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


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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**

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## 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.

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**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.

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# Certificate

This is to certify that Ms. **A. Manisha**, (Register No. 71206631024), 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.

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# ACKNOWLEDGEMENT

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The materialization of this report has witnessed innumerous 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 atmost 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 successfull.

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, Thete, 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 that exact pricing model.

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# 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 idiosyn-cratic 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 tex-math${\rm H}_{\infty}$/tex-math 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 opting 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:

$$C = S_0 N(d1) - Ee^{-rt} N(d_1)$$

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

$$P = Ee^{-rt}\left[1 - N(d_1)\right] - S_0\left[1 - N(d_1)\right]$$

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

$S_0$ = 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 revels that the input required to value an option are; current price of the stock ($S_0$), 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, Thete, 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

$\sigma_p$ = Standard deviation of the population
= 6.0 (Determined on the basis of trial sample)

N = Size of population

Therefore,

$$\text{Sample size} = \frac{(1.96)^2 \times 30 \times (6)^2}{(30-1)\times(3)^2 + (1.96)^2 \times (6)^2}$$

$$= 10.39$$

$$\approx 10$$

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 f 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' o 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

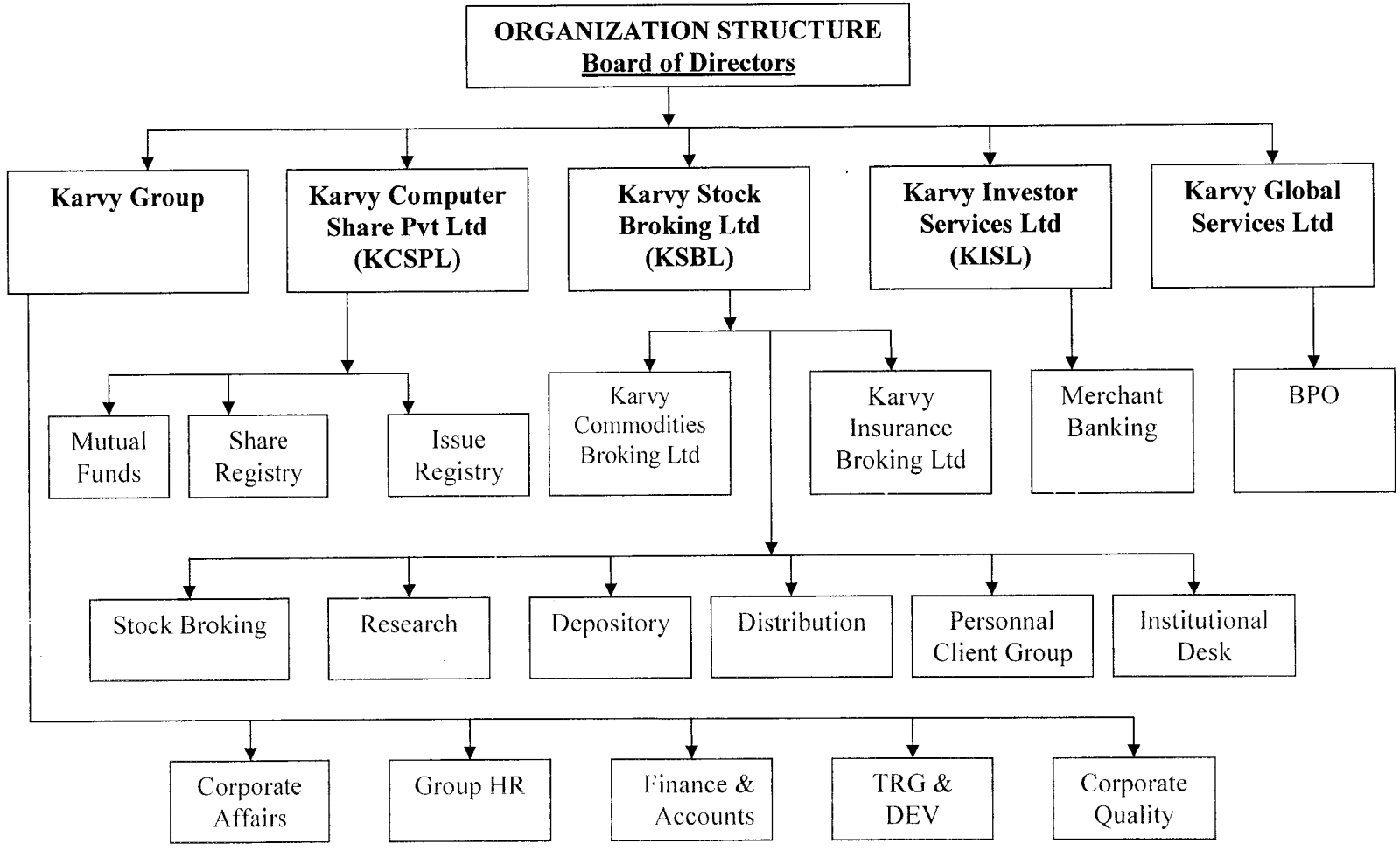
S Gopichand

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

**Intrinsic Value + Time Value = 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:

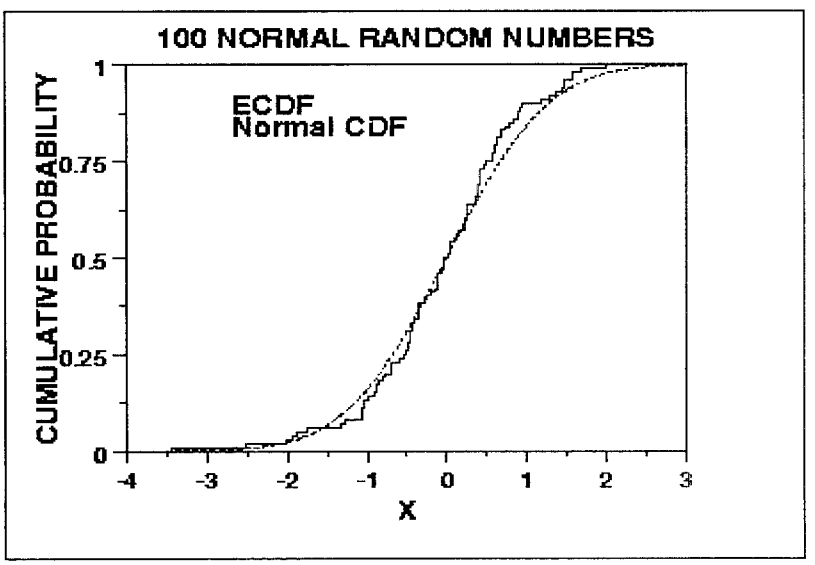



Fig 3.2.1 Comparison between Normal CDF and ECDF

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:

$H_o$ : 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

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

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 he 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.

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

Where,

$\sigma$ = Standard Deviation

$\prod$ = Constant = 3.1415

e = Exponential function = 2.7183

X = Variable

$\mu$ = Mean

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

$$D_n = Max|F_e - F_0|$$

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 Dn 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 $(t-1)^{th}$ 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,

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

In other words, the annualized volatility is estimated to betimes 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. Foe 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,

$$Z(d_1) = \frac{e^{-\frac{d^2_1}{2}}}{\sqrt{2\Pi}}$$

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 $D_n =$ $Max/F_e-F_0/$ |
|---|---|---|---|---|---|---|
| 1-Apr-04 | 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 | |
| 3-May-04 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | 0.166925 | 0.1669247 |
| 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 | |
| 1-Jun-04 | 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 | |
| 1-Jul-04 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 2-Aug-04 | 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 | |
| 1-Sep-04 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Oct-04 | 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 | |
| 1-Nov-04 | 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 | |

