.00713	1.658E-04	0.00696	
22-Mar-07	1340.00	1.01289	0.01281	1.729E-04	0.01263	
23-Mar-07	1375.25	1.02631	0.02597	1.802E-04	0.02579	
26-Mar-07	1376.05	1.00058	0.00058	1.877E-04	0.00039	
28-Mar-07	1364.55	0.99164	-0.00839	1.954E-04	0.00859	
29-Mar-07	1350.00	0.98934	-0.01072	2.033E-04	0.01092	
30-Mar-07	1357.20	1.00533	0.00532	2.113E-04	0.00511	
	1370.30	1.00965	0.00961	2.196E-04	0.00939	
3-Apr-07	1313.95	0.95888	-0.04199	2.281E-04	0.04222	
4-Apr-07	1340.75	1.02040	0.02019	2.367E-04	0.01995	
5-Apr-07	1363.25	1.01678	0.01664	2.455E-04	0.01640	
9-Apr-07	1358.85	0.99677	-0.00323	2.545E-04	0.00349	
10-Apr-07	1384.30	1.01873	0.01856	2.637E-04	0.01829	
11-Apr-07	1384.40	1.00007	0.00007	2.730E-04	0.00020	
12-Apr-07	1386.60	1.00159	0.00159	2.825E-04	0.00131	
13-Apr-07	1387.50	1.00065	0.00065	2.922E-04	0.00036	
16-Apr-07	1411.95	1.01762	0.01747	3.020E-04	0.01717	
17-Apr-07	1457.75	1.03244	0.03192	3.120E-04	0.03161	
18-Apr-07	1475.80	1.01238	0.01231	3.221E-04	0.01198	
19-Apr-07	1485.35	1.00647	0.00645	3.323E-04	0.00612	
20-Apr-07	1492.35	1.00471	0.00470	3.427E-04	0.00436	
23-Apr-07	1541.45	1.03290	0.03237	3.531E-04	0.03202	
24-Apr-07	1554.30	1.00834	0.00830	3.637E-04	0.00794	
25-Apr-07	1582.95	1.01843	0.01826	3.744E-04	0.01789	
26-Apr-07	1598.40	1.00976	0.00971	3.851E-04	0.00933	
27-Apr-07	1596.85	0.99903	-0.00097	3.960E-04	0.00137	
30-Apr-07	1539.20	0.96390	-0.03677	4.068E-04	0.03718	
	1561.05	1.01420	0.01410	4.178E-04	0.01368	
4-May-07	1626.15	1.04170	0.04086	4.288E-04	0.04043	

7-May-07	1583.15	0.97356	-0.02680	4.398E-04	0.02724	
8-May-07	1606.50	1.01475	0.01464	4.508E-04	0.01419	
9-May-07	1593.15	0.99169	-0.00834	4.619E-04	0.00881	
10-May-07	1598.25	1.00320	0.00320	4.729E-04	0.00272	
11-May-07	1581.40	0.98946	-0.01060	4.839E-04	0.01108	
14-May-07	1589.10	1.00487	0.00486	4.949E-04	0.00436	
15-May-07	1620.25	1.01960	0.01941	5.058E-04	0.01891	
16-May-07	1598.50	0.98658	-0.01351	5.166E-04	0.01403	
17-May-07	1634.70	1.02265	0.02239	5.274E-04	0.02187	
18-May-07	1685.25	1.03092	0.03045	5.381E-04	0.02992	
21-May-07	1698.45	1.00783	0.00780	5.487E-04	0.00725	
22-May-07	1760.95	1.03680	0.03614	5.591E-04	0.03558	
23-May-07	1779.25	1.01039	0.01034	5.694E-04	0.00977	
24-May-07	1756.15	0.98702	-0.01307	5.796E-04	0.01365	
25-May-07	1727.20	0.98352	-0.01662	5.896E-04	0.01721	
28-May-07	1728.05	1.00049	0.00049	5.994E-04	0.00011	
29-May-07	1723.90	0.99760	-0.00240	6.090E-04	0.00301	
30-May-07	1756.90	1.01914	0.01896	6.184E-04	0.01834	
31-May-07	1752.85	0.99769	-0.00231	6.276E-04	0.00294	
	1758.80	1.00339	0.00339	6.366E-04	0.00275	
4-Jun-07	1751.25	0.99571	-0.00430	6.452E-04	0.00495	
5-Jun-07	1741.95	0.99469	-0.00532	6.537E-04	0.00598	
6-Jun-07	1745.40	1.00198	0.00198	6.618E-04	0.00132	
7-Jun-07	1691.30	0.96900	-0.03149	6.696E-04	0.03216	
8-Jun-07	1669.15	0.98690	-0.01318	6.772E-04	0.01386	
11-Jun-07	1657.05	0.99275	-0.00728	6.844E-04	0.00796	
12-Jun-07	1666.15	1.00549	0.00548	6.913E-04	0.00479	
13-Jun-07	1698.90	1.01966	0.01947	6.978E-04	0.01877	
14-Jun-07	1675.40	0.98617	-0.01393	7.040E-04	0.01463	
15-Jun-07	1696.05	1.01233	0.01225	7.098E-04	0.01154	
18-Jun-07	1681.90	0.99166	-0.00838	7.153E-04	0.00909	
19-Jun-07	1671.60	0.99388	-0.00614	7.204E-04	0.00686	
20-Jun-07	1726.55	1.03287	0.03234	7.250E-04	0.03162	
21-Jun-07	1732.95	1.00371	0.00370	7.293E-04	0.00297	
22-Jun-07	1734.35	1.00081	0.00081	7.332E-04	0.00007	
25-Jun-07	1705.10	0.98313	-0.01701	7.366E-04	0.01775	
26-Jun-07	1709.15	1.00238	0.00237	7.397E-04	0.00163	
27-Jun-07	1703.25	0.99655	-0.00346	7.423E-04	0.00420	
28-Jun-07	1698.55	0.99724	-0.00276	7.445E-04	0.00351	
29-Jun-07	1692.00	0.99614	-0.00386	7.462E-04	0.00461	
	1700.55	1.00505	0.00504	7.475E-04	0.00429	
3-Jul-07	1684.30	0.99044	-0.00960	7.484E-04	0.01035	
4-Jul-07	1707.30	1.01366	0.01356	7.488E-04	0.01281	
5-Jul-07	1718.15	1.00636	0.00633	7.488E-04	0.00559	

6-Jul-07	1709.85	0.99517	-0.00484	7.483E-04	0.00559	
9-Jul-07	1709.90	1.00003	0.00003	7.474E-04	0.00072	
10-Jul-07	1710.95	1.00061	0.00061	7.461E-04	0.00013	
11-Jul-07	1702.70	0.99518	-0.00483	7.443E-04	0.00558	
12-Jul-07	1703.30	1.00035	0.00035	7.421E-04	0.00039	
13-Jul-07	1719.35	1.00942	0.00938	7.394E-04	0.00864	
16-Jul-07	1773.05	1.03123	0.03075	7.364E-04	0.03002	
17-Jul-07	1776.70	1.00206	0.00206	7.329E-04	0.00132	
18-Jul-07	1827.85	1.02879	0.02838	7.290E-04	0.02765	
19-Jul-07	1822.65	0.99716	-0.00285	7.247E-04	0.00357	
20-Jul-07	1892.80	1.03849	0.03777	7.199E-04	0.03705	
23-Jul-07	1892.15	0.99966	-0.00034	7.148E-04	0.00106	
24-Jul-07	1909.20	1.00901	0.00897	7.094E-04	0.00826	
25-Jul-07	1912.60	1.00178	0.00178	7.035E-04	0.00108	
26-Jul-07	1902.60	0.99477	-0.00524	6.973E-04	0.00594	
27-Jul-07	1941.95	1.02068	0.02047	6.907E-04	0.01978	
30-Jul-07	1867.50	0.96166	-0.03909	6.838E-04	0.03978	
31-Jul-07	1848.75	0.98996	-0.01009	6.765E-04	0.01077	
	1893.50	1.02421	0.02392	6.690E-04	0.02325	
2-Aug-07	1797.75	0.94943	-0.05189	6.611E-04	0.05255	
3-Aug-07	1800.55	1.00156	0.00156	6.529E-04	0.00090	
6-Aug-07	1801.15	1.00033	0.00033	6.445E-04	0.00031	
7-Aug-07	1780.15	0.98834	-0.01173	6.358E-04	0.01236	
8-Aug-07	1810.20	1.01688	0.01674	6.268E-04	0.01611	
9-Aug-07	1875.45	1.03605	0.03541	6.176E-04	0.03479	
10-Aug-07	1845.80	0.98419	-0.01594	6.082E-04	0.01654	
13-Aug-07	1809.05	0.98009	-0.02011	5.986E-04	0.02071	
14-Aug-07	1829.20	1.01114	0.01108	5.887E-04	0.01049	
16-Aug-07	1833.05	1.00210	0.00210	5.787E-04	0.00152	
17-Aug-07	1739.05	0.94872	-0.05264	5.685E-04	0.05321	
20-Aug-07	1752.90	1.00796	0.00793	5.582E-04	0.00737	
21-Aug-07	1798.00	1.02573	0.02540	5.478E-04	0.02486	
22-Aug-07	1746.85	0.97155	-0.02886	5.372E-04	0.02940	
23-Aug-07	1766.20	1.01108	0.01102	5.265E-04	0.01049	
24-Aug-07	1744.00	0.98743	-0.01265	5.157E-04	0.01316	
27-Aug-07	1776.35	1.01855	0.01838	5.048E-04	0.01787	
28-Aug-07	1833.80	1.03234	0.03183	4.939E-04	0.03134	
29-Aug-07	1882.50	1.02656	0.02621	4.829E-04	0.02573	
30-Aug-07	1889.70	1.00382	0.00382	4.719E-04	0.00335	
31-Aug-07	1912.05	1.01183	0.01176	4.609E-04	0.01130	
	1960.90	1.02555	0.02523	4.499E-04	0.02478	
4-Sep-07	1957.95	0.99850	-0.00151	4.388E-04	0.00194	
5-Sep-07	1972.90	1.00764	0.00761	4.278E-04	0.00718	
6-Sep-07	1964.60	0.99579	-0.00422	4.168E-04	0.00463	

7-Sep-07	1982.85	1.00929	0.00925	4.059E-04	0.00884	
10-Sep-07	1962.90	0.98994	-0.01011	3.950E-04	0.01051	
11-Sep-07	1985.60	1.01156	0.01150	3.842E-04	0.01111	
12-Sep-07	1990.10	1.00227	0.00226	3.735E-04	0.00189	
13-Sep-07	2013.15	1.01158	0.01152	3.628E-04	0.01115	
14-Sep-07	2027.50	1.00713	0.00710	3.522E-04	0.00675	
17-Sep-07	2034.75	1.00358	0.00357	3.418E-04	0.00323	
18-Sep-07	2028.30	0.99683	-0.00317	3.314E-04	0.00351	
19-Sep-07	2058.05	1.01467	0.01456	3.212E-04	0.01424	
20-Sep-07	2173.90	1.05629	0.05476	3.111E-04	0.05445	
21-Sep-07	2190.30	1.00754	0.00752	3.012E-04	0.00721	
24-Sep-07	2280.45	1.04116	0.04033	2.914E-04	0.04004	
25-Sep-07	2355.50	1.03291	0.03238	2.817E-04	0.03210	
26-Sep-07	2399.60	1.01872	0.01855	2.722E-04	0.01828	
27-Sep-07	2321.95	0.96764	-0.03289	2.629E-04	0.03316	
28-Sep-07	2318.30	0.99843	-0.00157	2.537E-04	0.00183	
	2298.05	0.99127	-0.00877	2.448E-04	0.00902	
3-Oct-07	2292.20	0.99745	-0.00255	2.359E-04	0.00278	
4-Oct-07	2395.90	1.04524	0.04425	2.273E-04	0.04402	
5-Oct-07	2425.90	1.01252	0.01244	2.189E-04	0.01222	
8-Oct-07	2492.50	1.02745	0.02708	2.106E-04	0.02687	
9-Oct-07	2421.20	0.97139	-0.02902	2.026E-04	0.02923	
10-Oct-07	2600.00	1.07385	0.07125	1.947E-04	0.07105	
11-Oct-07	2618.40	1.00708	0.00705	1.871E-04	0.00686	
12-Oct-07	2630.55	1.00464	0.00463	1.796E-04	0.00445	
15-Oct-07	2565.75	0.97537	-0.02494	1.723E-04	0.02511	
16-Oct-07	2666.35	1.03921	0.03846	1.652E-04	0.03829	
17-Oct-07	2651.55	0.99445	-0.00557	1.583E-04	0.00572	
18-Oct-07	2687.55	1.01358	0.01349	1.517E-04	0.01333	
19-Oct-07	2583.15	0.96115	-0.03962	1.452E-04	0.03977	
22-Oct-07	2469.30	0.95593	-0.04507	1.389E-04	0.04521	
23-Oct-07	2410.05	0.97601	-0.02429	1.328E-04	0.02442	
24-Oct-07	2599.85	1.07875	0.07581	1.269E-04		
25-Oct-07	2615.05	1.00585	0.00583	1.212E-04	0.00571	
26-Oct-07	2628.05	1.00497	0.00496	1.156E-04	0.00484	
29-Oct-07	2698.30	1.02673	0.02638	1.103E-04	0.02627	
30-Oct-07	2827.90	1.04803	0.04691	1.051E-04	0.04681	
31-Oct-07	2769.50	0.97935	-0.02087	1.002E-04	0.02097	
	2783.80	1.00516	0.00515	9.538E-05	0.00505	
2-Nov-07	2680.60	0.96293	-0.03778	9.076E-05	0.03787	
5-Nov-07	2713.30	1.01220	0.01212	8.632E-05	0.01204	
6-Nov-07	2661.15	0.98078	-0.01941	8.204E-05	0.01949	
7-Nov-07	2666.20	1.00190	0.00190	7.793E-05	0.00182	
8-Nov-07	2770.90	1.03927	0.03852	7.398E-05	0.03844	

9-Nov-07	2742.85	0.98988	-0.01017	7.019E-05	0.01024	
12-Nov-07	2734.40	0.99692	-0.00309	6.656E-05	0.00315	
13-Nov-07	2675.60	0.97850	-0.02174	6.307E-05	0.02180	
14-Nov-07	2693.10	1.00654	0.00652	5.974E-05	0.00646	
15-Nov-07	2888.45	1.07254	0.07003	5.654E-05	0.06997	
16-Nov-07	2875.10	0.99538	-0.00463	5.349E-05	0.00469	
19-Nov-07	2881.65	1.00228	0.00228	5.057E-05	0.00223	
20-Nov-07	2850.90	0.98933	-0.01073	4.778E-05	0.01078	
21-Nov-07	2784.85	0.97683	-0.02344	4.512E-05	0.02349	
22-Nov-07	2709.50	0.97294	-0.02743	4.258E-05	0.02747	
23-Nov-07	2724.75	1.00563	0.00561	4.016E-05	0.00557	
26-Nov-07	2811.20	1.03173	0.03123	3.786E-05	0.03120	
27-Nov-07	2884.55	1.02609	0.02576	3.567E-05	0.02572	
28-Nov-07	2843.30	0.98570	-0.01440	3.358E-05	0.01444	
29-Nov-07	2792.30	0.98206	-0.01810	3.160E-05	0.01813	
30-Nov-07	2812.55	1.00725	0.00723	2.972E-05	0.00720	
	2851.65	1.01390	0.01381	2.793E-05	0.01378	
4-Dec-07	2934.90	1.02919	0.02878	2.623E-05	0.02875	
5-Dec-07	2862.50	0.97533	-0.02498	2.463E-05	0.02500	
6-Dec-07	2901.40	1.01359	0.01350	2.310E-05	0.01347	
7-Dec-07	2873.80	0.99049	-0.00956	2.166E-05	0.00958	
10-Dec-07	2841.45	0.98874	-0.01132	2.030E-05	0.01134	
11-Dec-07	2822.95	0.99349	-0.00653	1.901E-05	0.00655	
12-Dec-07	2885.65	1.02221	0.02197	1.780E-05	0.02195	
13-Dec-07	2880.90	0.99835	-0.00165	1.665E-05	0.00166	
14-Dec-07	2832.75	0.98329	-0.01685	1.556E-05	0.01687	
17-Dec-07	2888.65	1.01973	0.01954	1.454E-05	0.01952	
18-Dec-07	2775.10	0.96069	-0.04010	1.358E-05	0.04011	
19-Dec-07	2727.55	0.98287	-0.01728	1.267E-05	0.01729	
20-Dec-07	2703.80	0.99129	-0.00875	1.182E-05	0.00875	
24-Dec-07	2713.65	1.00364	0.00364	1.102E-05	0.00362	
26-Dec-07	2788.55	1.02760	0.02723	1.026E-05	0.02721	
27-Dec-07	2896.50	1.03871	0.03798	9.554E-06	0.03797	
28-Dec-07	2893.85	0.99909	-0.00092	8.889E-06	0.00092	
31-Dec-07	2894.85	1.00035	0.00035	8.267E-06	0.00033	
	2832.75					

H_0 :Reliance share price for the year 2007 with mean = 1900.705 follows normal distribution.