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|---|---|---|---|---|---|---|
| 10-Nov-04 | 406.6942 | 1.00806 | 0.00802 | 0.001962 | 0.006062 | |
| 11-Nov-04 | 407.8523 | 1.00285 | 0.00284 | 0.001847 | 0.000997 | |
| 12-Nov-04 | 407.5908 | 0.99936 | -0.00064 | 0.001737 | 0.002378 | |
| 16-Nov-04 | 407.0678 | 0.99872 | -0.00128 | 0.001631 | 0.002915 | |
| 17-Nov-04 | 406.246 | 0.99798 | -0.00202 | 0.001531 | 0.003552 | |
| 18-Nov-04 | 407.7402 | 1.00368 | 0.00367 | 0.001435 | 0.002236 | |
| 19-Nov-04 | 393.9932 | 0.96628 | -0.03430 | 0.001344 | 0.035641 | |
| 22-Nov-04 | 397.8782 | 1.00986 | 0.00981 | 0.001258 | 0.008554 | |
| 23-Nov-04 | 394.703 | 0.99202 | -0.00801 | 0.001176 | 0.009188 | |
| 24-Nov-04 | 384.8784 | 0.97511 | -0.02521 | 0.001098 | 0.026304 | |
| 25-Nov-04 | 376.0624 | 0.97709 | -0.02317 | 0.001024 | 0.024197 | |
| 29-Nov-04 | 380.8813 | 1.01281 | 0.01273 | 0.000955 | 0.011778 | |
| 30-Nov-04 | 386.2979 | 1.01422 | 0.01412 | 0.000889 | 0.013232 | |
| 1-Dec-04 | 394.1053 | 1.02021 | 0.02001 | 0.000827 | 0.019183 | |
| 2-Dec-04 | 404.9385 | 1.02749 | 0.02712 | 0.000768 | 0.026349 | |
| 3-Dec-04 | 406.2086 | 1.00314 | 0.00313 | 0.000713 | 0.002419 | |
| 6-Dec-04 | 396.6828 | 0.97655 | -0.02373 | 0.000661 | 0.024391 | |
| 7-Dec-04 | 386.2979 | 0.97382 | -0.02653 | 0.000613 | 0.027141 | |
| 8-Dec-04 | 379.387 | 0.98211 | -0.01805 | 0.000567 | 0.018619 | |
| 9-Dec-04 | 382.6744 | 1.00866 | 0.00863 | 0.000524 | 0.008103 | |
| 10-Dec-04 | 372.9618 | 0.97462 | -0.02571 | 0.000484 | 0.026192 | |
| 13-Dec-04 | 375.3152 | 1.00631 | 0.00629 | 0.000447 | 0.005844 | |
| 14-Dec-04 | 377.8928 | 1.00687 | 0.00684 | 0.000412 | 0.006432 | |
| 15-Dec-04 | 369.8986 | 0.97885 | -0.02138 | 0.000379 | 0.021761 | |
| 16-Dec-04 | 366.9101 | 0.99192 | -0.00811 | 0.000349 | 0.008461 | |
| 17-Dec-04 | 359.028 | 0.97852 | -0.02172 | 0.000321 | 0.022037 | |
| 20-Dec-04 | 359.1028 | 1.00021 | 0.00021 | 0.000294 | 0.000086 | |
| 21-Dec-04 | 362.3527 | 1.00905 | 0.00901 | 0.000270 | 0.008740 | |
| 22-Dec-04 | 369.8613 | 1.02072 | 0.02051 | 0.000247 | 0.020263 | |
| 23-Dec-04 | 378.2664 | 1.02272 | 0.02247 | 0.000226 | 0.022244 | |
| 24-Dec-04 | 391.0421 | 1.03377 | 0.03322 | 0.000207 | 0.033010 | |
| 27-Dec-04 | 386.2232 | 0.98768 | -0.01240 | 0.000189 | 0.012589 | |
| 28-Dec-04 | 394.1426 | 1.02050 | 0.02030 | 0.000173 | 0.020125 | |
| 29-Dec-04 | 397.0938 | 1.00749 | 0.00746 | 0.000157 | 0.007302 | |
| 30-Dec-04 | 390.818 | 0.98420 | -0.01593 | 0.000143 | 0.016074 | |
| 31-Dec-04 | 398.7374 | 1.02026 | 0.02006 | 0.000130 | 0.019931 | |
| MEAN | 370.8321 | | | | | |
| STDEV | 33.5746 | | | | | |

$H_0$ :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*** ($\alpha$) = 0.01

***Sample size*** ($n$) = 192

***Test statistics:*** $D_n = Max|F_e - F_0|$

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 $D_n =$ $Max/F_e - F_0/$ |
|---|---|---|---|---|---|---|
| 3-Jan-05 | 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 | |
| 1-Feb-05 | 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 | |

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|---|---|---|---|---|---|---|
| 1-Mar-05 | 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 | |
| 1-Apr-05 | 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 | |
| 2-May-05 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Jun-05 | 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 | |
| 1-Jul-05 | 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 | 0.05413 | 0.054134 |
| 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 | |
| 1-Aug-05 | 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 | |
| 1-Sep-05 | 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 | |

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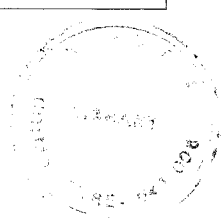

| | | | | | | |
|---|---|---|---|---|---|---|
| 23-Sep-05 | 558.658 | 0.9911 | -0.0089 | 1.7268E-03 | 0.01065 | |
| 26-Sep-05 | 582.940 | 1.0435 | 0.0425 | 1.6696E-03 | 0.04088 | |
| 27-Sep-05 | 588.730 | 1.0099 | 0.0099 | 1.6133E-03 | 0.00827 | |
| 28-Sep-05 | 598.031 | 1.0158 | 0.0157 | 1.5581E-03 | 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 | |
| 3-Oct-05 | 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 | |
| 1-Nov-05 | 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 | |
| 1-Dec-05 | 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 | |
| MEAN | **490.594** | | | | | |
| STDEV | **88.390** | | | | | |

$H_0$ : 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:*** $D_n = Max|F_e - F_0|$

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 $D_n$ = $Max/F_e - F_0/$ |
|---|---|---|---|---|---|---|
| 2-Jan-06 | 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 | |
| 1-Feb-06 | 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 | |

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|---|---|---|---|---|---|---|
| 28-Feb-06 | 708.850 | 1.01250 | 0.01242 | 2.204E-04 | 0.01220 | |
| 1-Mar-06 | 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 | |
| 3-Apr-06 | 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 | -0.02283 | 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 | |
| 2-May-06 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Jun-06 | 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 | 0.10929 | 0.109291 |
| 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 | |
| 3-Jul-06 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Aug-06 | 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 | |
| 1-Sep-06 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 3-Oct-06 | 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 | |
| 1-Nov-06 | 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 | |

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|---|---|---|---|---|---|---|
| 1-Dec-06 | 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 | |
| MEAN | 999.631 | | | | | |
| STDEV | 197.662 | | | | | |

$H_0$ : 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:*** $D_n = Max|F_e - F_0|$

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(PR) $F_0$ | Expected Normal Distribution $F_e$ | Absolute Deviation / $F_0 - F_e$/ | K-S statistics $D_n$ = Max/$F_e$-$F_0$/ |
|---|---|---|---|---|---|---|
| 2-Jan-07 | 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 | |
| 1-Feb-07 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Mar-07 | 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 | |
| 2-Apr-07 | 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 | |
| 3-May-07 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Jun-07 | 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 | |
| 2-Jul-07 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Aug-07 | 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 | |
| 3-Sep-07 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Oct-07 | 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 | 0.07568 | 0.075679 |
| 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 | |
| 1-Nov-07 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 3-Dec-07 | 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 | |
| MEAN | 1900.71 | | | | | |
| STDEV | 532.75 | | | | | |

$H_0$ :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*** $(\alpha) = 0.01$

***Sample size*** $(n) = 249$

***Test statistics***: $D_n = Max|F_e - F_0|$

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/ |
|---|---|---|---|---|---|---|
| 1-Jan-08 | 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 | 0.09749 | 0.09749 |
| 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 | |
| 1-Feb-08 | 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 | |
| 3-Mar-08 | 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 | |
| MEAN | 2560.49 | | | | | |
| STDEV | 285.13 | | | | | |