H_a :Reliance share price for the year 2007 with mean = 1900.705 does not follow normal distribution.

Level of significance (α) = 0.01

Sample size (n) = 249

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.075679$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{249}} = 0.103297$$

Since $D_n < D_{table}$, the null hypothesis is accepted. Hence, the data are described by normal distribution

Hypothesis testing for Reliance for the year 2008

TABLE 4.1.5 : Calculation of K-S statistics for Reliance for the year 2008

Date	Year 2008 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F0	Expected Normal Distribution Fe	Absolute Deviation / F0 - Fe/	K-S statistics Dn = Max/Fe-F0/
	2882.70					
2-Jan-08	2848.25	0.98805	-0.01202	1.5543E-05	0.01204	
3-Jan-08	2861.75	1.00474	0.00473	3.5564E-05	0.00469	
4-Jan-08	2903.70	1.01466	0.01455	4.6012E-05	0.01451	
7-Jan-08	2993.00	1.03075	0.03029	5.8976E-05	0.03023	
8-Jan-08	3020.25	1.00910	0.00906	7.4887E-05	0.00899	
9-Jan-08	3054.65	1.01139	0.01133	9.4205E-05	0.01123	
10-Jan-08	3033.65	0.99313	-0.00690	1.1740E-04	0.00702	
11-Jan-08	3027.80	0.99807	-0.00193	1.4494E-04	0.00208	
14-Jan-08	3127.60	1.03296	0.03243	1.7728E-04	0.03225	
15-Jan-08	3220.85	1.02982	0.02938	2.1481E-04	0.02916	
16-Jan-08	3165.55	0.98283	-0.01732	2.5787E-04	0.01758	
17-Jan-08	3093.65	0.97729	-0.02298	3.0666E-04	0.02328	
18-Jan-08	2996.55	0.96861	-0.03189	3.6129E-04	0.03225	
21-Jan-08	2799.60	0.93427	-0.06799	4.2168E-04	0.06841	
22-Jan-08	2540.80	0.90756	-0.09700	4.8757E-04		
23-Jan-08	2357.45	0.92784	-0.07490	5.5851E-04	0.07546	
24-Jan-08	2550.70	1.08197	0.07879	6.3381E-04	0.07815	
25-Jan-08	2488.90	0.97577	-0.02453	7.1255E-04	0.02524	
28-Jan-08	2615.40	1.05083	0.04958	7.9361E-04	0.04878	
29-Jan-08	2566.40	0.98126	-0.01891	8.7565E-04	0.01979	
30-Jan-08	2576.90	1.00409	0.00408	9.5717E-04	0.00313	
31-Jan-08	2471.90	0.95925	-0.04160	1.0365E-03	0.04264	
	2478.90	1.00283	0.00283	1.1120E-03	0.00172	
4-Feb-08	2542.75	1.02576	0.02543	1.1818E-03	0.02425	
5-Feb-08	2591.20	1.01905	0.01887	1.2444E-03	0.01763	
6-Feb-08	2617.10	1.01000	0.00995	1.2980E-03	0.00865	
7-Feb-08	2552.50	0.97532	-0.02499	1.3413E-03	0.02633	
8-Feb-08	2425.45	0.95023	-0.05106	1.3731E-03	0.05243	
11-Feb-08	2426.40	1.00039	0.00039	1.3926E-03	0.00100	
12-Feb-08	2277.00	0.93843	-0.06355	1.3992E-03	0.06495	
13-Feb-08	2324.85	1.02101	0.02080	1.3927E-03	0.01940	
14-Feb-08	2389.50	1.02781	0.02743	1.3733E-03	0.02606	
15-Feb-08	2516.75	1.05325	0.05188	1.3416E-03	0.05054	
18-Feb-08	2593.95	1.03067	0.03021	1.2984E-03	0.02892	
19-Feb-08	2553.70	0.98448	-0.01564	1.2449E-03	0.01688	

20-Feb-08	2554.55	1.00033	0.00033	1.1824E-03	0.00085	
21-Feb-08	2484.00	0.97238	-0.02801	1.1126E-03	0.02912	
22-Feb-08	2496.30	1.00495	0.00494	1.0372E-03	0.00390	
25-Feb-08	2434.45	0.97522	-0.02509	9.5787E-04	0.02605	
26-Feb-08	2551.45	1.04806	0.04694	8.7637E-04	0.04606	
27-Feb-08	2576.65	1.00988	0.00983	7.9433E-04	0.00903	
28-Feb-08	2588.45	1.00458	0.00457	7.1325E-04	0.00386	
29-Feb-08	2533.25	0.97867	-0.02156	6.3448E-04	0.02219	
	2463.45	0.97245	-0.02794	5.5915E-04	0.02850	
4-Mar-08	2306.00	0.93609	-0.06605	4.8817E-04	0.06654	
5-Mar-08	2243.20	0.97277	-0.02761	4.2223E-04	0.02803	
7-Mar-08	2292.75	1.02209	0.02185	3.6179E-04	0.02149	
10-Mar-08	2248.25	0.98059	-0.01960	3.0711E-04	0.01991	
11-Mar-08	2274.55	1.01170	0.01163	2.5827E-04	0.01137	
12-Mar-08	2347.90	1.03225	0.03174	2.1517E-04	0.03152	
13-Mar-08	2374.60	1.01137	0.01131	1.7759E-04	0.01113	
14-Mar-08	2243.05	0.94460	-0.05699	1.4521E-04	0.05714	
17-Mar-08	2322.60	1.03547	0.03485	1.1762E-04	0.03473	
18-Mar-08	2180.20	0.93869	-0.06327	9.4390E-05	0.06337	
19-Mar-08	2151.00	0.98661	-0.01348	7.5040E-05	0.01356	
24-Mar-08	2159.10	1.00377	0.00376	5.9101E-05	0.00370	
25-Mar-08	2200.25	1.01906	0.01888	4.6114E-05	0.01883	
26-Mar-08	2313.80	1.05161	0.05032	3.5645E-05	0.05028	
27-Mar-08	2299.45	0.99380	-0.00622	2.7296E-05	0.00625	
28-Mar-08	2270.80	0.98754	-0.01254	2.0708E-05	0.01256	
31-Mar-08	2352.45	1.03596	0.03533	1.5563E-05	0.03531	

H_0 : The share price for the year 2008 with mean 2560.49 follows normal distribution.

H_a : The share price for the year 2008 with mean 2560.49 does not follow normal distribution.

Level of significance (α) = 0.01

Sample size (n) = 62

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.097485$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{62}} = 0.20701$$

Since $D_n < D_{table}$, the null hypothesis is accepted . Hence, the data are described by normal distribution.

Hypothesis testing for ICICI for the year 2004

TABLE 4.1.6: Calculation of K-S statistics for ICICI for the year 2004

Date	Year 2004 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ Max/ $F_e - F_0$ /
	300.95					
2-Apr-04	298.85	0.99302	-0.00700	0.0001250	0.00713	
5-Apr-04	295.85	0.98996	-0.01009	0.0001374	0.01023	
6-Apr-04	291.40	0.98496	-0.01516	0.0001508	0.01531	
7-Apr-04	289.45	0.99331	-0.00671	0.0001654	0.00688	
8-Apr-04	292.40	1.01019	0.01014	0.0001812	0.00996	
12-Apr-04	291.65	0.99744	-0.00257	0.0001984	0.00277	
13-Apr-04	291.65	1.00000	0.00000	0.0002169	0.00022	
15-Apr-04	289.05	0.99109	-0.00895	0.0002369	0.00919	
16-Apr-04	287.65	0.99516	-0.00486	0.0002585	0.00511	
17-Apr-04	291.95	1.01495	0.01484	0.0002818	0.01456	
19-Apr-04	299.75	1.02672	0.02637	0.0003069	0.02606	
20-Apr-04	307.25	1.02502	0.02471	0.0003340	0.02438	
21-Apr-04	297.45	0.96810	-0.03242	0.0003630	0.03278	
22-Apr-04	299.00	1.00521	0.00520	0.0003941	0.00480	
23-Apr-04	319.35	1.06806	0.06584	0.0004275	0.06542	
27-Apr-04	312.30	0.97792	-0.02232	0.0004633	0.02279	
28-Apr-04	317.60	1.01697	0.01683	0.0005015	0.01633	
29-Apr-04	318.75	1.00362	0.00361	0.0005424	0.00307	
30-Apr-04	315.00	0.98824	-0.01183	0.0005860	0.01242	
	314.80	0.99937	-0.00064	0.0006324	0.00127	
4-May-04	306.90	0.97490	-0.02542	0.0006819	0.02610	
5-May-04	301.90	0.98371	-0.01643	0.0007345	0.01716	
6-May-04	303.85	1.00646	0.00644	0.0007904	0.00565	
7-May-04	302.80	0.99654	-0.00346	0.0008497	0.00431	
10-May-04	298.85	0.98696	-0.01313	0.0009125	0.01404	
11-May-04	283.00	0.94696	-0.05449	0.0009790	0.05547	
12-May-04	284.60	1.00565	0.00564	0.0010493	0.00459	
13-May-04	284.75	1.00053	0.00053	0.0011235	0.00060	
14-May-04	264.70	0.92959	-0.07301	0.0012018	0.07422	
17-May-04	236.75	0.89441	-0.11159	0.0012842		
18-May-04	256.35	1.08279	0.07954	0.0013710	0.07817	
19-May-04	264.20	1.03062	0.03016	0.0014621	0.02870	
20-May-04	262.80	0.99470	-0.00531	0.0015577	0.00687	
21-May-04	267.15	1.01655	0.01642	0.0016579	0.01476	
24-May-04	267.30	1.00056	0.00056	0.0017628	0.00120	

25-May-04	258.55	0.96727	-0.03328	0.0018724	0.03515	
26-May-04	262.50	1.01528	0.01516	0.0019869	0.01318	
27-May-04	264.95	1.00933	0.00929	0.0021063	0.00718	
28-May-04	246.05	0.92867	-0.07401	0.0022307	0.07624	
31-May-04	230.40	0.93640	-0.06572	0.0023600	0.06808	
	236.75	1.02756	0.02719	0.0024943	0.02469	
2-Jun-04	261.55	1.10475	0.09962	0.0026336	0.09699	
3-Jun-04	265.30	1.01434	0.01424	0.0027780	0.01146	
4-Jun-04	268.35	1.01150	0.01143	0.0029273	0.00850	
7-Jun-04	268.35	1.00000	0.00000	0.0030816	0.00308	
8-Jun-04	270.20	1.00689	0.00687	0.0032408	0.00363	
9-Jun-04	272.30	1.00777	0.00774	0.0034048	0.00434	
10-Jun-04	267.55	0.98256	-0.01760	0.0035735	0.02117	
11-Jun-04	259.65	0.97047	-0.02997	0.0037469	0.03372	
14-Jun-04	251.35	0.96803	-0.03249	0.0039247	0.03641	
15-Jun-04	252.60	1.00497	0.00496	0.0041069	0.00085	
16-Jun-04	257.30	1.01861	0.01844	0.0042932	0.01414	
17-Jun-04	262.80	1.02138	0.02115	0.0044835	0.01667	
18-Jun-04	258.65	0.98421	-0.01592	0.0046776	0.02060	
21-Jun-04	256.05	0.98995	-0.01010	0.0048752	0.01498	
22-Jun-04	252.35	0.98555	-0.01456	0.0050761	0.01963	
23-Jun-04	253.55	1.00476	0.00474	0.0052799	0.00054	
24-Jun-04	254.15	1.00237	0.00236	0.0054865	0.00312	
25-Jun-04	250.60	0.98603	-0.01407	0.0056955	0.01976	
28-Jun-04	252.90	1.00918	0.00914	0.0059066	0.00323	
29-Jun-04	248.80	0.98379	-0.01634	0.0061193	0.02246	
30-Jun-04	244.50	0.98272	-0.01743	0.0063334	0.02377	
	247.80	1.01350	0.01341	0.0065484	0.00686	
2-Jul-04	244.85	0.98810	-0.01198	0.0067640	0.01874	
5-Jul-04	235.35	0.96120	-0.03957	0.0069797	0.04655	
6-Jul-04	241.55	1.02634	0.02600	0.0071951	0.01881	
7-Jul-04	245.75	1.01739	0.01724	0.0074097	0.00983	
8-Jul-04	238.45	0.97030	-0.03016	0.0076231	0.03778	
9-Jul-04	244.35	1.02474	0.02444	0.0078349	0.01661	
12-Jul-04	241.30	0.98752	-0.01256	0.0080445	0.02061	
13-Jul-04	236.85	0.98156	-0.01861	0.0082514	0.02687	
14-Jul-04	234.40	0.98966	-0.01040	0.0084552	0.01885	
15-Jul-04	238.45	1.01728	0.01713	0.0086555	0.00848	
16-Jul-04	245.20	1.02831	0.02791	0.0088516	0.01906	
19-Jul-04	253.00	1.03181	0.03132	0.0090431	0.02227	
20-Jul-04	261.60	1.03399	0.03343	0.0092295	0.02420	
21-Jul-04	262.70	1.00420	0.00420	0.0094104	0.00521	
22-Jul-04	262.50	0.99924	-0.00076	0.0095853	0.01035	
23-Jul-04	261.35	0.99562	-0.00439	0.0097536	0.01414	
26-Jul-04	257.35	0.98469	-0.01542	0.0099150	0.02534	
27-Jul-04	258.70	1.00525	0.00523	0.0100690	0.00484	

28-Jul-04	258.50	0.99923	-0.00077	0.0102152	0.01099	
29-Jul-04	264.60	1.02360	0.02332	0.0103532	0.01297	
30-Jul-04	267.50	1.01096	0.01090	0.0104826	0.00042	
	275.90	1.03140	0.03092	0.0106030	0.02032	
3-Aug-04	273.50	0.99130	-0.00874	0.0107141	0.01945	
4-Aug-04	271.00	0.99086	-0.00918	0.0108155	0.02000	
5-Aug-04	279.10	1.02989	0.02945	0.0109070	0.01854	
6-Aug-04	272.55	0.97653	-0.02375	0.0109883	0.03474	
9-Aug-04	277.10	1.01669	0.01656	0.0110592	0.00550	
10-Aug-04	275.20	0.99314	-0.00688	0.0111194	0.01800	
11-Aug-04	277.40	1.00799	0.00796	0.0111687	0.00321	
12-Aug-04	277.00	0.99856	-0.00144	0.0112071	0.01265	
13-Aug-04	275.15	0.99332	-0.00670	0.0112344	0.01794	
16-Aug-04	275.40	1.00091	0.00091	0.0112506	0.01034	
17-Aug-04	277.10	1.00617	0.00615	0.0112555	0.00510	
18-Aug-04	272.65	0.98394	-0.01619	0.0112492	0.02744	
19-Aug-04	273.80	1.00422	0.00421	0.0112316	0.00702	
20-Aug-04	267.85	0.97827	-0.02197	0.0112029	0.03317	
23-Aug-04	267.40	0.99832	-0.00168	0.0111631	0.01284	
24-Aug-04	265.00	0.99102	-0.00902	0.0111124	0.02013	
25-Aug-04	266.80	1.00679	0.00677	0.0110508	0.00428	
26-Aug-04	273.95	1.02680	0.02645	0.0109786	0.01547	
27-Aug-04	268.75	0.98102	-0.01916	0.0108960	0.03006	
30-Aug-04	271.80	1.01135	0.01128	0.0108032	0.00048	
31-Aug-04	269.80	0.99264	-0.00739	0.0107006	0.01809	
	270.90	1.00408	0.00407	0.0105883	0.00652	
2-Sep-04	262.45	0.96881	-0.03169	0.0104667	0.04216	
3-Sep-04	262.95	1.00191	0.00190	0.0103362	0.00843	
6-Sep-04	264.50	1.00589	0.00588	0.0101972	0.00432	
7-Sep-04	263.00	0.99433	-0.00569	0.0100500	0.01574	
8-Sep-04	265.40	1.00913	0.00908	0.0098950	0.00081	
9-Sep-04	267.25	1.00697	0.00695	0.0097327	0.00279	
10-Sep-04	268.95	1.00636	0.00634	0.0095635	0.00322	
13-Sep-04	265.25	0.98624	-0.01385	0.0093878	0.02324	
14-Sep-04	267.80	1.00961	0.00957	0.0092062	0.00036	
15-Sep-04	264.80	0.98880	-0.01127	0.0090191	0.02028	
16-Sep-04	266.05	1.00472	0.00471	0.0088270	0.00412	
17-Sep-04	275.20	1.03439	0.03381	0.0086303	0.02518	
20-Sep-04	279.00	1.01381	0.01371	0.0084296	0.00528	
21-Sep-04	288.95	1.03566	0.03504	0.0082254	0.02682	
22-Sep-04	295.35	1.02215	0.02191	0.0080181	0.01389	
23-Sep-04	288.70	0.97748	-0.02277	0.0078082	0.03058	
24-Sep-04	292.25	1.01230	0.01222	0.0075962	0.00463	
27-Sep-04	295.30	1.01044	0.01038	0.0073826	0.00300	