$H_0$ : 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*** $(\alpha) = 0.01$

***Sample size*** $(n) = 62$

***Test statistics:*** $D_n = Max|F_e - F_0|$

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 $D_n =$ $Max/F_e-F_0/$ |
|---|---|---|---|---|---|---|
| 1-Apr-04 | 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 | |
| 3-May-04 | 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 | 0.11288 | 0.11288 |
| 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 | |
| 1-Jun-04 | 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 | |
| 1-Jul-04 | 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 | |
| 2-Aug-04 | 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 | |
| 1-Sep-04 | 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 | |
| 1-Oct-04 | 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 | |
| 1-Nov-04 | 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 | |
| MEAN | 289.47 | | | | | |
| STDEV | 35.44 | | | | | |

$H_0$ :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*** ($\alpha$) = 0.01

***Sample size*** ($n$) = 192

***Test statistics:*** $D_n = Max|F_e - F_0|$

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 $D_n =$ $Max/F_e-F_0/$ |
|---|---|---|---|---|---|---|
| 3-Jan-05 | 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 | |
| 1-Feb-05 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Mar-05 | 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 | |
| 1-Apr-05 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Jun-05 | 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 | |

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|---|---|---|---|---|---|---|
| 1-Jul-05 | 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 | 0.07649 | 0.07649 |
| 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 | |
| 1-Aug-05 | 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 | |
| 1-Sep-05 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 3-Oct-05 | 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 | |
| 1-Nov-05 | 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 | |

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|---|---|---|---|---|---|---|
| 10-Nov-05 | 503.65 | 0.99634 | -0.00367 | 5.535E-04 | 0.00422 | |
| 11-Nov-05 | 515.10 | 1.02273 | 0.02248 | 5.256E-04 | 0.02195 | |
| 14-Nov-05 | 526.90 | 1.02291 | 0.02265 | 4.989E-04 | 0.02215 | |
| 16-Nov-05 | 533.10 | 1.01177 | 0.01170 | 4.732E-04 | 0.01123 | |
| 17-Nov-05 | 545.40 | 1.02307 | 0.02281 | 4.485E-04 | 0.02236 | |
| 18-Nov-05 | 538.65 | 0.98762 | -0.01245 | 4.250E-04 | 0.01288 | |
| 21-Nov-05 | 522.40 | 0.96983 | -0.03063 | 4.024E-04 | 0.03103 | |
| 22-Nov-05 | 519.95 | 0.99531 | -0.00470 | 3.808E-04 | 0.00508 | |
| 23-Nov-05 | 527.90 | 1.01529 | 0.01517 | 3.601E-04 | 0.01481 | |
| 24-Nov-05 | 538.85 | 1.02074 | 0.02053 | 3.404E-04 | 0.02019 | |
| 25-Nov-05 | 544.70 | 1.01086 | 0.01080 | 3.215E-04 | 0.01048 | |
| 26-Nov-05 | 540.65 | 0.99256 | -0.00746 | 3.036E-04 | 0.00777 | |
| 28-Nov-05 | 539.00 | 0.99695 | -0.00306 | 2.864E-04 | 0.00334 | |
| 29-Nov-05 | 536.90 | 0.99610 | -0.00390 | 2.701E-04 | 0.00417 | |
| 30-Nov-05 | 538.05 | 1.00214 | 0.00214 | 2.546E-04 | 0.00189 | |
| 1-Dec-05 | 540.55 | 1.00465 | 0.00464 | 2.398E-04 | 0.00440 | |
| 2-Dec-05 | 544.20 | 1.00675 | 0.00673 | 2.257E-04 | 0.00650 | |
| 5-Dec-05 | 532.75 | 0.97896 | -0.02126 | 2.124E-04 | 0.02148 | |
| 6-Dec-05 | 529.90 | 0.99465 | -0.00536 | 1.997E-04 | 0.00556 | |
| 7-Dec-05 | 542.45 | 1.02368 | 0.02341 | 1.877E-04 | 0.02322 | |
| 8-Dec-05 | 540.20 | 0.99585 | -0.00416 | 1.762E-04 | 0.00433 | |
| 9-Dec-05 | 549.30 | 1.01685 | 0.01671 | 1.654E-04 | 0.01654 | |
| 12-Dec-05 | 561.65 | 1.02248 | 0.02223 | 1.552E-04 | 0.02208 | |
| 13-Dec-05 | 562.40 | 1.00134 | 0.00133 | 1.455E-04 | 0.00119 | |
| 14-Dec-05 | 571.60 | 1.01636 | 0.01623 | 1.363E-04 | 0.01609 | |
| 15-Dec-05 | 562.45 | 0.98399 | -0.01614 | 1.277E-04 | 0.01626 | |
| 16-Dec-05 | 586.55 | 1.04285 | 0.04196 | 1.195E-04 | 0.04184 | |
| 19-Dec-05 | 584.85 | 0.99710 | -0.00290 | 1.118E-04 | 0.00301 | |
| 20-Dec-05 | 575.05 | 0.98324 | -0.01690 | 1.045E-04 | 0.01700 | |
| 21-Dec-05 | 575.10 | 1.00009 | 0.00009 | 9.762E-05 | 0.00001 | |
| 22-Dec-05 | 573.55 | 0.99730 | -0.00270 | 9.116E-05 | 0.00279 | |
| 23-Dec-05 | 581.05 | 1.01308 | 0.01299 | 8.507E-05 | 0.01291 | |
| 26-Dec-05 | 559.55 | 0.96300 | -0.03770 | 7.934E-05 | 0.03778 | |
| 27-Dec-05 | 578.20 | 1.03333 | 0.03279 | 7.395E-05 | 0.03271 | |
| 28-Dec-05 | 576.45 | 0.99697 | -0.00303 | 6.889E-05 | 0.00310 | |
| 29-Dec-05 | 573.85 | 0.99549 | -0.00452 | 6.414E-05 | 0.00458 | |
| 30-Dec-05 | 585.05 | 1.01952 | 0.01933 | 5.969E-05 | 0.01927 | |
| MEAN | 452.43 | | | | | |
| STDEV | 74.05 | | | | | |