28-Sep-04	291.60	0.98747	-0.01261	0.0071679	0.01978	
29-Sep-04	288.90	0.99074	-0.00930	0.0069524	0.01625	
30-Sep-04	286.25	0.99083	-0.00922	0.0067367	0.01595	
	289.30	1.01066	0.01060	0.0065212	0.00408	
4-Oct-04	291.45	1.00743	0.00740	0.0063062	0.00110	
5-Oct-04	298.00	1.02247	0.02223	0.0060923	0.01613	
6-Oct-04	295.85	0.99279	-0.00724	0.0058797	0.01312	
7-Oct-04	294.65	0.99594	-0.00406	0.0056689	0.00973	
8-Oct-04	296.35	1.00577	0.00575	0.0054602	0.00029	
9-Oct-04	292.45	0.98684	-0.01325	0.0052540	0.01850	
11-Oct-04	286.20	0.97863	-0.02160	0.0050505	0.02665	
12-Oct-04	289.30	1.01083	0.01077	0.0048500	0.00592	
14-Oct-04	289.30	1.00000	0.00000	0.0046528	0.00465	
15-Oct-04	287.45	0.99361	-0.00642	0.0044592	0.01087	
18-Oct-04	294.30	1.02383	0.02355	0.0042694	0.01928	
19-Oct-04	296.70	1.00815	0.00812	0.0040836	0.00404	
20-Oct-04	290.20	0.97809	-0.02215	0.0039019	0.02605	
21-Oct-04	290.60	1.00138	0.00138	0.0037247	0.00235	
25-Oct-04	285.35	0.98193	-0.01823	0.0035519	0.02178	
26-Oct-04	286.90	1.00543	0.00542	0.0033838	0.00203	
27-Oct-04	290.10	1.01115	0.01109	0.0032204	0.00787	
28-Oct-04	294.95	1.01672	0.01658	0.0030618	0.01352	
29-Oct-04	299.05	1.01390	0.01380	0.0029081	0.01090	
	296.30	0.99080	-0.00924	0.0027594	0.01200	
2-Nov-04	296.75	1.00152	0.00152	0.0026157	0.00110	
3-Nov-04	307.75	1.03707	0.03640	0.0024770	0.03392	
4-Nov-04	309.10	1.00439	0.00438	0.0023433	0.00203	
5-Nov-04	318.90	1.03170	0.03121	0.0022146	0.02900	
8-Nov-04	316.35	0.99200	-0.00803	0.0020909	0.01012	
9-Nov-04	317.45	1.00348	0.00347	0.0019722	0.00150	
10-Nov-04	317.05	0.99874	-0.00126	0.0018583	0.00312	
11-Nov-04	315.75	0.99590	-0.00411	0.0017492	0.00586	
12-Nov-04	315.00	0.99762	-0.00238	0.0016449	0.00402	
16-Nov-04	319.65	1.01476	0.01465	0.0015453	0.01311	
17-Nov-04	334.75	1.04724	0.04616	0.0014503	0.04471	
18-Nov-04	330.70	0.98790	-0.01217	0.0013597	0.01353	
19-Nov-04	325.75	0.98503	-0.01508	0.0012736	0.01635	
22-Nov-04	322.85	0.99110	-0.00894	0.0011917	0.01013	
23-Nov-04	325.25	1.00743	0.00741	0.0011139	0.00629	
24-Nov-04	326.60	1.00415	0.00414	0.0010402	0.00310	
25-Nov-04	318.20	0.97428	-0.02606	0.0009704	0.02703	
29-Nov-04	336.10	1.05625	0.05473	0.0009044	0.05382	
30-Nov-04	339.75	1.01086	0.01080	0.0008420	0.00996	
1-Dec-04	339.75	1.00000	0.00000	0.0007832	0.00078	

2-Dec-04	344.25	1.01325	0.01316	0.0007277	0.01243	
3-Dec-04	353.95	1.02818	0.02779	0.0006755	0.02711	
6-Dec-04	357.25	1.00932	0.00928	0.0006264	0.00865	
7-Dec-04	364.90	1.02141	0.02119	0.0005803	0.02061	
8-Dec-04	358.10	0.98136	-0.01881	0.0005370	0.01935	
9-Dec-04	364.10	1.01676	0.01662	0.0004965	0.01612	
10-Dec-04	359.75	0.98805	-0.01202	0.0004586	0.01248	
13-Dec-04	360.55	1.00222	0.00222	0.0004231	0.00180	
14-Dec-04	363.20	1.00735	0.00732	0.0003900	0.00693	
15-Dec-04	364.85	1.00454	0.00453	0.0003592	0.00417	
16-Dec-04	366.00	1.00315	0.00315	0.0003304	0.00282	
17-Dec-04	359.95	0.98347	-0.01667	0.0003037	0.01697	
20-Dec-04	363.90	1.01097	0.01091	0.0002788	0.01064	
21-Dec-04	366.00	1.00577	0.00575	0.0002557	0.00550	
22-Dec-04	360.95	0.98620	-0.01389	0.0002343	0.01413	
23-Dec-04	364.40	1.00956	0.00951	0.0002145	0.00930	
24-Dec-04	371.30	1.01894	0.01876	0.0001961	0.01856	
27-Dec-04	374.00	1.00727	0.00725	0.0001792	0.00707	
28-Dec-04	373.30	0.99813	-0.00187	0.0001635	0.00204	
29-Dec-04	370.80	0.99330	-0.00672	0.0001491	0.00687	
30-Dec-04	363.25	0.97964	-0.02057	0.0001358	0.02071	
31-Dec-04	371.35	1.02230	0.02205	0.0001235	0.02193	

H_0 : ICICI share price for the year 2004 with mean = 289.465 follows normal distribution.

H_a : ICICI share price for the year 2004 with mean = 289.465 does not follow normal distribution.

Level of significance (α) = 0.01

Sample size (n) = 192

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.112877$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{192}} = 0.117635$$

Since $D_n < D_{table}$, the null hypothesis is accepted. Hence, the data are described by normal distribution.

Hypothesis testing for ICICI for the year 2005

TABLE 4.1.7: Calculation of K-S statistics for ICICI for the year 2005

Date	Year 2005 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ Max/ $F_e - F_0$ /
	371.35					
4-Jan-05	373.90	1.00687	0.00684	5.985E-05	0.00678	
5-Jan-05	361.75	0.96750	-0.03304	6.432E-05	0.03310	
6-Jan-05	353.40	0.97692	-0.02335	6.908E-05	0.02342	
7-Jan-05	358.70	1.01500	0.01489	7.415E-05	0.01481	
10-Jan-05	348.90	0.97268	-0.02770	7.955E-05	0.02778	
11-Jan-05	350.75	1.00530	0.00529	8.529E-05	0.00520	
12-Jan-05	345.10	0.98389	-0.01624	9.139E-05	0.01633	
13-Jan-05	354.05	1.02593	0.02560	9.787E-05	0.02551	
14-Jan-05	351.15	0.99181	-0.00822	1.048E-04	0.00833	
17-Jan-05	352.10	1.00271	0.00270	1.121E-04	0.00259	
18-Jan-05	351.00	0.99688	-0.00313	1.198E-04	0.00325	
19-Jan-05	351.60	1.00171	0.00171	1.280E-04	0.00158	
20-Jan-05	346.20	0.98464	-0.01548	1.367E-04	0.01561	
24-Jan-05	338.55	0.97790	-0.02234	1.459E-04	0.02249	
25-Jan-05	343.55	1.01477	0.01466	1.556E-04	0.01451	
27-Jan-05	337.50	0.98239	-0.01777	1.658E-04	0.01793	
28-Jan-05	348.05	1.03126	0.03078	1.767E-04	0.03060	
31-Jan-05	360.90	1.03692	0.03625	1.881E-04	0.03607	
	361.80	1.00249	0.00249	2.002E-04	0.00229	
2-Feb-05	366.05	1.01175	0.01168	2.129E-04	0.01147	
3-Feb-05	369.65	1.00983	0.00979	2.262E-04	0.00956	
4-Feb-05	365.70	0.98931	-0.01074	2.403E-04	0.01098	
7-Feb-05	361.10	0.98742	-0.01266	2.551E-04	0.01291	
8-Feb-05	362.80	1.00471	0.00470	2.707E-04	0.00443	
9-Feb-05	366.45	1.01006	0.01001	2.871E-04	0.00972	
10-Feb-05	374.70	1.02251	0.02226	3.042E-04	0.02196	
11-Feb-05	374.90	1.00053	0.00053	3.222E-04	0.00021	
14-Feb-05	380.80	1.01574	0.01561	3.411E-04	0.01527	
15-Feb-05	383.15	1.00617	0.00615	3.609E-04	0.00579	
16-Feb-05	375.60	0.98029	-0.01990	3.816E-04	0.02028	
17-Feb-05	376.10	1.00133	0.00133	4.032E-04	0.00093	
18-Feb-05	381.75	1.01502	0.01491	4.258E-04	0.01449	
21-Feb-05	376.45	0.98612	-0.01398	4.494E-04	0.01443	
22-Feb-05	374.65	0.99522	-0.00479	4.741E-04	0.00527	
23-Feb-05	373.75	0.99760	-0.00241	4.998E-04	0.00290	

24-Feb-05	369.40	0.98836	-0.01171	5.267E-04	0.01223	
25-Feb-05	367.65	0.99526	-0.00475	5.546E-04	0.00530	
28-Feb-05	380.90	1.03604	0.03541	5.837E-04	0.03482	
	372.25	0.97729	-0.02297	6.139E-04	0.02359	
2-Mar-05	389.50	1.04634	0.04530	6.453E-04	0.04465	
3-Mar-05	397.00	1.01926	0.01907	6.780E-04	0.01839	
4-Mar-05	397.70	1.00176	0.00176	7.119E-04	0.00105	
7-Mar-05	399.30	1.00402	0.00402	7.470E-04	0.00327	
8-Mar-05	398.95	0.99912	-0.00088	7.835E-04	0.00166	
9-Mar-05	390.50	0.97882	-0.02141	8.212E-04	0.02223	
10-Mar-05	392.05	1.00397	0.00396	8.603E-04	0.00310	
11-Mar-05	390.50	0.99605	-0.00396	9.006E-04	0.00486	
14-Mar-05	384.20	0.98387	-0.01626	9.424E-04	0.01721	
15-Mar-05	382.60	0.99584	-0.00417	9.855E-04	0.00516	
16-Mar-05	400.95	1.04796	0.04685	1.030E-03	0.04582	
17-Mar-05	401.40	1.00112	0.00112	1.076E-03	0.00005	
18-Mar-05	413.05	1.02902	0.02861	1.123E-03	0.02749	
21-Mar-05	408.45	0.98886	-0.01120	1.172E-03	0.01237	
22-Mar-05	395.25	0.96768	-0.03285	1.222E-03	0.03407	
23-Mar-05	390.25	0.98735	-0.01273	1.273E-03	0.01400	
24-Mar-05	390.35	1.00026	0.00026	1.326E-03	0.00107	
28-Mar-05	397.85	1.01921	0.01903	1.380E-03	0.01765	
29-Mar-05	389.85	0.97989	-0.02031	1.436E-03	0.02175	
30-Mar-05	383.00	0.98243	-0.01773	1.493E-03	0.01922	
31-Mar-05	392.80	1.02559	0.02527	1.551E-03	0.02371	
	406.05	1.03373	0.03318	1.611E-03	0.03157	
4-Apr-05	418.35	1.03029	0.02984	1.672E-03	0.02817	
5-Apr-05	425.45	1.01697	0.01683	1.734E-03	0.01510	
6-Apr-05	425.25	0.99953	-0.00047	1.797E-03	0.00227	
7-Apr-05	408.70	0.96108	-0.03970	1.862E-03	0.04156	
8-Apr-05	403.95	0.98838	-0.01169	1.928E-03	0.01362	
11-Apr-05	394.55	0.97673	-0.02355	1.995E-03	0.02554	
12-Apr-05	408.40	1.03510	0.03450	2.064E-03	0.03244	
13-Apr-05	412.00	1.00881	0.00878	2.133E-03	0.00664	
15-Apr-05	403.10	0.97840	-0.02184	2.204E-03	0.02404	
18-Apr-05	386.80	0.95956	-0.04128	2.275E-03	0.04355	
19-Apr-05	383.80	0.99224	-0.00779	2.348E-03	0.01013	
20-Apr-05	378.30	0.98567	-0.01443	2.421E-03	0.01686	
21-Apr-05	383.45	1.01361	0.01352	2.495E-03	0.01103	
22-Apr-05	396.45	1.03390	0.03334	2.570E-03	0.03077	
25-Apr-05	408.10	1.02939	0.02896	2.646E-03	0.02632	
26-Apr-05	404.70	0.99167	-0.00837	2.722E-03	0.01109	
27-Apr-05	383.90	0.94860	-0.05276	2.799E-03	0.05556	
28-Apr-05	379.15	0.98763	-0.01245	2.877E-03	0.01533	
29-Apr-05	359.95	0.94936	-0.05197	2.954E-03	0.05492	
2-May-05	360.35	1.00111	0.00111	3.033E-03	0.00192	

3-May-05	362.45	1.00583	0.00581	3.111E-03	0.00270	
4-May-05	367.30	1.01338	0.01329	3.190E-03	0.01010	
5-May-05	376.70	1.02559	0.02527	3.269E-03	0.02200	
6-May-05	377.70	1.00265	0.00265	3.347E-03	0.00070	
9-May-05	382.30	1.01218	0.01211	3.426E-03	0.00868	
10-May-05	392.05	1.02550	0.02518	3.504E-03	0.02168	
11-May-05	393.20	1.00293	0.00293	3.583E-03	0.00065	
12-May-05	391.70	0.99619	-0.00382	3.660E-03	0.00748	
13-May-05	392.20	1.00128	0.00128	3.738E-03	0.00246	
16-May-05	398.10	1.01504	0.01493	3.814E-03	0.01112	
17-May-05	396.50	0.99598	-0.00403	3.890E-03	0.00792	
18-May-05	390.65	0.98525	-0.01486	3.966E-03	0.01883	
19-May-05	393.70	1.00781	0.00778	4.040E-03	0.00374	
20-May-05	397.45	1.00953	0.00948	4.113E-03	0.00537	
23-May-05	402.55	1.01283	0.01275	4.186E-03	0.00856	
24-May-05	399.30	0.99193	-0.00811	4.257E-03	0.01236	
25-May-05	397.40	0.99524	-0.00477	4.326E-03	0.00910	
26-May-05	400.00	1.00654	0.00652	4.395E-03	0.00213	
27-May-05	399.05	0.99763	-0.00238	4.461E-03	0.00684	
30-May-05	389.70	0.97657	-0.02371	4.527E-03	0.02824	
31-May-05	392.05	1.00603	0.00601	4.590E-03	0.00142	
	399.40	1.01875	0.01857	4.652E-03	0.01392	
2-Jun-05	392.15	0.98185	-0.01832	4.712E-03	0.02303	
3-Jun-05	393.00	1.00217	0.00217	4.769E-03	0.00260	
4-Jun-05	397.25	1.01081	0.01076	4.825E-03	0.00593	
6-Jun-05	393.70	0.99106	-0.00898	4.879E-03	0.01386	
7-Jun-05	405.35	1.02959	0.02916	4.930E-03	0.02423	
8-Jun-05	419.60	1.03515	0.03455	4.979E-03	0.02957	
9-Jun-05	413.65	0.98582	-0.01428	5.025E-03	0.01931	
10-Jun-05	408.60	0.98779	-0.01228	5.069E-03	0.01735	
13-Jun-05	423.75	1.03708	0.03641	5.110E-03	0.03130	
14-Jun-05	433.95	1.02407	0.02379	5.149E-03	0.01864	
15-Jun-05	433.45	0.99885	-0.00115	5.185E-03	0.00634	
16-Jun-05	417.05	0.96216	-0.03857	5.218E-03	0.04379	
17-Jun-05	416.00	0.99748	-0.00252	5.248E-03	0.00777	
20-Jun-05	405.15	0.97392	-0.02643	5.276E-03	0.03170	
21-Jun-05	418.20	1.03221	0.03170	5.300E-03	0.02640	
22-Jun-05	420.70	1.00598	0.00596	5.322E-03	0.00064	
23-Jun-05	418.40	0.99453	-0.00548	5.340E-03	0.01082	
24-Jun-05	418.35	0.99988	-0.00012	5.356E-03	0.00548	
27-Jun-05	417.75	0.99857	-0.00144	5.368E-03	0.00680	
28-Jun-05	417.85	1.00024	0.00024	5.378E-03	0.00514	
29-Jun-05	416.95	0.99785	-0.00216	5.384E-03	0.00754	
30-Jun-05	425.75	1.02111	0.02089	5.387E-03	0.01550	