$H_0$ :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:*** $D_n = Max|F_e - F_0|$

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 $D_n$ = $Max/F_e-F_0/$ |
|---|---|---|---|---|---|---|
| 2-Jan-06 | 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 | |
| 1-Feb-06 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 3-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 | |

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|---|---|---|---|---|---|---|
| 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 | |

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|---|---|---|---|---|---|---|
| 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 3-Oct-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 | |

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|---|---|---|---|---|---|---|
| 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 | 0.07007 | 0.07007 |
| 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 | 635.73 | | | | | |
| STDEV | 115.42 | | | | | |

$H_0$ :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*** $(\alpha) = 0.01$

***Test statistics:*** $D_n = Max|F_e - F_0|$

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 $D_n =$ $Max/F_e - F_0/$ |
|---|---|---|---|---|---|---|
| 2-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 | |
| 1-Feb-07 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 2-Apr-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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Jun-07 | 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 | |
| 2-Jul-07 | 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 | |

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|---|---|---|---|---|---|---|
| 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 | |
| 1-Aug-07 | 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 | |
| 3-Sep-07 | 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 | |
| 1-Oct-07 | 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 | |
| 1-Nov-07 | 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 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12-Nov-07 | 1145.35 | 1.00079 | 0.00079 | 2.830E-04 | 0.00050 | |
| 13-Nov-07 | 1173.70 | 1.02475 | 0.02445 | 2.681E-04 | 0.02418 | |
| 14-Nov-07 | 1278.55 | 1.08933 | 0.08557 | 2.540E-04 | 0.08531 | |
| 15-Nov-07 | 1241.65 | 0.97114 | -0.02929 | 2.404E-04 | 0.02953 | |
| 16-Nov-07 | 1220.05 | 0.98260 | -0.01755 | 2.274E-04 | 0.01778 | |
| 19-Nov-07 | 1187.70 | 0.97348 | -0.02687 | 2.150E-04 | 0.02709 | |
| 20-Nov-07 | 1160.45 | 0.97706 | -0.02321 | 2.031E-04 | 0.02341 | |
| 21-Nov-07 | 1106.45 | 0.95347 | -0.04765 | 1.918E-04 | 0.04784 | |
| 22-Nov-07 | 1145.35 | 1.03516 | 0.03455 | 1.810E-04 | 0.03437 | |
| 23-Nov-07 | 1139.40 | 0.99481 | -0.00521 | 1.707E-04 | 0.00538 | |
| 26-Nov-07 | 1156.80 | 1.01527 | 0.01516 | 1.610E-04 | 0.01499 | |
| 27-Nov-07 | 1132.30 | 0.97882 | -0.02141 | 1.516E-04 | 0.02156 | |
| 28-Nov-07 | 1122.90 | 0.99170 | -0.00834 | 1.428E-04 | 0.00848 | |
| 29-Nov-07 | 1161.75 | 1.03460 | 0.03401 | 1.343E-04 | 0.03388 | |
| 30-Nov-07 | 1178.40 | 1.01433 | 0.01423 | 1.263E-04 | 0.01410 | |
| 3-Dec-07 | 1162.00 | 0.98608 | -0.01401 | 1.187E-04 | 0.01413 | |
| 4-Dec-07 | 1139.70 | 0.98081 | -0.01938 | 1.115E-04 | 0.01949 | |
| 5-Dec-07 | 1164.05 | 1.02137 | 0.02114 | 1.047E-04 | 0.02104 | |
| 6-Dec-07 | 1200.70 | 1.03148 | 0.03100 | 9.823E-05 | 0.03090 | |
| 7-Dec-07 | 1247.60 | 1.03906 | 0.03832 | 9.210E-05 | 0.03822 | |
| 10-Dec-07 | 1271.45 | 1.01912 | 0.01894 | 8.631E-05 | 0.01885 | |
| 11-Dec-07 | 1314.30 | 1.03370 | 0.03315 | 8.083E-05 | 0.03307 | |
| 12-Dec-07 | 1289.90 | 0.98143 | -0.01874 | 7.565E-05 | 0.01882 | |
| 13-Dec-07 | 1242.85 | 0.96352 | -0.03716 | 7.077E-05 | 0.03723 | |
| 14-Dec-07 | 1206.95 | 0.97111 | -0.02931 | 6.616E-05 | 0.02938 | |
| 17-Dec-07 | 1166.25 | 0.96628 | -0.03430 | 6.182E-05 | 0.03436 | |
| 18-Dec-07 | 1137.70 | 0.97552 | -0.02478 | 5.772E-05 | 0.02484 | |
| 19-Dec-07 | 1163.40 | 1.02259 | 0.02234 | 5.387E-05 | 0.02228 | |
| 20-Dec-07 | 1157.50 | 0.99493 | -0.00508 | 5.024E-05 | 0.00513 | |
| 24-Dec-07 | 1205.95 | 1.04186 | 0.04101 | 4.683E-05 | 0.04096 | |
| 26-Dec-07 | 1218.90 | 1.01074 | 0.01068 | 4.363E-05 | 0.01064 | |
| 27-Dec-07 | 1247.25 | 1.02326 | 0.02299 | 4.062E-05 | 0.02295 | |
| 28-Dec-07 | 1226.70 | 0.98352 | -0.01661 | 3.779E-05 | 0.01665 | |
| 31-Dec-07 | 1238.70 | 1.00978 | 0.00973 | 3.514E-05 | 0.00970 | |
| MEAN | 977.33 | | | | | |
| STDEV | 125.32 | | | | | |

$H_0$ :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:*** $D_n = Max|F_e - F_0|$

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 | |
| 1-Feb-08 | 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 | |
| 3-Mar-08 | 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 | 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 | |
| MEAN | 1112.15 | | | | | |
| STDEV | 179.91 | | | | | |