	421.25	0.98943	-0.01063	5.387E-03	0.01601	
4-Jul-05	429.25	1.01899	0.01881	5.384E-03	0.01343	
5-Jul-05	432.05	1.00652	0.00650	5.377E-03	0.00112	
6-Jul-05	431.95	0.99977	-0.00023	5.368E-03	0.00560	
7-Jul-05	422.00	0.97696	-0.02330	5.355E-03	0.02866	
8-Jul-05	424.25	1.00533	0.00532	5.340E-03	0.00002	
11-Jul-05	452.35	1.06623	0.06413	5.321E-03	0.05881	
12-Jul-05	468.05	1.03471	0.03412	5.300E-03	0.02882	
13-Jul-05	463.80	0.99092	-0.00912	5.275E-03	0.01440	
14-Jul-05	446.00	0.96162	-0.03913	5.247E-03	0.04438	
15-Jul-05	441.30	0.98946	-0.01059	5.217E-03	0.01581	
18-Jul-05	443.65	1.00533	0.00531	5.184E-03	0.00013	
19-Jul-05	440.70	0.99335	-0.00667	5.148E-03	0.01182	
20-Jul-05	440.60	0.99977	-0.00023	5.109E-03	0.00534	
21-Jul-05	438.80	0.99591	-0.00409	5.067E-03	0.00916	
22-Jul-05	454.80	1.03646	0.03581	5.023E-03	0.03079	
25-Jul-05	493.40	1.08487	0.08146	4.977E-03		
26-Jul-05	509.25	1.03212	0.03162	4.928E-03	0.02669	
27-Jul-05	528.20	1.03721	0.03654	4.877E-03	0.03166	
29-Jul-05	534.45	1.01183	0.01176	4.823E-03	0.00694	
	538.40	1.00739	0.00736	4.767E-03	0.00260	
2-Aug-05	520.40	0.96657	-0.03400	4.709E-03	0.03871	
3-Aug-05	522.65	1.00432	0.00431	4.650E-03	0.00034	
4-Aug-05	513.30	0.98211	-0.01805	4.588E-03	0.02264	
5-Aug-05	500.15	0.97438	-0.02595	4.524E-03	0.03048	
8-Aug-05	478.10	0.95591	-0.04509	4.459E-03	0.04955	
9-Aug-05	482.60	1.00941	0.00937	4.392E-03	0.00498	
10-Aug-05	494.05	1.02373	0.02345	4.324E-03	0.01912	
11-Aug-05	506.95	1.02611	0.02578	4.254E-03	0.02152	
12-Aug-05	512.75	1.01144	0.01138	4.183E-03	0.00719	
16-Aug-05	504.75	0.98440	-0.01573	4.111E-03	0.01984	
17-Aug-05	503.90	0.99832	-0.00169	4.037E-03	0.00572	
18-Aug-05	507.60	1.00734	0.00732	3.963E-03	0.00335	
19-Aug-05	498.20	0.98148	-0.01869	3.888E-03	0.02258	
22-Aug-05	491.55	0.98665	-0.01344	3.811E-03	0.01725	
23-Aug-05	480.45	0.97742	-0.02284	3.735E-03	0.02658	
24-Aug-05	488.25	1.01623	0.01610	3.657E-03	0.01245	
25-Aug-05	484.50	0.99232	-0.00771	3.580E-03	0.01129	
26-Aug-05	481.60	0.99401	-0.00600	3.501E-03	0.00950	
29-Aug-05	467.95	0.97166	-0.02875	3.423E-03	0.03218	
30-Aug-05	477.10	1.01955	0.01936	3.344E-03	0.01602	
31-Aug-05	481.80	1.00985	0.00980	3.266E-03	0.00654	
	483.85	1.00425	0.00425	3.187E-03	0.00106	
2-Sep-05	481.50	0.99514	-0.00487	3.108E-03	0.00798	

5-Sep-05	484.50	1.00623	0.00621	3.030E-03	0.00318	
6-Sep-05	488.00	1.00722	0.00720	2.952E-03	0.00425	
8-Sep-05	505.25	1.03535	0.03474	2.874E-03	0.03186	
9-Sep-05	513.55	1.01643	0.01629	2.796E-03	0.01350	
12-Sep-05	516.45	1.00565	0.00563	2.719E-03	0.00291	
13-Sep-05	518.50	1.00397	0.00396	2.643E-03	0.00132	
14-Sep-05	527.25	1.01688	0.01673	2.567E-03	0.01417	
15-Sep-05	533.15	1.01119	0.01113	2.492E-03	0.00864	
16-Sep-05	546.15	1.02438	0.02409	2.418E-03	0.02167	
19-Sep-05	555.40	1.01694	0.01679	2.345E-03	0.01445	
20-Sep-05	582.30	1.04843	0.04730	2.272E-03	0.04502	
21-Sep-05	576.50	0.99004	-0.01001	2.201E-03	0.01221	
22-Sep-05	573.15	0.99419	-0.00583	2.131E-03	0.00796	
23-Sep-05	574.55	1.00244	0.00244	2.061E-03	0.00038	
26-Sep-05	575.85	1.00226	0.00226	1.993E-03	0.00027	
27-Sep-05	590.35	1.02518	0.02487	1.926E-03	0.02294	
28-Sep-05	599.40	1.01533	0.01521	1.860E-03	0.01335	
29-Sep-05	598.95	0.99925	-0.00075	1.795E-03	0.00255	
30-Sep-05	601.70	1.00459	0.00458	1.731E-03	0.00285	
	593.40	0.98621	-0.01389	1.669E-03	0.01556	
4-Oct-05	590.35	0.99486	-0.00515	1.608E-03	0.00676	
5-Oct-05	562.10	0.95215	-0.04904	1.549E-03	0.05058	
6-Oct-05	534.50	0.95090	-0.05035	1.490E-03	0.05184	
7-Oct-05	529.95	0.99149	-0.00855	1.434E-03	0.00998	
10-Oct-05	531.40	1.00274	0.00273	1.378E-03	0.00135	
11-Oct-05	538.55	1.01346	0.01337	1.324E-03	0.01204	
13-Oct-05	525.65	0.97605	-0.02424	1.271E-03	0.02552	
14-Oct-05	506.25	0.96309	-0.03760	1.220E-03	0.03882	
17-Oct-05	500.35	0.98835	-0.01172	1.170E-03	0.01289	
18-Oct-05	496.65	0.99261	-0.00742	1.121E-03	0.00854	
19-Oct-05	497.60	1.00191	0.00191	1.074E-03	0.00084	
20-Oct-05	496.90	0.99859	-0.00141	1.028E-03	0.00244	
21-Oct-05	506.55	1.01942	0.01923	9.838E-04	0.01825	
24-Oct-05	497.60	0.98233	-0.01783	9.408E-04	0.01877	
25-Oct-05	503.95	1.01276	0.01268	8.991E-04	0.01178	
26-Oct-05	510.80	1.01359	0.01350	8.588E-04	0.01264	
27-Oct-05	479.90	0.93951	-0.06240	8.198E-04	0.06322	
28-Oct-05	485.50	1.01167	0.01160	7.821E-04	0.01082	
31-Oct-05	498.60	1.02698	0.02662	7.457E-04	0.02588	
	498.65	1.00010	0.00010	7.106E-04	0.00061	
2-Nov-05	499.45	1.00160	0.00160	6.768E-04	0.00093	
7-Nov-05	499.55	1.00020	0.00020	6.442E-04	0.00044	
8-Nov-05	504.70	1.01031	0.01026	6.128E-04	0.00964	
9-Nov-05	505.50	1.00159	0.00158	5.826E-04	0.00100	

H_0 : ICICI share price for the year 2005 with mean = 452.4307 follows normal distribution.

H_a : ICICI share price for the year 2005 with mean = 452.4307 does not follow normal distribution.

Level of significance $(\alpha) = 0.01$

Sample size $(n) = 251$

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.076486$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{251}} = 0.102885$$

Since $D_n < D_{table}$, the null hypothesis is accepted. Hence, the data are described by normal distribution.

Hypothesis testing for ICICI for the year 2006

TABLE 4.1.8: Calculation of K-S statistics for ICICI for the year 2006

Date	Year 2006 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ Max/ $F_e - F_0$ /
	597.00					
3-Jan-06	606.50	1.01591	0.01579	3.840E-05	0.01575	
4-Jan-06	613.70	1.01187	0.01180	4.128E-05	0.01176	
5-Jan-06	604.55	0.98509	-0.01502	4.435E-05	0.01507	
6-Jan-06	600.15	0.99272	-0.00730	4.762E-05	0.00735	
9-Jan-06	591.20	0.98509	-0.01503	5.110E-05	0.01508	
10-Jan-06	585.25	0.98994	-0.01012	5.480E-05	0.01017	
12-Jan-06	577.80	0.98727	-0.01281	5.874E-05	0.01287	
13-Jan-06	584.00	1.01073	0.01067	6.292E-05	0.01061	
16-Jan-06	573.30	0.98168	-0.01849	6.736E-05	0.01856	
17-Jan-06	564.40	0.98448	-0.01565	7.207E-05	0.01572	
18-Jan-06	559.15	0.99070	-0.00935	7.707E-05	0.00942	
19-Jan-06	569.55	1.01860	0.01843	8.236E-05	0.01835	
20-Jan-06	579.50	1.01747	0.01732	8.797E-05	0.01723	
23-Jan-06	570.70	0.98481	-0.01530	9.391E-05	0.01540	
24-Jan-06	573.10	1.00421	0.00420	1.002E-04	0.00410	
25-Jan-06	597.05	1.04179	0.04094	1.068E-04	0.04083	
27-Jan-06	619.55	1.03769	0.03699	1.138E-04	0.03688	
30-Jan-06	614.65	0.99209	-0.00794	1.212E-04	0.00806	
31-Jan-06	609.25	0.99121	-0.00882	1.290E-04	0.00895	
	590.20	0.96873	-0.03177	1.372E-04	0.03190	
2-Feb-06	579.95	0.98263	-0.01752	1.459E-04	0.01767	
3-Feb-06	570.95	0.98448	-0.01564	1.550E-04	0.01580	
6-Feb-06	608.25	1.06533	0.06328	1.646E-04	0.06312	
7-Feb-06	628.75	1.03370	0.03315	1.747E-04	0.03297	
8-Feb-06	619.10	0.98465	-0.01547	1.853E-04	0.01565	
10-Feb-06	603.80	0.97529	-0.02502	1.964E-04	0.02522	
13-Feb-06	609.50	1.00944	0.00940	2.080E-04	0.00919	
14-Feb-06	596.50	0.97867	-0.02156	2.202E-04	0.02178	
15-Feb-06	598.30	1.00302	0.00301	2.330E-04	0.00278	
16-Feb-06	597.80	0.99916	-0.00084	2.464E-04	0.00108	
17-Feb-06	586.90	0.98177	-0.01840	2.605E-04	0.01866	
20-Feb-06	591.75	1.00826	0.00823	2.751E-04	0.00795	
21-Feb-06	593.35	1.00270	0.00270	2.904E-04	0.00241	
22-Feb-06	594.30	1.00160	0.00160	3.064E-04	0.00129	
23-Feb-06	588.40	0.99007	-0.00998	3.231E-04	0.01030	

24-Feb-06	593.80	1.00918	0.00914	3.405E-04	0.00880	
27-Feb-06	596.60	1.00472	0.00470	3.586E-04	0.00435	
28-Feb-06	615.25	1.03126	0.03078	3.774E-04	0.03040	
1-Mar-06	616.55	1.00211	0.00211	3.970E-04	0.00171	
2-Mar-06	620.40	1.00624	0.00623	4.174E-04	0.00581	
3-Mar-06	611.80	0.98614	-0.01396	4.386E-04	0.01440	
6-Mar-06	613.35	1.00253	0.00253	4.605E-04	0.00207	
7-Mar-06	600.90	0.97970	-0.02051	4.833E-04	0.02099	
8-Mar-06	591.55	0.98444	-0.01568	5.069E-04	0.01619	
9-Mar-06	601.75	1.01724	0.01710	5.314E-04	0.01656	
10-Mar-06	614.35	1.02094	0.02072	5.567E-04	0.02017	
13-Mar-06	605.20	0.98511	-0.01501	5.829E-04	0.01559	
14-Mar-06	606.90	1.00281	0.00281	6.099E-04	0.00220	
16-Mar-06	610.80	1.00643	0.00641	6.379E-04	0.00577	
17-Mar-06	606.15	0.99239	-0.00764	6.667E-04	0.00831	
20-Mar-06	606.25	1.00016	0.00016	6.964E-04	0.00053	
21-Mar-06	598.20	0.98672	-0.01337	7.270E-04	0.01409	
22-Mar-06	592.75	0.99089	-0.00915	7.585E-04	0.00991	
23-Mar-06	592.50	0.99958	-0.00042	7.910E-04	0.00121	
24-Mar-06	598.65	1.01038	0.01033	8.243E-04	0.00950	
27-Mar-06	598.95	1.00050	0.00050	8.585E-04	0.00036	
28-Mar-06	592.60	0.98940	-0.01066	8.936E-04	0.01155	
29-Mar-06	598.50	1.00996	0.00991	9.297E-04	0.00898	
30-Mar-06	588.70	0.98363	-0.01651	9.666E-04	0.01748	
31-Mar-06	589.05	1.00059	0.00059	1.004E-03	0.00041	
1-Apr-06	604.00	1.02538	0.02506	1.043E-03	0.02402	
4-Apr-06	613.75	1.01614	0.01601	1.082E-03	0.01493	
5-Apr-06	621.90	1.01328	0.01319	1.123E-03	0.01207	
7-Apr-06	599.70	0.96430	-0.03635	1.164E-03	0.03751	
10-Apr-06	597.45	0.99625	-0.00376	1.206E-03	0.00496	
12-Apr-06	582.55	0.97506	-0.02526	1.249E-03	0.02650	
13-Apr-06	563.35	0.96704	-0.03351	1.292E-03	0.03481	
17-Apr-06	580.70	1.03080	0.03033	1.336E-03	0.02900	
18-Apr-06	586.50	1.00999	0.00994	1.381E-03	0.00856	
19-Apr-06	588.05	1.00264	0.00264	1.427E-03	0.00121	
20-Apr-06	588.65	1.00102	0.00102	1.473E-03	0.00045	
21-Apr-06	591.60	1.00501	0.00500	1.520E-03	0.00348	
24-Apr-06	569.05	0.96188	-0.03886	1.567E-03	0.04043	
25-Apr-06	559.80	0.98374	-0.01639	1.615E-03	0.01800	
26-Apr-06	567.50	1.01375	0.01366	1.664E-03	0.01200	
27-Apr-06	566.15	0.99762	-0.00238	1.713E-03	0.00409	
28-Apr-06	576.80	1.01881	0.01864	1.762E-03	0.01687	
29-Apr-06	591.75	1.02592	0.02559	1.812E-03	0.02378	
2-May-06	621.95	1.05104	0.04978	1.862E-03	0.04791	
3-May-06	649.10	1.04365	0.04273	1.912E-03	0.04082	
4-May-06	659.90	1.01664	0.01650	1.962E-03	0.01454	

5-May-06	638.20	0.96712	-0.03344	2.013E-03	0.03545	
8-May-06	634.55	0.99428	-0.00574	2.064E-03	0.00780	
9-May-06	639.15	1.00725	0.00722	2.114E-03	0.00511	
10-May-06	660.75	1.03379	0.03324	2.165E-03	0.03107	
11-May-06	662.55	1.00272	0.00272	2.216E-03	0.00050	
12-May-06	636.05	0.96000	-0.04082	2.266E-03	0.04309	
15-May-06	619.30	0.97367	-0.02669	2.317E-03	0.02900	
16-May-06	618.60	0.99887	-0.00113	2.367E-03	0.00350	
17-May-06	626.05	1.01204	0.01197	2.416E-03	0.00956	
18-May-06	593.75	0.94841	-0.05297	2.465E-03	0.05544	
19-May-06	555.45	0.93549	-0.06668	2.514E-03	0.06919	
22-May-06	553.15	0.99586	-0.00415	2.563E-03	0.00671	
23-May-06	577.35	1.04375	0.04282	2.610E-03	0.04021	
24-May-06	568.90	0.98536	-0.01474	2.657E-03	0.01740	
25-May-06	558.95	0.98251	-0.01764	2.703E-03	0.02035	
26-May-06	563.75	1.00859	0.00855	2.749E-03	0.00580	
29-May-06	569.30	1.00984	0.00980	2.793E-03	0.00700	
30-May-06	569.90	1.00105	0.00105	2.837E-03	0.00178	
31-May-06	537.50	0.94315	-0.05853	2.880E-03	0.06141	
1-Jun-06	534.30	0.99405	-0.00597	2.921E-03	0.00889	
2-Jun-06	551.95	1.03303	0.03250	2.962E-03	0.02954	
5-Jun-06	538.10	0.97491	-0.02541	3.001E-03	0.02841	
6-Jun-06	542.70	1.00855	0.00851	3.039E-03	0.00547	
7-Jun-06	533.25	0.98259	-0.01757	3.076E-03	0.02064	
8-Jun-06	498.85	0.93549	-0.06668	3.111E-03	0.06980	
9-Jun-06	500.35	1.00301	0.00300	3.145E-03	0.00014	
12-Jun-06	474.20	0.94774	-0.05368	3.177E-03	0.05686	
13-Jun-06	459.65	0.96932	-0.03116	3.208E-03	0.03437	
14-Jun-06	451.20	0.98162	-0.01855	3.237E-03	0.02179	
15-Jun-06	482.55	1.06948	0.06717	3.265E-03	0.06391	
16-Jun-06	506.70	1.05005	0.04883	3.290E-03	0.04554	
19-Jun-06	501.00	0.98875	-0.01131	3.314E-03	0.01463	
20-Jun-06	490.45	0.97894	-0.02128	3.337E-03	0.02462	
21-Jun-06	494.40	1.00805	0.00802	3.357E-03	0.00466	
22-Jun-06	512.25	1.03610	0.03547	3.376E-03	0.03209	
23-Jun-06	508.05	0.99180	-0.00823	3.393E-03	0.01163	
25-Jun-06	507.20	0.99833	-0.00167	3.408E-03	0.00508	
26-Jun-06	490.75	0.96757	-0.03297	3.421E-03	0.03639	
27-Jun-06	498.60	1.01600	0.01587	3.432E-03	0.01244	
28-Jun-06	488.90	0.98055	-0.01965	3.441E-03	0.02309	
29-Jun-06	479.05	0.97985	-0.02035	3.448E-03	0.02380	
30-Jun-06	487.90	1.01847	0.01831	3.453E-03	0.01485	
3-Jul-06	489.10	1.00246	0.00246	3.455E-03	0.00100	
4-Jul-06	490.35	1.00256	0.00255	3.456E-03	0.00090	

5-Jul-06	499.90	1.01948	0.01929	3.455E-03	0.01583	
6-Jul-06	485.55	0.97129	-0.02913	3.452E-03	0.03258	
7-Jul-06	498.95	1.02760	0.02722	3.447E-03	0.02378	
10-Jul-06	493.00	0.98807	-0.01200	3.440E-03	0.01544	
11-Jul-06	487.95	0.98976	-0.01030	3.431E-03	0.01373	
12-Jul-06	488.30	1.00072	0.00072	3.420E-03	0.00270	
13-Jul-06	495.75	1.01526	0.01514	3.407E-03	0.01174	
14-Jul-06	485.90	0.98013	-0.02007	3.392E-03	0.02346	
17-Jul-06	477.25	0.98220	-0.01796	3.375E-03	0.02134	
18-Jul-06	472.60	0.99026	-0.00979	3.356E-03	0.01315	
19-Jul-06	467.75	0.98974	-0.01032	3.335E-03	0.01365	
20-Jul-06	492.05	1.05195	0.05065	3.313E-03	0.04733	
21-Jul-06	484.75	0.98516	-0.01495	3.289E-03	0.01824	
24-Jul-06	514.85	1.06209	0.06024	3.263E-03	0.05698	
25-Jul-06	542.40	1.05351	0.05213	3.235E-03	0.04889	
26-Jul-06	540.50	0.99650	-0.00351	3.206E-03	0.00671	
27-Jul-06	543.60	1.00574	0.00572	3.175E-03	0.00254	
28-Jul-06	542.55	0.99807	-0.00193	3.142E-03	0.00508	
31-Jul-06	553.85	1.02083	0.02061	3.109E-03	0.01751	
1-Aug-06	549.65	0.99242	-0.00761	3.073E-03	0.01069	
2-Aug-06	548.00	0.99700	-0.00301	3.036E-03	0.00604	
3-Aug-06	557.60	1.01752	0.01737	2.998E-03	0.01437	
4-Aug-06	547.00	0.98099	-0.01919	2.959E-03	0.02215	
7-Aug-06	567.85	1.03812	0.03741	2.919E-03	0.03449	
8-Aug-06	595.55	1.04878	0.04763	2.877E-03	0.04475	
9-Aug-06	590.30	0.99118	-0.00885	2.834E-03	0.01169	
10-Aug-06	599.25	1.01516	0.01505	2.791E-03	0.01226	
11-Aug-06	584.50	0.97539	-0.02492	2.746E-03	0.02767	
14-Aug-06	576.75	0.98674	-0.01335	2.700E-03	0.01605	
16-Aug-06	590.70	1.02419	0.02390	2.654E-03	0.02125	
17-Aug-06	591.50	1.00135	0.00135	2.607E-03	0.00125	
18-Aug-06	588.35	0.99467	-0.00534	2.559E-03	0.00790	
21-Aug-06	594.65	1.01071	0.01065	2.511E-03	0.00814	
22-Aug-06	595.15	1.00084	0.00084	2.462E-03	0.00162	
23-Aug-06	590.60	0.99235	-0.00767	2.413E-03	0.01009	
24-Aug-06	589.15	0.99754	-0.00246	2.363E-03	0.00482	
25-Aug-06	588.95	0.99966	-0.00034	2.313E-03	0.00265	
28-Aug-06	587.75	0.99796	-0.00204	2.263E-03	0.00430	
29-Aug-06	595.30	1.01285	0.01276	2.212E-03	0.01055	
30-Aug-06	593.90	0.99765	-0.00235	2.162E-03	0.00452	
31-Aug-06	597.45	1.00598	0.00596	2.111E-03	0.00385	
1-Sep-06	609.60	1.02034	0.02013	2.060E-03	0.01807	
4-Sep-06	622.75	1.02157	0.02134	2.010E-03	0.01933	
5-Sep-06	613.15	0.98458	-0.01554	1.959E-03	0.01749	

6-Sep-06	610.45	0.99560	-0.00441	1.909E-03	0.00632	
7-Sep-06	607.10	0.99451	-0.00550	1.858E-03	0.00736	
8-Sep-06	606.40	0.99885	-0.00115	1.808E-03	0.00296	
11-Sep-06	596.75	0.98409	-0.01604	1.759E-03	0.01780	
12-Sep-06	604.75	1.01341	0.01332	1.710E-03	0.01161	
13-Sep-06	631.75	1.04465	0.04368	1.661E-03	0.04202	
14-Sep-06	650.35	1.02944	0.02902	1.612E-03	0.02740	
15-Sep-06	646.60	0.99423	-0.00578	1.564E-03	0.00735	
18-Sep-06	643.65	0.99544	-0.00457	1.517E-03	0.00609	
19-Sep-06	646.75	1.00482	0.00480	1.470E-03	0.00333	
20-Sep-06	651.20	1.00688	0.00686	1.424E-03	0.00543	
21-Sep-06	663.40	1.01873	0.01856	1.378E-03	0.01718	
22-Sep-06	654.90	0.98719	-0.01290	1.333E-03	0.01423	
25-Sep-06	658.65	1.00573	0.00571	1.289E-03	0.00442	
26-Sep-06	678.25	1.02976	0.02932	1.246E-03	0.02808	
27-Sep-06	688.25	1.01474	0.01464	1.203E-03	0.01343	
28-Sep-06	708.80	1.02986	0.02942	1.161E-03	0.02826	
29-Sep-06	699.60	0.98702	-0.01306	1.120E-03	0.01418	
30-Sep-06	697.75	0.99736	-0.00265	1.080E-03	0.00373	
4-Oct-06	695.05	0.99613	-0.00388	1.040E-03	0.00492	
5-Oct-06	705.85	1.01554	0.01542	1.002E-03	0.01442	
6-Oct-06	702.45	0.99518	-0.00483	9.641E-04	0.00579	
9-Oct-06	698.60	0.99452	-0.00550	9.272E-04	0.00642	
10-Oct-06	695.50	0.99556	-0.00445	8.913E-04	0.00534	
11-Oct-06	687.00	0.98778	-0.01230	8.562E-04	0.01315	
12-Oct-06	690.40	1.00495	0.00494	8.221E-04	0.00411	
13-Oct-06	694.90	1.00652	0.00650	7.888E-04	0.00571	
16-Oct-06	720.30	1.03655	0.03590	7.564E-04	0.03514	
17-Oct-06	726.30	1.00833	0.00830	7.250E-04	0.00757	
18-Oct-06	744.55	1.02513	0.02482	6.944E-04	0.02412	
19-Oct-06	741.75	0.99624	-0.00377	6.648E-04	0.00443	
20-Oct-06	741.50	0.99966	-0.00034	6.360E-04	0.00097	
21-Oct-06	739.30	0.99703	-0.00297	6.081E-04	0.00358	
23-Oct-06	720.55	0.97464	-0.02569	5.811E-04	0.02627	
26-Oct-06	759.35	1.05385	0.05245	5.550E-04	0.05189	
27-Oct-06	758.55	0.99895	-0.00105	5.297E-04	0.00158	
30-Oct-06	787.90	1.03869	0.03796	5.053E-04	0.03746	
31-Oct-06	777.15	0.98636	-0.01374	4.818E-04	0.01422	
1-Nov-06	778.15	1.00129	0.00129	4.590E-04	0.00083	
2-Nov-06	779.60	1.00186	0.00186	4.371E-04	0.00142	
3-Nov-06	772.75	0.99121	-0.00883	4.160E-04	0.00924	
6-Nov-06	767.65	0.99340	-0.00662	3.957E-04	0.00702	
7-Nov-06	770.75	1.00404	0.00403	3.761E-04	0.00365	
8-Nov-06	785.05	1.01855	0.01838	3.573E-04	0.01803	

9-Nov-06	800.35	1.01949	0.01930	3.393E-04	0.01896	
10-Nov-06	830.95	1.03823	0.03752	3.220E-04	0.03720	
13-Nov-06	841.00	1.01209	0.01202	3.053E-04	0.01172	
14-Nov-06	856.90	1.01891	0.01873	2.894E-04	0.01844	
15-Nov-06	880.50	1.02754	0.02717	2.741E-04	0.02689	
16-Nov-06	887.35	1.00778	0.00775	2.595E-04	0.00749	
17-Nov-06	876.55	0.98783	-0.01225	2.455E-04	0.01249	
20-Nov-06	859.20	0.98021	-0.01999	2.322E-04	0.02022	
21-Nov-06	872.35	1.01530	0.01519	2.194E-04	0.01497	
22-Nov-06	880.05	1.00883	0.00879	2.072E-04	0.00858	
23-Nov-06	876.00	0.99540	-0.00461	1.956E-04	0.00481	
24-Nov-06	872.85	0.99640	-0.00360	1.845E-04	0.00379	
27-Nov-06	883.05	1.01169	0.01162	1.740E-04	0.01144	
28-Nov-06	861.30	0.97537	-0.02494	1.639E-04	0.02510	
29-Nov-06	858.65	0.99692	-0.00308	1.544E-04	0.00324	
30-Nov-06	872.45	1.01607	0.01594	1.453E-04	0.01580	
1-Dec-06	878.15	1.00653	0.00651	1.367E-04	0.00638	
4-Dec-06	870.70	0.99152	-0.00852	1.285E-04	0.00865	
5-Dec-06	863.55	0.99179	-0.00825	1.207E-04	0.00837	
6-Dec-06	868.45	1.00567	0.00566	1.133E-04	0.00554	
7-Dec-06	879.15	1.01232	0.01225	1.064E-04	0.01214	
8-Dec-06	880.35	1.00136	0.00136	9.976E-05	0.00126	
11-Dec-06	820.85	0.93241	-0.06998	9.350E-05		
12-Dec-06	803.95	0.97941	-0.02080	8.759E-05	0.02089	
13-Dec-06	830.90	1.03352	0.03297	8.201E-05	0.03289	
14-Dec-06	870.35	1.04748	0.04639	7.673E-05	0.04631	
15-Dec-06	870.80	1.00052	0.00052	7.175E-05	0.00045	
18-Dec-06	887.15	1.01878	0.01860	6.706E-05	0.01853	
19-Dec-06	868.20	0.97864	-0.02159	6.263E-05	0.02165	
20-Dec-06	854.40	0.98411	-0.01602	5.847E-05	0.01608	
21-Dec-06	854.25	0.99982	-0.00018	5.455E-05	0.00023	
22-Dec-06	857.00	1.00322	0.00321	5.086E-05	0.00316	
26-Dec-06	873.00	1.01867	0.01850	4.739E-05	0.01845	
27-Dec-06	894.25	1.02434	0.02405	4.414E-05	0.02401	
28-Dec-06	903.20	1.01001	0.00996	4.108E-05	0.00992	
29-Dec-06	891.50	0.98705	-0.01304	3.821E-05	0.01308	
MEAN						
STDEV						

H_0 : ICICI share price for the year 2006 with mean = 635.7344 follows normal distribution.

H_a : ICICI share price for the year 2006 with mean = 635.7344 does not follow normal distribution.

Level of significance (α) = 0.01

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.070073$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{250}} = 0.10309$$

Since $D_n < D_{table}$, the null hypothesis is accepted. Hence, the data are described by normal distribution.