$H_0$ : 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*** $(\alpha) = 0.01$

***Sample size*** $(n) = 62$

***Test statistics:*** $D_n = Max|F_e - F_0|$

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 $D_{calulated}$ | 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 ($6^{th}$ Sep,2007) | ITC ($6^{th}$ Aug, 2007) | RANBAXY ($16^{th}$Mar,2007) | BHEL ($4^{th}$April,2007) | ACC ($16^{th}$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*** $(\Delta)$ *:* 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*** $(\gamma)$ **:** 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*** $(\theta)$ **:** 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*** $(\rho)$**:** 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*** $(\lambda)$**:** This value indicates that if volatility ($\sigma$) 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. 26$^{th}$ 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*** $(\Delta)$ *:* 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*** $(\gamma)$**:** 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*** $(\theta)$**:** 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*** $(\rho)$**:** 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*** $(\lambda)$**:** This value indicates that if volatility ($\sigma$) 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*** $(\Delta)$ **:** 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*** $(\gamma)$ **:** Gamma equals to 0.0048 implies that a unit change in stock price yields change in delta by 0.0048.

***Theta*** $(\theta)$ **:** 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 by Rs. 27.98.

***Rho*** $(\rho)$ **:** 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*** $(\lambda)$ **:** This value indicates that if volatility $(\sigma)$ 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*** $(\Delta)$ **:** The call value would be expected to rise by 50 paisa for every rise of Re. 1 in the stock price.

***Gamma*** $(\gamma)$ **:** Gamma equals to 0.0074 implies that a unit change in stock price yields change in delta by 0.0074.

***Theta*** $(\theta)$ **:** 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 by Rs. 69.95.

***Rho*** $(\rho)$ **:** 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*** $(\lambda)$ **:** This value indicates that if volatility ($\sigma$) 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*** $(\Delta)$ *:* The call value would be expected to rise by 33 paisa for every rise of Re. 1 in the stock price.

***Gamma*** $(\gamma)$ **:** Gamma equals to 0.0024 implies that a unit change in stock price yields change in delta by 0.0024.

***Theta*** $(\theta)$ **:** 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 by Rs. 143.43.

***Rho*** $(\rho)$ **:** 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*** $(\lambda)$ **:** This value indicates that if volatility ($\sigma$) 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*** **($\gamma$) :** Gamma equals to 0.0097 implies that a unit change in stock price yields change in delta by 0.0097.

***Theta*** **($\theta$) :** 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 by Rs. 52.95.

***Rho*** **($\rho$) :** 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*** **($\lambda$) :** This value indicates that if volatility ($\sigma$) 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*** **($\gamma$) :** 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*** $(\theta)$ **:** 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*** $(\rho)$ **:** 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*** $(\lambda)$ **:** This value indicates that if volatility ($\sigma$) 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*** $(\Delta)$ *:* The unit change in the stock price would cause the option price change by 62.17%.

***Gamma*** $(\gamma)$ **:** 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*** $(\theta)$ **:** 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*** $(\rho)$ **:** 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*** $(\lambda)$ **:** This value indicates that if volatility ($\sigma$) 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*** $(\Delta)$ **:** The call value would be expected to rise by 78 paisa for every rise of Re. 1 in the stock price.

***Gamma*** $(\gamma)$ **:** 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*** $(\theta)$ **:** 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*** $(\rho)$ **:** 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*** $(\lambda)$ **:** This value indicates that if volatility $(\sigma)$ 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*** $(\Delta)$ **:** The unit change in the stock price would cause the option price change by 65.54%.

***Gamma*** ($\gamma$) : Gamma equals to 0.008 implies that a unit change in stock price yields change in delta by 0.008.

***Theta*** ($\theta$) : 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*** ($\rho$) : 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*** ($\lambda$) : This value indicates that if volatility ($\sigma$) 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 that 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 afore mentioned 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) 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 scrip's, 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 ands 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

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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.**

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| 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

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## Sensex 30 Companies

Wednesday, February 27, 2008 BSE Index: 18052.27 ( -220.13 )

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

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

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