Hypothesis testing for ICICI for the year 2007

TABLE 4.1.9: Calculation of K-S statistics for ICICI for the year 2007

Date	Year 2007 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ Max/ $F_e - F_0$ /
3-Jan-07	897.45					
3-Jan-07	894.55	0.99677	-0.00324	3.537E-05	0.00327	
4-Jan-07	890.50	0.99547	-0.00454	3.803E-05	0.00458	
5-Jan-07	910.10	1.02201	0.02177	4.087E-05	0.02173	
8-Jan-07	906.30	0.99582	-0.00418	4.389E-05	0.00423	
9-Jan-07	912.35	1.00668	0.00665	4.712E-05	0.00661	
10-Jan-07	883.85	0.96876	-0.03174	5.054E-05	0.03179	
11-Jan-07	892.35	1.00962	0.00957	5.419E-05	0.00952	
12-Jan-07	972.30	1.08959	0.08581	5.807E-05	0.08575	0.08575
15-Jan-07	957.85	0.98514	-0.01497	6.218E-05	0.01504	
16-Jan-07	960.05	1.00230	0.00229	6.655E-05	0.00223	
17-Jan-07	986.85	1.02792	0.02753	7.118E-05	0.02746	
18-Jan-07	971.25	0.98419	-0.01593	7.609E-05	0.01601	
19-Jan-07	985.40	1.01457	0.01446	8.129E-05	0.01438	
22-Jan-07	977.20	0.99168	-0.00836	8.679E-05	0.00844	
23-Jan-07	964.30	0.98680	-0.01329	9.262E-05	0.01338	
24-Jan-07	974.55	1.01063	0.01057	9.877E-05	0.01047	
25-Jan-07	991.45	1.01734	0.01719	1.053E-04	0.01709	
29-Jan-07	955.95	0.96419	-0.03646	1.121E-04	0.03658	
31-Jan-07	941.10	0.98447	-0.01566	1.194E-04	0.01578	
	952.55	1.01217	0.01209	1.270E-04	0.01197	
2-Feb-07	944.90	0.99197	-0.00806	1.350E-04	0.00820	
5-Feb-07	946.80	1.00201	0.00201	1.435E-04	0.00187	
6-Feb-07	957.90	1.01172	0.01166	1.524E-04	0.01150	
7-Feb-07	983.15	1.02636	0.02602	1.618E-04	0.02586	
8-Feb-07	999.70	1.01683	0.01669	1.716E-04	0.01652	
9-Feb-07	996.15	0.99645	-0.00356	1.819E-04	0.00374	
12-Feb-07	966.15	0.96988	-0.03058	1.928E-04	0.03077	
13-Feb-07	955.90	0.98939	-0.01067	2.041E-04	0.01087	
14-Feb-07	914.40	0.95659	-0.04439	2.160E-04	0.04460	
15-Feb-07	949.60	1.03850	0.03777	2.285E-04	0.03754	
19-Feb-07	980.20	1.03222	0.03172	2.415E-04	0.03147	
20-Feb-07	969.45	0.98903	-0.01103	2.552E-04	0.01128	
21-Feb-07	969.30	0.99985	-0.00015	2.694E-04	0.00042	
22-Feb-07	946.20	0.97617	-0.02412	2.843E-04	0.02440	
23-Feb-07	907.00	0.95857	-0.04231	2.998E-04	0.04261	
26-Feb-07	904.00	0.99669	-0.00331	3.159E-04	0.00363	

27-Feb-07	875.80	0.96881	-0.03169	3.328E-04	0.03202	
28-Feb-07	829.50	0.94713	-0.05431	3.503E-04	0.05466	
1-Mar-07	855.35	1.03116	0.03069	3.686E-04	0.03032	
2-Mar-07	842.90	0.98544	-0.01466	3.875E-04	0.01505	
5-Mar-07	821.55	0.97467	-0.02566	4.072E-04	0.02606	
6-Mar-07	847.90	1.03207	0.03157	4.277E-04	0.03114	
7-Mar-07	828.65	0.97730	-0.02296	4.489E-04	0.02341	
8-Mar-07	863.00	1.04145	0.04062	4.708E-04	0.04015	
9-Mar-07	858.60	0.99490	-0.00511	4.936E-04	0.00561	
12-Mar-07	868.70	1.01176	0.01169	5.172E-04	0.01118	
13-Mar-07	877.60	1.01025	0.01019	5.415E-04	0.00965	
14-Mar-07	829.40	0.94508	-0.05649	5.667E-04	0.05706	
15-Mar-07	823.90	0.99337	-0.00665	5.927E-04	0.00725	
16-Mar-07	810.00	0.98313	-0.01701	6.195E-04	0.01763	
19-Mar-07	822.55	1.01549	0.01538	6.472E-04	0.01473	
20-Mar-07	824.00	1.00176	0.00176	6.757E-04	0.00109	
21-Mar-07	870.55	1.05649	0.05495	7.050E-04	0.05425	
22-Mar-07	899.60	1.03337	0.03283	7.352E-04	0.03209	
23-Mar-07	891.60	0.99111	-0.00893	7.662E-04	0.00970	
26-Mar-07	875.70	0.98217	-0.01799	7.980E-04	0.01879	
28-Mar-07	857.85	0.97962	-0.02059	8.307E-04	0.02142	
29-Mar-07	855.30	0.99703	-0.00298	8.642E-04	0.00384	
30-Mar-07	853.35	0.99772	-0.00228	8.985E-04	0.00318	
31-Mar-07	803.95	0.94211	-0.05963	9.336E-04	0.06057	
3-Apr-07	807.90	1.00491	0.00490	9.696E-04	0.00393	
4-Apr-07	820.95	1.01615	0.01602	1.006E-03	0.01502	
5-Apr-07	838.65	1.02156	0.02133	1.044E-03	0.02029	
9-Apr-07	858.25	1.02337	0.02310	1.082E-03	0.02202	
10-Apr-07	857.75	0.99942	-0.00058	1.121E-03	0.00170	
11-Apr-07	859.50	1.00204	0.00204	1.161E-03	0.00088	
12-Apr-07	849.25	0.98807	-0.01200	1.201E-03	0.01320	
13-Apr-07	873.45	1.02850	0.02810	1.242E-03	0.02686	
16-Apr-07	888.25	1.01694	0.01680	1.284E-03	0.01552	
17-Apr-07	894.00	1.00647	0.00645	1.326E-03	0.00513	
18-Apr-07	898.95	1.00554	0.00552	1.369E-03	0.00415	
19-Apr-07	905.15	1.00690	0.00687	1.413E-03	0.00546	
20-Apr-07	916.70	1.01276	0.01268	1.457E-03	0.01122	
23-Apr-07	917.55	1.00093	0.00093	1.501E-03	0.00057	
24-Apr-07	950.10	1.03547	0.03486	1.546E-03	0.03331	
25-Apr-07	962.90	1.01347	0.01338	1.592E-03	0.01179	
26-Apr-07	961.45	0.99849	-0.00151	1.637E-03	0.00314	
27-Apr-07	935.15	0.97265	-0.02774	1.683E-03	0.02942	
30-Apr-07	865.85	0.92589	-0.07700	1.730E-03	0.07872	
3-May-07	869.90	1.00468	0.00467	1.776E-03	0.00289	
4-May-07	855.85	0.98385	-0.01628	1.823E-03	0.01811	
7-May-07	843.75	0.98586	-0.01424	1.870E-03	0.01611	

8-May-07	839.80	0.99532	-0.00469	1.917E-03	0.00661	
9-May-07	849.35	1.01137	0.01131	1.964E-03	0.00934	
10-May-07	842.95	0.99246	-0.00756	2.010E-03	0.00957	
11-May-07	848.45	1.00652	0.00650	2.057E-03	0.00445	
14-May-07	870.40	1.02587	0.02554	2.104E-03	0.02344	
15-May-07	886.85	1.01890	0.01872	2.150E-03	0.01657	
16-May-07	918.60	1.03580	0.03517	2.196E-03	0.03298	
17-May-07	938.05	1.02117	0.02095	2.242E-03	0.01871	
18-May-07	951.15	1.01397	0.01387	2.288E-03	0.01158	
21-May-07	943.00	0.99143	-0.00861	2.333E-03	0.01094	
22-May-07	928.55	0.98468	-0.01544	2.377E-03	0.01782	
23-May-07	917.85	0.98848	-0.01159	2.421E-03	0.01401	
24-May-07	911.30	0.99286	-0.00716	2.464E-03	0.00963	
25-May-07	912.70	1.00154	0.00154	2.507E-03	0.00097	
28-May-07	922.80	1.01107	0.01101	2.548E-03	0.00846	
29-May-07	920.60	0.99762	-0.00239	2.589E-03	0.00498	
30-May-07	913.65	0.99245	-0.00758	2.629E-03	0.01021	
31-May-07	919.15	1.00602	0.00600	2.668E-03	0.00333	
	930.45	1.01229	0.01222	2.706E-03	0.00951	
4-Jun-07	933.35	1.00312	0.00311	2.743E-03	0.00037	
5-Jun-07	939.05	1.00611	0.00609	2.779E-03	0.00331	
6-Jun-07	911.20	0.97034	-0.03011	2.813E-03	0.03292	
7-Jun-07	909.10	0.99770	-0.00231	2.847E-03	0.00515	
8-Jun-07	903.45	0.99379	-0.00623	2.879E-03	0.00911	
11-Jun-07	901.95	0.99834	-0.00166	2.910E-03	0.00457	
12-Jun-07	919.35	1.01929	0.01911	2.939E-03	0.01617	
13-Jun-07	913.95	0.99413	-0.00589	2.967E-03	0.00886	
14-Jun-07	905.85	0.99114	-0.00890	2.993E-03	0.01190	
15-Jun-07	908.70	1.00315	0.00314	3.018E-03	0.00012	
18-Jun-07	918.75	1.01106	0.01100	3.041E-03	0.00796	
19-Jun-07	945.15	1.02873	0.02833	3.062E-03	0.02527	
20-Jun-07	948.15	1.00317	0.00317	3.082E-03	0.00009	
21-Jun-07	949.95	1.00190	0.00190	3.101E-03	0.00120	
22-Jun-07	954.55	1.00484	0.00483	3.117E-03	0.00171	
25-Jun-07	952.60	0.99796	-0.00204	3.132E-03	0.00518	
26-Jun-07	945.90	0.99297	-0.00706	3.145E-03	0.01020	
27-Jun-07	938.05	0.99170	-0.00833	3.156E-03	0.01149	
28-Jun-07	942.85	1.00512	0.00510	3.165E-03	0.00194	
29-Jun-07	955.45	1.01336	0.01328	3.172E-03	0.01010	
	950.20	0.99451	-0.00551	3.178E-03	0.00869	
3-Jul-07	966.70	1.01736	0.01722	3.182E-03	0.01403	
4-Jul-07	985.95	1.01991	0.01972	3.183E-03	0.01653	
5-Jul-07	1003.65	1.01795	0.01779	3.183E-03	0.01461	
6-Jul-07	981.50	0.97793	-0.02232	3.181E-03	0.02550	

9-Jul-07	970.70	0.98900	-0.01106	3.177E-03	0.01424	
10-Jul-07	963.95	0.99305	-0.00698	3.172E-03	0.01015	
11-Jul-07	953.55	0.98921	-0.01085	3.164E-03	0.01401	
12-Jul-07	967.65	1.01479	0.01468	3.155E-03	0.01152	
13-Jul-07	972.50	1.00501	0.00500	3.144E-03	0.00186	
16-Jul-07	970.90	0.99835	-0.00165	3.130E-03	0.00478	
17-Jul-07	973.70	1.00288	0.00288	3.116E-03	0.00024	
18-Jul-07	983.35	1.00991	0.00986	3.099E-03	0.00676	
19-Jul-07	989.60	1.00636	0.00634	3.081E-03	0.00325	
20-Jul-07	985.85	0.99621	-0.00380	3.061E-03	0.00686	
23-Jul-07	970.10	0.98402	-0.01611	3.039E-03	0.01914	
24-Jul-07	969.65	0.99954	-0.00046	3.016E-03	0.00348	
25-Jul-07	958.40	0.98840	-0.01167	2.991E-03	0.01466	
26-Jul-07	944.55	0.98555	-0.01456	2.964E-03	0.01752	
27-Jul-07	914.40	0.96808	-0.03244	2.936E-03	0.03538	
30-Jul-07	923.00	1.00941	0.00936	2.907E-03	0.00645	
31-Jul-07	927.45	1.00482	0.00481	2.876E-03	0.00193	
	891.00	0.96070	-0.04009	2.844E-03	0.04294	
2-Aug-07	901.40	1.01167	0.01160	2.811E-03	0.00879	
3-Aug-07	915.50	1.01564	0.01552	2.776E-03	0.01275	
6-Aug-07	886.90	0.96876	-0.03174	2.740E-03	0.03448	
7-Aug-07	869.90	0.98083	-0.01935	2.703E-03	0.02206	
8-Aug-07	884.00	1.01621	0.01608	2.665E-03	0.01341	
9-Aug-07	889.70	1.00645	0.00643	2.626E-03	0.00380	
10-Aug-07	864.10	0.97123	-0.02920	2.586E-03	0.03178	
13-Aug-07	873.85	1.01128	0.01122	2.545E-03	0.00868	
14-Aug-07	878.65	1.00549	0.00548	2.503E-03	0.00298	
16-Aug-07	832.15	0.94708	-0.05437	2.460E-03	0.05683	
17-Aug-07	824.70	0.99105	-0.00899	2.417E-03	0.01141	
20-Aug-07	872.35	1.05778	0.05617	2.373E-03	0.05380	
21-Aug-07	829.05	0.95036	-0.05091	2.329E-03	0.05324	
22-Aug-07	846.10	1.02057	0.02036	2.284E-03	0.01807	
23-Aug-07	824.95	0.97500	-0.02531	2.238E-03	0.02755	
24-Aug-07	833.80	1.01073	0.01067	2.192E-03	0.00848	
27-Aug-07	883.55	1.05967	0.05795	2.146E-03	0.05581	
28-Aug-07	862.90	0.97663	-0.02365	2.100E-03	0.02575	
29-Aug-07	857.10	0.99328	-0.00674	2.053E-03	0.00880	
30-Aug-07	873.05	1.01861	0.01844	2.006E-03	0.01643	
31-Aug-07	888.40	1.01758	0.01743	1.959E-03	0.01547	
	907.90	1.02195	0.02171	1.913E-03	0.01980	
4-Sep-07	908.60	1.00077	0.00077	1.866E-03	0.00109	
5-Sep-07	915.40	1.00748	0.00746	1.819E-03	0.00564	
6-Sep-07	920.90	1.00601	0.00599	1.772E-03	0.00422	
7-Sep-07	920.05	0.99908	-0.00092	1.726E-03	0.00265	

10-Sep-07	910.90	0.99005	-0.00999	1.679E-03	0.01167	
11-Sep-07	901.55	0.98974	-0.01032	1.633E-03	0.01195	
12-Sep-07	885.35	0.98203	-0.01813	1.588E-03	0.01972	
13-Sep-07	884.05	0.99853	-0.00147	1.542E-03	0.00301	
14-Sep-07	906.30	1.02517	0.02486	1.497E-03	0.02336	
17-Sep-07	895.15	0.98770	-0.01238	1.453E-03	0.01383	
18-Sep-07	924.55	1.03284	0.03232	1.409E-03	0.03091	
19-Sep-07	973.55	1.05300	0.05164	1.366E-03	0.05028	
20-Sep-07	967.10	0.99337	-0.00665	1.323E-03	0.00797	
21-Sep-07	966.05	0.99891	-0.00109	1.280E-03	0.00237	
24-Sep-07	996.30	1.03131	0.03083	1.239E-03	0.02959	
25-Sep-07	993.05	0.99674	-0.00327	1.198E-03	0.00447	
26-Sep-07	1020.00	1.02714	0.02678	1.157E-03	0.02562	
27-Sep-07	1028.25	1.00809	0.00806	1.118E-03	0.00694	
28-Sep-07	1062.40	1.03321	0.03267	1.079E-03	0.03159	
	1057.80	0.99567	-0.00434	1.041E-03	0.00538	
3-Oct-07	1086.55	1.02718	0.02682	1.003E-03	0.02581	
4-Oct-07	1068.00	0.98293	-0.01722	9.664E-04	0.01819	
5-Oct-07	1036.40	0.97041	-0.03003	9.306E-04	0.03097	
8-Oct-07	1021.20	0.98533	-0.01477	8.955E-04	0.01567	
9-Oct-07	1045.65	1.02394	0.02366	8.613E-04	0.02280	
10-Oct-07	1070.55	1.02381	0.02353	8.278E-04	0.02271	
11-Oct-07	1091.25	1.01934	0.01915	7.952E-04	0.01836	
12-Oct-07	1055.00	0.96678	-0.03378	7.635E-04	0.03455	
15-Oct-07	1097.45	1.04024	0.03945	7.325E-04	0.03872	
16-Oct-07	1159.65	1.05668	0.05513	7.024E-04	0.05443	
17-Oct-07	1117.10	0.96331	-0.03738	6.732E-04	0.03806	
18-Oct-07	1036.50	0.92785	-0.07489	6.448E-04	0.07553	
19-Oct-07	1022.80	0.98678	-0.01331	6.172E-04	0.01392	
22-Oct-07	1061.35	1.03769	0.03700	5.904E-04	0.03641	
23-Oct-07	1102.00	1.03830	0.03759	5.645E-04	0.03702	
24-Oct-07	1099.90	0.99809	-0.00191	5.394E-04	0.00245	
25-Oct-07	1144.65	1.04069	0.03988	5.151E-04	0.03936	
26-Oct-07	1187.50	1.03744	0.03675	4.916E-04	0.03626	
29-Oct-07	1240.65	1.04476	0.04379	4.689E-04	0.04332	
30-Oct-07	1240.20	0.99964	-0.00036	4.470E-04	0.00081	
31-Oct-07	1254.05	1.01117	0.01111	4.259E-04	0.01068	
	1298.30	1.03529	0.03468	4.055E-04	0.03427	
2-Nov-07	1333.40	1.02704	0.02668	3.859E-04	0.02629	
5-Nov-07	1269.85	0.95234	-0.04883	3.670E-04	0.04920	
6-Nov-07	1241.80	0.97791	-0.02234	3.488E-04	0.02269	
7-Nov-07	1200.80	0.96698	-0.03357	3.313E-04	0.03391	
8-Nov-07	1169.05	0.97356	-0.02680	3.145E-04	0.02711	
9-Nov-07	1144.45	0.97896	-0.02127	2.984E-04	0.02157	

H_0 : ICICI share price for the year 2007 with mean = 977.3289 follows normal distribution.

H_a : ICICI share price for the year 2007 with mean = 977.3289 does not follow normal distribution.

Level of significance $(\alpha) = 0.01$

Sample size $(n) = 249$

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the above calculation, $D_n = 0.085748$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{249}} = 0.08575$$

Since $D_n < D_{table}$, the null hypothesis is accepted. Hence, the data are described by normal distribution

Hypothesis testing for ICICI for the year 2008

TABLE 4.1.10: Calculation of K-S statistics for ICICI for the year 2008

Date	Year 2008 Share price In Rs.	Price Relative PR = $X_t / X_{(t-1)}$	Natural Logarithm Ln(PR) F_0	Expected Normal Distribution F_e	Absolute Deviation / $F_0 - F_e$ /	K-S statistics $D_n =$ Max/ $F_e - F_0$ /
1-Jan-08	1238.70					
2-Jan-08	1228.75	0.99197	-0.00807	2.463E-05	0.00809	
3-Jan-08	1267.25	1.03133	0.03085	5.636E-05	0.03080	
4-Jan-08	1228.95	0.96978	-0.03069	7.292E-05	0.03076	
7-Jan-08	1286.30	1.04667	0.04561	9.347E-05	0.04552	
8-Jan-08	1362.55	1.05928	0.05759	1.187E-04	0.05747	
9-Jan-08	1339.95	0.98341	-0.01673	1.493E-04	0.01687	
10-Jan-08	1307.95	0.97612	-0.02417	1.861E-04	0.02436	
11-Jan-08	1356.15	1.03685	0.03619	2.297E-04	0.03596	
14-Jan-08	1435.00	1.05814	0.05652	2.810E-04	0.05623	
15-Jan-08	1410.00	0.98258	-0.01758	3.405E-04	0.01792	
16-Jan-08	1352.20	0.95901	-0.04186	4.087E-04	0.04227	
17-Jan-08	1368.30	1.01191	0.01184	4.860E-04	0.01135	
18-Jan-08	1322.10	0.96624	-0.03435	5.726E-04	0.03492	
21-Jan-08	1248.85	0.94460	-0.05700	6.683E-04	0.05767	
22-Jan-08	1173.20	0.93942	-0.06249	7.727E-04	0.06326	
23-Jan-08	1124.95	0.95887	-0.04200	8.852E-04	0.04288	
24-Jan-08	1151.45	1.02356	0.02328	1.004E-03	0.02228	
25-Jan-08	1131.85	0.98298	-0.01717	1.129E-03	0.01830	
28-Jan-08	1261.30	1.11437	0.10829	1.258E-03	0.10703	
29-Jan-08	1273.95	1.01003	0.00998	1.388E-03	0.00859	
30-Jan-08	1220.45	0.95800	-0.04290	1.517E-03	0.04442	
31-Jan-08	1187.40	0.97292	-0.02745	1.643E-03	0.02910	
	1147.00	0.96598	-0.03462	1.762E-03	0.03638	
4-Feb-08	1198.15	1.04459	0.04363	1.873E-03	0.04176	
5-Feb-08	1212.25	1.01177	0.01170	1.972E-03	0.00973	
6-Feb-08	1191.30	0.98272	-0.01743	2.057E-03	0.01949	
7-Feb-08	1152.05	0.96705	-0.03350	2.126E-03	0.03563	
8-Feb-08	1106.10	0.96011	-0.04070	2.176E-03	0.04288	
11-Feb-08	1073.90	0.97089	-0.02954	2.207E-03	0.03175	
12-Feb-08	1033.85	0.96271	-0.03801	2.217E-03	0.04022	
13-Feb-08	1067.25	1.03231	0.03180	2.207E-03	0.02959	
14-Feb-08	1101.80	1.03237	0.03186	2.177E-03	0.02968	
15-Feb-08	1161.85	1.05450	0.05307	2.126E-03	0.05094	
18-Feb-08	1190.90	1.02500	0.02470	2.058E-03	0.02264	
19-Feb-08	1209.80	1.01587	0.01575	1.973E-03	0.01377	
20-Feb-08	1220.20	1.00860	0.00856	1.874E-03	0.00669	

21-Feb-08	1168.30	0.95747	-0.04347	1.763E-03	0.04523	
22-Feb-08	1141.30	0.97689	-0.02338	1.644E-03	0.02503	
25-Feb-08	1099.80	0.96364	-0.03704	1.518E-03	0.03856	
26-Feb-08	1107.10	1.00664	0.00662	1.389E-03	0.00523	
27-Feb-08	1117.85	1.00971	0.00966	1.259E-03	0.00840	
28-Feb-08	1116.95	0.99919	-0.00081	1.130E-03	0.00194	
29-Feb-08	1105.85	0.99006	-0.00999	1.006E-03	0.01099	
	1088.50	0.98431	-0.01581	8.862E-04	0.01670	
4-Mar-08	1024.60	0.94130	-0.06050	7.737E-04	0.06127	
5-Mar-08	971.10	0.94778	-0.05363	6.692E-04	0.05430	
7-Mar-08	960.15	0.98872	-0.01134	5.734E-04	0.01191	
10-Mar-08	893.40	0.93048	-0.07206	4.867E-04	0.07254	
11-Mar-08	871.85	0.97588	-0.02442	4.093E-04	0.02483	
12-Mar-08	856.65	0.98257	-0.01759	3.410E-04	0.01793	
13-Mar-08	880.30	1.02761	0.02723	2.815E-04	0.02695	
14-Mar-08	837.55	0.95144	-0.04978	2.301E-04	0.05001	
17-Mar-08	876.95	1.04704	0.04597	1.864E-04	0.04578	
18-Mar-08	759.95	0.86658	-0.14320	1.496E-04		0.14335
19-Mar-08	768.20	1.01086	0.01080	1.189E-04	0.01068	
24-Mar-08	768.20	1.00000	0.00000	9.367E-05	0.00009	
25-Mar-08	802.20	1.04426	0.04331	7.308E-05	0.04323	
26-Mar-08	878.85	1.09555	0.09126	5.649E-05	0.09120	
27-Mar-08	843.95	0.96029	-0.04052	4.326E-05	0.04056	
28-Mar-08	834.55	0.98886	-0.01120	3.282E-05	0.01123	
31-Mar-08	835.50	1.00114	0.00114	2.467E-05	0.00111	

H_0 : The share price for the year 2008 with mean = 1112.154 follows normal distribution.

H_a : ICICI share price for the year 2008 with mean = 1112.154 does not follow normal distribution.

Level of significance (α) = 0.01

Sample size (n) = 62

Test statistics: $D_n = \text{Max}|F_e - F_0|$

From the table, the critical value is

$$D_{table} = \frac{1.63}{\sqrt{n}} = \frac{1.63}{\sqrt{62}} = 0.20701$$

Since $D_n < D_{table}$, the null hypothesis is accepted. Hence, the data are described by normal distribution.

FINAL RESULT OF HYPOTHESIS TESTING

The following table shows the final result of the hypothesis testing.

Table 4.1.11: Final result of Hypothesis testing

Name of the company	Year	D-statistics		Distribution
		Observed value $D_{calculated}$	Critical value at 1% level of significance D_{table}	
RELIANCE	2004	0.16693	0.117635	Left-skewed
	2005	0.05413	0.102885	Normal
	2006	0.10929	0.10309	Right-skewed
	2007	0.07568	0.103297	Normal
	2008	0.09749	0.20701	Normal
ONGC	2004	0.14052	0.117635	Left-skewed
	2005	0.05185	0.102885	Normal
	2006	0.08159	0.10309	Normal
	2007	0.08407	0.103297	Normal
	2008	0.15313	0.20701	Normal
ICICI	2004	0.11288	0.117635	Normal
	2005	0.07649	0.102885	Normal
	2006	0.07007	0.10309	Normal
	2007	0.08575	0.103297	Normal
	2008	0.14335	0.20701	Normal
TATASTEEL	2004	0.46083	0.117635	Left-skewed
	2005	0.06427	0.102885	Normal
	2006	0.11994	0.10309	Left-skewed
	2007	0.11066	0.103297	Left-skewed
	2008	0.09862	0.20701	Normal
INFOSYS	2004	0.1193	0.117635	Left-skewed
	2005	0.07237	0.102885	Normal
	2006	0.09153	0.10309	Normal
	2007	0.07283	0.103297	Normal
	2008	0.09241	0.20701	Normal
TATAMOTORS	2004	0.10622	0.117635	Normal
	2005	0.0552	0.102885	Normal
	2006	0.10681	0.10309	Left-skewed
	2007	0.08345	0.103297	Normal

	2008	0.09174	0.20701	Normal
ITC	2004	0.10784	0.117635	Normal
	2005	0.10519	0.102885	Right-skewed
	2006	0.08655	0.10309	Normal
	2007	0.07742	0.103297	Normal
	2008	0.11153	0.20701	Normal
RANBAXY	2004	0.06476	0.117635	Normal
	2005	0.092680	0.102885	Normal
	2006	0.09366	0.10309	Normal
	2007	0.08123	0.103297	Normal
	2008	0.06829	0.20701	Normal
BHEL	2004	0.23564	0.117635	Left-skewed
	2005	0.05588	0.102885	Normal
	2006	0.13187	0.10309	Right-skewed
	2007	0.10939	0.103297	Right-skewed
	2008	0.11906	0.20701	Normal
ACC	2004	0.09304	0.117635	Normal
	2005	0.06674	0.102885	Normal
	2006	0.12965	0.10309	Left-skewed
	2007	0.14788	0.103297	Left-skewed
	2008	0.16222	0.20701	Normal

4.2 APPLICATION OF BLACK AND SCHOLES MODEL IN OPTION PRICING

TABLE 4.2.1: Consolidated results of option prices and Greeks calculated using Black & Scholes calculator

PARTICULARS	RELIANCE (3 rd July, 2007)	ONGC (16 th April, 2007)	ICICI (7 th May, 2007)	TATASTEEL (4 th July, 2007)	INFOSYS (1 st Aug, 2007)
Strike price	1710	860	900	620	2010
Share price	1707.3	900.2	843.75	616.35	1929.5
Share price on Expiry	1941.95	958.55	919.15	703.65	1865.2
No. of Days to Expiry	18	9	19	17	21
Volatility	26.4729%	31.9915	23.3433	40.7295	32.41601
Interest Rate	8%	8%	8%	8%	8%
Call Option Value (As Per Data)	49.9	44	12.05	20.9	23.3
Call Option Value (As Per B&S Calculator)	42.8608	45.894	2.3784	21.4811	33.391
Delta	0.5279	0.834	0.1335	0.508	0.3336
Theta	1.2977	0.7783	0.2798	0.6995	1.4343
Vega	1.5089	0.351	0.4162	0.5306	1.6851
Rho	0.4233	0.1738	0.0574	0.1358	0.3511
Gamma	0.004	0.0055	0.0048	0.0074	0.0024

TABLE 4.2.2: Consolidated results of option prices and Greeks calculated using Black & Scholes calculator

PARTICULARS	TATAMOTORS (6th Sep,2007)	ITC (6th Aug, 2007)	RANBAXY (16th Mar,2007)	BHEL (4th April,2007)	ACC (16th April,2007)
Strike price	700	170	310	2010	700
Share price	712.05	172.55	316.25	2174.2	714.35
Share price on Expiry	751.3	171.6	345.05	2277.65	830.85
No. of Days to Expiry	16	18	9	15	16
Volatility	25.3078	32.7435	51.63561	53.8053	30.9367
Interest Rate	8%	8%	8%	8%	8%
Call Option Value (As Per Data)	31.9	7.35	14.9	104	39.65
Call Option Value (As Per B&S Calculator)	22.4763	7.2126	13.7841	194.9322	26.6017
Delta	0.6591	0.6179	0.6217	0.7881	0.6554
Theta	0.5295	0.1549	0.5816	2.6144	0.6293
Vega	0.5457	0.1463	0.1888	1.2721	0.5508
Rho	0.1959	0.049	0.0451	0.6241	0.1936
Gamma	0.0097	0.0304	0.0148	0.0012	0.008

INTERPRETATION

1. RELIANCE

Option value: Thus the fair value of the given call option on Reliance is Rs. 42.8608 which is lower than the market value of Rs, 49.9. Therefore, the given option is overvalued and the investor should not consider buying these options. However, the decision to exercise an option depends upon the stock price at the given maturity date. The stock price of Reliance on Maturity I. e. 25th July 2007 is Rs. 1941.95. Since the stock price on maturity date is much higher than the exercise price, the option is said to be in deep ITM and hence the investor can also exercise the option.

Interpretation with Greeks

Delta (Δ) : Also known as option 'hedge ratio' is the change in the price of option for a unit change in the price of underlying stock.

$$\Delta = \frac{\Delta c}{\Delta s} = N(d_1) = 0.5279$$

This implies that if the price of the underlying stock were to rise by one rupee, the call value would be expected to rise by about 52 paise. Accordingly, for every call option written, 52.79% of shares of the stock would be needed to hedge the investor's portfolio.

Gamma (γ) : It represents the rate of change of option's delta with respect to a unit change in the underlying stock price or index. Gamma equals to 0.004 implies that a unit change in stock price yields change in delta by 0.004. This means that delta is not highly sensitive to stock price.

Theta (θ) : It is obtained by considering value of option as a function of time. A theta equal to 129.77 suggests that if time to expiration were a year longer, then the value of each call shall be up by about by Rs. 129.7

Rho (ρ) : It measures the sensitivity of an option to invest rates. It refers to the rate of change of option value with respect to a unit change in the interest rate. Here, Rho equal to 0.4233 implies that an increase in risk free rate of return from 8% to 9% result in the value of Call option equal to Re. 0.4233 or about 40 paise.

Vega (λ): This value indicates that if volatility (σ) changes from 0.26472 to .36472, the call value shall be up by Rs. 15.089.

2. ONGC:

Option value: Thus the fair value of the given call option on ONGC is Rs. 45.894 which is higher than the market value of Rs. 44. Therefore, the given option is undervalued and the investor should consider buying these options. However, the decision to exercise an option depends upon the stock price at the given maturity date. The stock price of ONGC on Maturity i. e. 26th April 2007 is Rs. 958.55. Since the stock price on maturity date is much higher than the exercise price, the option is said to be in deep ITM and hence the investor can also exercise the option.

Interpretation with Greeks

Delta (Δ): This implies that if the price of the underlying stock were to rise by one rupee, the call value would be expected to rise by about 83 paisa. Accordingly, for every call option written, 83.40% of shares of the stock would be needed to hedge the investor's portfolio.

Gamma (γ): Gamma equals to 0.0055 implies that a unit change in stock price yields change in delta by 0.0055. This means that delta is not highly sensitive to stock price.

Theta (θ): A theta equal to 77.83 suggests that if time to expiration were a year longer, then the value of each call shall be up by about by Rs. 77.83.

Rho (ρ): Here, Rho equal to 0.1738 implies that an increase in risk free rate of return from 8% to 9% result in the value of Call option equal to about 17 paisa.

Vega (λ): This value indicates that if volatility (σ) changes from 0.319915 to 0.419915, the call value shall be up by Rs 35.1.

3. ICICI

Option value: The fair value of the given call option on ICICI is Rs. 12.05 which is lower than the market value of Rs. 2,3784. Therefore, the given option is overvalued and the investor should not consider buying these options.

Interpretation with Greeks

Delta (Δ) : If the price of the underlying stock were to rise by one rupee, the call value would be expected to rise by only 13 paisa, therefore it implies that the effect of the share price on the option value is very minimum.

Gamma (γ) : Gamma equals to 0.0048 implies that a unit change in stock price yields change in delta by 0.0048.

Theta (θ) : A theta equal to 27.98 suggests that if time to expiration were a year longer, then the value of each call shall be up by about Rs. 27.98.

Rho (ρ) : Rho equal to 0.0574 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 5 paisa in the value of Call option.

Vega (λ) : This value indicates that if volatility (σ) changes from 23.343 to 33.343, the call value shall be up by Rs. 4.16.

4. TATASTEEL

Option value: The fair value of the given call option on Tatasteel is Rs. 21.4811 which is higher than the market value of Rs. 20.9. Therefore, the given option is undervalued and the investor should consider buying these options.

Interpretation with Greeks

Delta (Δ) : The call value would be expected to rise by 50 paisa for every rise of Re. 1 in the stock price.

Gamma (γ) : Gamma equals to 0.0074 implies that a unit change in stock price yields change in delta by 0.0074.

Theta (θ) : A theta equal to 69.95 suggests that if time to expiration were a year longer, then the value of each call shall be up by about Rs. 69.95.

Rho (ρ) : Rho equal to 0.1358 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 13 paisa in the value of Call option.

Vega (λ) : This value indicates that if volatility (σ) changes from 0.4072% to 0.5072% the call value shall be up by Rs. 5.306.

5. INFOSYS

Option value: The fair value of the given call option on Infosys is Rs. 33.391 which is higher than the market value of Rs.23.3. Therefore, the given option is undervalued and the investor should consider buying these options.

Interpretation with Greeks

Delta (Δ) : The call value would be expected to rise by 33 paisa for every rise of Re. 1 in the stock price.

Gamma (γ) : Gamma equals to 0.0024 implies that a unit change in stock price yields change in delta by 0.0024.

Theta (θ) : A theta equal to 143.43 suggests that if time to expiration were a year longer, then the value of each call shall be up by about Rs. 143.43.

Rho (ρ) : Rho equal to 0.3511 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 35 paisa in the value of Call option

Vega (λ) : This value indicates that if volatility (σ) changes from 32.416 to 42.416 the call value shall be up by Rs. 16.851.

6. TATAMOTORS

Option value: The fair value of the given call option on ICICI is Rs. 22.4763 which is lower than the market value of Rs, 31.9. Therefore, the given option is overvalued and the investor should not consider buying these options.

Interpretation with Greeks

Delta (Δ) : The call value would be expected to rise by about 65 paisa, if the price of the underlying stock were to rise by one rupee.

Gamma (γ) : Gamma equals to 0.0097 implies that a unit change in stock price yields change in delta by 0.0097.

Theta (θ) : A theta equal to 52.95 suggests that if time to expiration were a year longer, then the value of each call shall be up by about Rs. 52.95.

Rho (ρ) : Rho equal to 0.1959 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 19 paisa in the value of Call option.

Vega (λ) : This value indicates that if volatility (σ) changes from 0.2530% to 0.3530% the call value shall be up by Rs. 5.45.

7. ITC

Option value: Thus the fair value of the given call option on ITC is 7.2126 which is lower than the market value of Rs, 7.35. Therefore, the given option is overvalued and the investor should not consider buying these options. However, the decision to exercise an option depends upon the stock price at the given maturity date. The stock price of ITC on Maturity is Rs.171.6. Since the stock price on maturity date is higher than the exercise price, the option is said to be in ITM and hence the investor can also exercise the option.

Interpretation with Greeks

Delta (Δ) : If the price of the underlying stock were to rise by one rupee, the call value would be expected to rise by about 61 paisa.

Gamma (γ) : Gamma equals to 0.0304 implies that a unit change in stock price yields change in delta by 0.0304. In case of ITC, the delta is the most sensitive to stock price when compare to the other scrips.

Theta (θ) : A theta equal to 15.49 suggests that if time to expiration were a year longer, then the value of each call shall be up by about by Rs. 15.49.

Rho (ρ) : Rho equal to 0.049 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 4 paisa in the value of Call option.

Vega (λ) : This value indicates that if volatility (σ) changes from 32.743 to 42.743 the call value shall be up by only by Rs. 1.46.

8. RANBAXY

Option value: The fair value of the given call option on Ranbaxy is 13.7841 which is lower than the market value of Rs, 14.9. Therefore, the given option is overvalued and the investor should not consider buying these options.

Interpretation with Greeks

Delta (Δ) : The unit change in the stock price would cause the option price change by 62.17%.

Gamma (γ) : Gamma equals to 0.0148 implies that a unit change in stock price yields change in delta by 0.0148. Here the delta is comparatively more sensitive to stock price than the other scrips.

Theta (θ) : A theta equal to 58.16 suggests that if time to expiration were a year longer, then the value of each call shall be up by about by Rs. 15.16.

Rho (ρ) : Rho equal to 0.0451 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 4 paisa in the value of Call option. A change in interest rate wouldn't cause much change in the value of call option in case of this scrip.

Vega (λ) : This value indicates that if volatility (σ) changes from 51.635 to 61.635 the call value shall be up by only by Rs. 1.88.

9. BHEL

Option value: The fair value of the given call option on BHEL is Rs. 194.9322 which is higher than the market value of Rs.104. Therefore, the given option is undervalued and the investor should consider buying these options.

Interpretation with Greeks

Delta (Δ): The call value would be expected to rise by 78 paisa for every rise of Re. 1 in the stock price.

Gamma (γ): Gamma equals to 0.0012 implies that a unit change in stock price yields change in delta by 0.0012. This implies that delta is least sensitive to stock price in case of this scrip.

Theta (θ): A theta equal to 261.44 suggests that if time to expiration were a year longer, then the value of each call shall be up by about by Rs. 261.44. This scrip would be the most beneficial for the investors who make long term investment.

Rho (ρ): Rho equal to 0.6241 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 62 paisa in the value of Call option

Vega (λ): This value indicates that if volatility (σ) changes from 53.805 to 63.805 the call value shall be up by only by Rs. 12.72.

10. ACC

Option value: The fair value of the given call option on ACC is Rs.26.6 which is lower than the market value of Rs, 39.65. Therefore, the given option is overvalued and the investor should not consider buying these options.

Interpretation with Greeks

Delta (Δ): The unit change in the stock price would cause the option price change by 65.54%.

Gamma (γ) : Gamma equals to 0.008 implies that a unit change in stock price yields change in delta by 0.008.

Theta (θ) : A theta equal to 62.93 suggests that if time to expiration were a year longer, then the value of each call shall be up by about by Rs. 62.93.

Rho (ρ) : Rho equal to 0.1936 implies that an increase in risk free rate of return from 8% to 9% will result an increase of about 19 paisa in the value of Call option.

Vega (λ) : This value indicates that if volatility (σ) changes from 0.3093% to 0.4093% the call value shall be up by Rs. 5.50.

CHAPTER 5

CONCLUSION

CONCLUSION

The implication of this study is that the most sophisticated and pervasively used option pricing model, the Black and Scholes model, holds good in the context of Indian stock market though certain assumption of the model do not hold true in reality. Therefore, investors can employ this model in pricing the option and to formulate the effective strategies for effective hedging. But the investor should not fully depend on this model only. This model should be taken as a transformation model rather than exact pricing model. The conclusion is derived from the following results and discussion.

a) RESULTS AND DISCUSSION

The following conclusions have been drawn based upon the above analysis.

- 1) The K-S test shows that out of fifty observations, thirty six observations have followed normal distribution. Only fourteen observations have not followed the normal distribution. This implies that Black and Scholes model is likely to be suitable as an option valuation model in Indian stock market.
- 2) The application of Black and Scholes option pricing model gives the fair value of option and it is compared with the market value or option premium. The difference between the fair value and market value of option is instrumental to formulate the effective option strategies for effective hedging. From the aforementioned examples of ten different options, it is clear that the investor can buy options namely Reliance, ONGC, Tatasteel, Infosys, BHEL whereas the other options namely ICICI, Tata motors, Ranbaxy, ITC, ACC should not be exercised as they are overpriced.
- 3) An increase in stock price results in an increase in the value of call option because it becomes deeper in-the-money and, hence, its intrinsic value increases. Out of the ten scrips, the influence of stock price on the value of the call option is highest in case of ONGC with 83.4% followed by BHEL with 78.8%.

- 4) Based on results derived from Gamma, the call value of ITC is more sensitive to the stock price.
- 5) If time to expiration were a year longer, then the stock option of BHEL would be the most beneficial one as the influence of time on the call value is the highest in case of this stock option followed by INFOSYS and RELIANCE.
- 6) Black & Scholes model assumes the risk free interest rate to be constant over the life of the option. But if the risk free interest rate is increased by 1% the influence of interest rate on call value is highest in case of BHEL option with 62.41% followed by RELIANCE.
- 7) The influence of volatility on the call value is high in case of INFOSYS and RELIANCE followed by BHEL.

b) RECOMMENDATIONS

1. Out of the fifty observations made, only fourteen observations did not follow the normal distribution. It means that Black and Scholes model is likely to be suitable for as a valuation model in Indian stock market. Of course, no generalization may be made on the basis of result obtained above since the sample is small and the calculations have been done only taking the closing prices of shares. However, since the companies selected are included among highly traded scrip's, and options are likely to be traded on such scrips, it may be assumed that model serve the purpose reasonably well.

2. Black and Scholes option pricing model is extremely helpful in determining the fair price and the risk aspect of the given options which is instrumental to formulate effective strategies for effective hedging as it was illustrated above by applying this model to ten companies equity call option. The application of Black and Scholes option pricing model gives the fair value of option and it is compared with the market value or option premium. The difference between the fair value and market value of option is instrumental to formulate the effective option strategies for effective hedging. From the aforementioned examples of ten different options, it is clear that the investor can buy options namely

Reliance, ONGC, Tatasteel, Infosys, BHEL whereas the other options namely ICICI, Tatamotors, Ranbaxy, ITC, ACC should not exercised as they are overpriced.

3. Value of option price in the context of Black and Scholes model is a function of stock price; strike price, maturity period, risk free rate of return and implied volatility. There is direct relationship between the stock price and Greeks like Delta, Theta, and Rho but this does not happen in case of Gamma and Vega. The influence of each of them is listed below:-

- An increase in stock price results in an increase in the value of call option because it becomes deeper in-the-money and, hence, its intrinsic value increases.
- An increase in the strike price results in decrease in the value of call option.
- Longer the duration of maturity period of an option, greater is the time value of the option and hence higher the value of option.
- A rise in the risk free rate of return has favorable impact on call option price but the impact is not that much significant.
- Similarly, an increase in the volatility of the underlying asset value makes the option more valuable.

There is direct relationship between the stock price and Greeks like Delta, Theta, and Rho but this does not happen in case of Gamma and Vega.

APPENDICES

BLACK & SCHOLES ONLINE CALCULATOR

This calculator assumes European Style Options and neglects the effects of possible dividends being paid between transaction and expiration. To use it: **Fill in the input fields, then click Compute.**

NEW: BloBek goes wireless. Try our Black-Scholes for WAP!

[Click here for a brief primer on Black-Scholes analysis](#)

[Home](#)
[Exchanges](#)
[Quotes](#)
[Online Brokers](#)
[Black-Scholes](#)
[Option Tips](#)
[Business News](#)
[Financial Literature](#)
[Financial Software](#)
[Investors' Forum](#)
[Currency Conversion](#)

Wireless (WAP)

[Contact Us](#)
[Mailing Lists](#)
[Tell a Friend](#)
[Guestbook](#)
[Disclaimer](#)

Input		Output	
		Calls	Puts
Strike price		Option value	
Share price		Delta	
Time to expiration (days)		Theta	
Volatility (%)		Vega	
Annual interest rate (%)		Rho	
		Gamma	

[Clear form](#)

Join the options discussion in the Investors' Forum! That's also where you may find the answers to your questions about options and Black-Scholes analysis, or post the questions you are looking for answers to. We are in the process of preparing an FAQ for options and Black-Scholes analysis. It will partly be based on the questions our visitors post in the [Investors' Forum](#).

Disclaimer: This Black-Scholes calculator is not intended as a basis for trading decisions. No responsibility whatsoever is assumed for its correctness or suitability for any given purpose. Use at your own risk...

Sensex 30 Companies

Wednesday, February 27, 2008

BSE Index: 18032.23 (+ 226.04)

COMPANY	INDUSTRY	MARKET PRICE (Rs)	% CHANGE IN PRICE	EQUITY SHARES (crores)	MARKET CAP. (Rs crores)	WEIGHTAGE(%)
<u>ACC</u>	Cement	835	0.5	18.424	15384	0.8
<u>Bajaj Auto</u>	Automobile	2181	-1.2	10.118	22067	1.1
<u>Bharti Tele</u>	Telecom	847.7	1.1	189.3	160470	8.7
<u>BHEL</u>	Engineering	2264.2	3.8	24.476	55419	3.0
<u>Cipla</u>	Pharma	202.45	0.5	29.97	6067	0.3
<u>Dr Reddys</u>	Pharma	550.65	0.3	7.97	4389	0.2
<u>Grasim</u>	Cement	2973.95	-2.3	9.169	27268	1.4
<u>Gui Ambuja</u>	Cement	122.95	-0.3	135.51	16661	0.9
<u>HDFC</u>	Financial Services	2659	3.3	24.933	66297	3.5
<u>HDFC Bk</u>	Banking	1461.25	0.4	31.314	45758	2.4
<u>Hero Honda</u>	Automobile	738.5	0.6	19.97	14748	0.7
<u>Hindalco</u>	Metals	201.4	2.1	98.6	19858	1.0
<u>HLL</u>	FMCG	223.1	1.7	220.14	49113	2.6
<u>ICICI Bk</u>	Banking	1144.95	2.4	27.6	31601	1.7
<u>Infosys</u>	Information Technology	1637.95	-1.5	27.6	45207	2.4
<u>ITC</u>	FMCG	199	-1.1	375.52	74728	4.0
<u>L & T</u>	Cement	3654	3.9	13.74	50206	2.7
<u>Maruti</u>	Automobile	820.2	0.9	28.892	23697	1.2
<u>NTPC</u>		206.5	1.3	824.55	170270	9.2
<u>ONGC</u>	Oil & Refinery	1048	2	142.593	149437	8.1
<u>Ranbaxy</u>	Pharma	434.85	3.7	37.248	16197	0.8
<u>RCVL</u>		597.5	0.7	122.314	73083	3.9
<u>Rel Energy</u>	Power	1707	0.6	21.236	36250	1.9
<u>RIL</u>	Oil & Refinery	2608.3501	1.3	139.4	363604	19.

<u>Satyam</u>	Information Technology	446.05	-0.8		32.445	14472	0.7
<u>SBI</u>	Banking	2129.3501	0.4		52.63	112068	6.0
<u>Tata Motors</u>	Automobile	707.95	0.8		38.287	27105	1.4
<u>TCS</u>	Information Technology	894	-0.4		48.93	43743	2.3
<u>TISCO</u>	Metals	826.6	2.1		55.367	45766	2.4
<u>Wipro</u>	Information Technology	441.25	-0.7		142.6	62922	3.4

--	--	--	--	--	--	--	--

BIBLIOGRAPHY

BIBLIOGRAPHY

BOOKS

1. Pandey I.M, "Financial management", Vikas Publishing House Pvt Ltd(1999) 9th edition, Pg 75,119,267,268.
2. Chandra Prassana, "Financial Management Theory and practice, Tata McGraw Hill Publishing Co Ltd(1999),4th edition, Pg 88,89.
3. The Karvy Magazine weekly Edition, March 15th, March 22nd and April 5th.
4. Kothari, C.R, "Research Methodology Methods and Techniques, New Delhi, New Age International Pvt Ltd, 2001, Pg 67,69.
5. John. C. Hull, "Introduction to Futures and Options Market", Prentice Hall India, New Delhi, 1999, Pg 14.
6. NCFM'S Derivative Market(Dealers Module)

WEBSITES & LINKS

www.bseindia.com

www.nseindia.comhttp://mfportfolio.karvy.com

www.economicstimes.indiatimes.com

www.thefinapolis.com

www.broking.karvy.com

www.dpbos.karvy.com

<http://www.karvy.com/v2/websites/ksbl/aboutUs.asp>

<http://www.investopedia.com/terms/o/optionpricingtheory.asp>

<http://www.investopedia.com/terms/b/binomialoptionpricing.asp>

<http://www.investopedia.com/terms/b/blackscholes.asp>

<http://www.hoadley.net/options/bs.htm#Black-Scholes>

<http://bradley.bradley.edu/~arr/bsm/pg04.html>

<http://www.investopedia.com/terms/b/blackscholes.asp>

http://en.wikipedia.org/wiki/Volatility_%28finance%29

<http://www.investopedia.com/terms/v/volatility.asp>

<http://www.investopedia.com/?viewed=1>